

REVISITING OF SEVEN OLD MEDICINAL PLANTS CONSERVATION AREAS (MPCAs) IN WEST BENGAL

FINAL TECHNICAL REPORT

Submitted to

The Principal Chief Conservator of Forests,
Research, Monitoring & Development
West Bengal Forest Department

Submitted by

The University of Trans-disciplinary Health Sciences and
Technology (TDU) – Foundation for Revitalisation of Local
Health Traditions (FRLHT), Bengaluru

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Butea monosperma var lutea

TABLE OF CONTENTS

Foreward	I
Acknowledgements	III
Table of Contents	VII
List of tables	X
List of figures	XIII
List of annexures	XVII
Executive Summary	XIX
Medicinal Plants Conservation Areas (MPCAs) - National and West Bengal perspective	1
Project objectives	9
Chapter 1: General information about seven MPCAs	
1.1. Introduction	10
1.2. Details of MPCAs	12
1.3. Disturbance levels	17
1.4. Current status of MPCAs	22
1.5. Research activities undertaken	32
Chapter 2: Spatial distribution of seven MPCAs	
2.1 Introduction	39
2.2 Methodology	39
2.3 MPCA-wise satellite map showing the boundaries	40
Chapter 3: Checklist of medicinal plants recorded in seven MPCAs	
3.1 Introduction	49
3.2 Methodology	49
3.3 Number of medicinal plants recorded across seven MPCAs	52
3.4 Comparative analysis of medicinal plants diversity	109
3.4.1 Family and genus diversity	109
3.4.2 Life-form diversity	109
3.4.3 Species distribution across MPCAs	110
3.4.4 Species similarity across MPCAs	112

3.5	Threatened medicinal plants across MPCAs	115
3.6	Non-native (exotic) plants recorded in MPCAs	120
3.7	Voucher specimens for digital herbarium	121
3.8	Conclusion	122
Chapter 4: Population status of medicinal plants in seven MPCAs		
4.1	Introduction	123
4.2	Materials and methods	126
4.2.1	Sampling methods	127
4.2.2	Data analysis	130
4.3	Results and discussion	132
4.3.1	Population of woody plant species (>30cm gbh size)	132
4.3.2	Population of plant species with ≤30 cm gbh size	143
4.3.3	Population of herbs, shrubs and plant seedlings	145
4.3.4	Species-area curve	147
4.3.5	Importance value index (IVI)	152
4.3.6	Girth class species richness, density and basal area	160
4.3.7	Structure of forest stand	163
4.3.8	Woody plant species dispersion patterns	163
4.3.9	Population structure of dominant woody plant species	163
4.4	Conclusion	169
Chapter 5: Community' understanding of medicinal plants and involvement in seven MPCAs		
5.1	Introduction	170
5.2	Materials and methods	171
5.2.1	Study approach	171
5.3	Results and discussion	175
5.3.1	Bonnie camp MPCA	176
5.3.2	Dhotrey MPCA	183
5.3.3	Garpanchkot MPCA	197
5.3.4	North Rajabhatkhawa MPCA	208
5.3.5	North Sevoke MPCA	215
5.3.6	Sursuti MPCA	220
5.3.7	Tonglu MPCA	226

5.4	Conclusion	242
Chapter 6: Population structure of threatened medicinal plants within MPCA		
6.1	Introduction	243
6.2	Threatened medicinal plants of West Bengal state	243
6.3	Population structure of threatened medicinal plants	244
6.4	Conclusion	252
Chapter 7: Community level training program on the conservation of medicinal plants		
7.1	Introduction	253
7.2	Methodology	254
7.3	Proceedings of training programs	255
7.4	Feedback and conclusion	260
Chapter 8: Conclusion and recommendations		
8.1	Conclusion	261
8.2	Recommendations	264
Annexures		271
Photo galary		

LIST OF TABLES

Table 1	Locations of seven MPCAs in West Bengal	5
Table 2	Details of seven MPCAs established in West Bengal	7
Table 3	Detailed profile of seven MPCAs established in West Bengal	12
Table 4	Assessment of disturbance levels in MPCA sites by scoring 15 factors	18
Table 5	Seven MPCA sites across disturbance categories	21
Table 6	An account of medicinal plants diversity documented in previous surveys at the time of establishment and current surveys in seven MPCAs	52
Table 7	Checklist of medicinal plant species that are recorded in seven MPCAs	53
Table 8	Presence of threatened medicinal plant species across seven MPCAs in West Bengal (* T – Traded; H – High traded (>100 MT/year))	118
Table 9	Summary of plant diversity inventory undertaken in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal	135
Table 10	Summary of plant species population density, basal area and diversity indices recorded in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal	141
Table 11	Girth class species richness of woody plant species in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal	161
Table 12	Girth class population density of woody plant species in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal	161
Table 13	Girth class basal area recorded for woody plant species in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal	162
Table 14	The occurrence rates of plant species (species richness/stem density) in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal	162
Table 15	List of villages and number of community members selected in each MPCA for the purpose of conducting community surveys	173
Table 16	Details of medicinal plants collected by villagers in the neighbourhood of Bonnie camp Medicinal Plants Conservation Area (MPCA)	179

Table 17a	Details of medicinal plants collected by Dhotrey villagers in the neighbourhood of Dhotrey Medicinal Plants Conservation Area (MPCA)	188
Table 17b	Details of medicinal plants collected by Sellempong villagers in the neighbourhood of Dhotrey Medicinal Plants Conservation Area (MPCA)	191
Table 17c	Details of medicinal plants collected by Chotahatta villagers in the neighbourhood of Dhotrey Medicinal Plants Conservation Area (MPCA)	194
Table 18	Details of medicinal plants collected by villagers in the neighbourhood of Garpanchkot Medicinal Plants Conservation Area (MPCA)	203
Table 19	Details of medicinal plants collected by villagers in the neighbourhood of North Rajabhatkhawa Medicinal Plants Conservation Area (MPCA)	212
Table 20	Details of medicinal plants collected by villagers in the neighbourhood of North Sevoke Medicinal Plants Conservation Area (MPCA)	218
Table 21	Details of medicinal plants collected by villagers in the neighbourhood of Sursuti Medicinal Plants Conservation Area (MPCA)	223
Table 22a	Details of medicinal plants collected by Tonglu villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)	232
Table 22b	Details of medicinal plants collected by Dilpa villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)	234
Table 22c	Details of medicinal plants collected by Tumling villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)	237
Table 22d	Details of medicinal plants collected by Magma villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)	239
Table 23	List of threatened medicinal plant species recorded in 20m x 20m quadrats with >30 cm gbh, in 5m x 5m quadrats with ≤30cm gbh and in 1m x 1m sub quadrats as shrubs, herbs and seedlings across seven MPCAs in West Bengal	245
Table 24	Summary of population status of threatened medicinal plants with >30 cm gbh recorded in 20m x 20m quadrats across seven Medicinal	247

Plants Conservation Areas (MPCAs), West Bengal

Table 25	Summary of population status of threatened medicinal plants with ≤ 30 cm gbh recorded in 5m x 5m quadrats across seven Medicinal Plants Conservation Areas (MPCAs), West Bengal	249
Table 26	Summary of population status of threatened medicinal shrubs, herbs and seedlings recorded in 1m x 1m quadrats across seven Medicinal Plants Conservation Areas (MPCAs), West Bengal	250
Table 27	Summary of proposed medicinal plants and MPCA related activities for West Bengal state under various components given in the central sector scheme on Conservation, Development and Sustainable Management of Medicinal Plants called by the National Medicinal Plants Board (NMPB), Govt. of India	268

LIST OF FIGURES

Figure 1	States having Medicinal Plants Conservation Areas (MPCAs)	2
Figure 2	Map locations for MPCAs in West Bengal	6
Figure 3	Locations of seven MPCAs depicted in the state map of West Bengal	41
Figure 4	Spatial distribution map of Bonnie camp MPCA	42
Figure 5	Spatial distribution map of Dhotrey MPCA	43
Figure 6	Spatial distribution map of Garpanchkot MPCA	44
Figure 7	Spatial distribution map of North Rajabhatkhawa MPCA	45
Figure 8	Spatial distribution map of North Sevoke MPCA	46
Figure 9	Spatial distribution map of Sursuti MPCA	47
Figure 10	Spatial distribution map of Tonglu MPCA	48
Figure 11	Families recorded with more than 20 medicinal plant species in all seven MPCAs in West Bengal	109
Figure 12	An account of number of medicinal plant species across life-form categories	110
Figure 13	An account of MPCA-wise number of medicinal plant species across life-form categories	111
Figure 14	Distribution of medicinal plant species across seven MPCAs	112
Figure 15	Number of medicinal plant species that are unique to each MPCA	112
Figure 16	An account of number of species shared between seven MPCAs	114
Figure 17	Cluster dendrogram to reveal species similarity across seven MPCA sites	115
Figure 18	Number of medicinal plant species belonging to different threatened status categories recorded in seven MPCAs in West Bengal	116
Figure 19	Number of threatened medicinal plant species across different life-form categories recorded in seven MPCAs in West Bengal	116
Figure 20	Number of traded medicinal plant species across different threatened status categories recorded in seven MPCAs in West Bengal	117
Figure 21	Number of traded medicinal plant species across different threatened status categories recorded in seven MPCAs in West Bengal	117

Figure 22	Number of non-native (exotic) medicinal plant species recorded in seven MPCAs in West Bengal (N = 55)	120
Figure 23	Details of places of origin for non-native medicinal plant species recorded in seven MPCAs in West Bengal (N = 55)	121
Figure 24	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Bonnie camp MPCA	149
Figure 25	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Dhotrey MPCA	149
Figure 26	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Garpanchkot MPCA	150
Figure 27	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in North Rajabhatkhawa MPCA	150
Figure 28	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in North Sevoke MPCA	151
Figure 29	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Sursuti MPCA	151
Figure 30	Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Tonglu MPCA	152
Figure 31	Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in Bonnie camp MPCA. Frequency and density are given above bar graph	153
Figure 32	Importance value index (IVI) of top ten woody plant species with >30cm gbh and plants with ≤30cm gbh enumerated in Dhotrey MPCA. Frequency and density are given above bar graph	154
Figure 33	Importance value index (IVI) of top ten woody plant species with >30cm gbh and plants with ≤30cm gbh enumerated in Garpanchkot MPCA. Frequency and density are given above bar graph	155
Figure 34	Importance value index (IVI) of top ten woody plant species with >30cm gbh and plants with ≤30cm gbh enumerated in North Rajabhatkhawa MPCA. Frequency and density given above bar graph	156

Figure 35	Importance value index (IVI) of top ten woody plant species with >30cm gbh and plants with ≤30cm gbh enumerated in North Sevoke MPCA. Frequency and density are given above bar graph	157
Figure 36	Importance value index (IVI) of top ten woody plant species with >30cm gbh and plants with ≤30cm gbh enumerated in Sursuti MPCA. Frequency and density are given above bar graph	158
Figure 37	Importance value index (IVI) of top ten woody plant species with >30cm gbh and plants with ≤30cm gbh enumerated in Tonglu MPCA. Frequency and density are given above bar graph	159
Figure 38	Forest stand structure based on woody plants density recorded in the seven MPCAs in West Bengal	165
Figure 39	Forest stand structure based on woody plants basal area calculated in the seven MPCAs in West Bengal	167
Figure 40	Questionnaire format used during community surveys	174
Figure 41	Responses to questions asked in the questionnaire survey conducted among community members of Ambika nagar village near Bonnie camp MPCA	177
Figure 42	Responses to questions asked in the questionnaire survey conducted among community members of Prubashridharpur village near Bonnie camp MPCA	178
Figure 43	Responses to questions asked in the questionnaire survey conducted among community members of Dhotrey village near Dhotrey MPCA	185
Figure 44	Responses to questions asked in the questionnaire survey conducted among community members of Sellempong village near Dhotrey MPCA	186
Figure 45	Responses to questions asked in the questionnaire survey conducted among community members of Chotahatta village near Dhotrey MPCA	187
Figure 46	Responses to questions asked in the questionnaire survey conducted among community members of Bagmara village near Garpanchkot MPCA	200
Figure 47	Responses to questions asked in the questionnaire survey conducted among community members of Rampur village near Garpanchkot MPCA	201
Figure 48	Responses to questions asked in the questionnaire survey conducted among community members of Shiulibari village near Garpanchkot MPCA	202

Figure 49	Responses to questions asked in the questionnaire survey conducted among community members of Buxa 28 village near North Rajabhatkhawa MPCA	210
Figure 50	Responses to questions asked in the questionnaire survey conducted among community members of Buxa 29 village near North Rajabhatkhawa MPCA	211
Figure 51	Responses to questions asked in the questionnaire survey conducted among community members of 10 th mile village near North Sevoke MPCA	217
Figure 52	Responses to questions asked in the questionnaire survey conducted among community members of Bamni village near Sursuti MPCA	221
Figure 53	Responses to questions asked in the questionnaire survey conducted among community members of Borodighi village near Sursuti MPCA	222
Figure 54	Responses to questions asked in the questionnaire survey conducted among community members of Dilpa village near Tonglu MPCA	228
Figure 55	Responses to questions asked in the questionnaire survey conducted among community members of Tonglu village near Tonglu MPCA	229
Figure 56	Responses to questions asked in the questionnaire survey conducted among community members of Magma village near Tonglu MPCA	230
Figure 57	Responses to questions asked in the questionnaire survey conducted among community members of Tumling village near Tonglu MPCA	231

LIST OF ANNEXURES

- Annexure 1 Details of 108 Medicinal Plants Conservation Areas (MPCAs) established across 13 states of India
- Annexure 2 Details of disturbance parameters used for assessing the MPCA sites by scoring method
- Annexure 3 Details of medicinal plant species collected and recorded from Bonnie camp MPCA, Sundarbans National Park, West Bengal
- Annexure 4 Details of medicinal plant species collected and recorded from Dhotrey MPCA, Darjeeling district, West Bengal
- Annexure 5 Details of medicinal plant species collected and recorded from Garpanchkot MPCA, Purulia district, West Bengal
- Annexure 6 Details of medicinal plant species collected and recorded from North Rajabhatkhawa MPCA, Buxa tiger reserve, Jalpaiguri district, West Bengal
- Annexure 7 Details of medicinal plant species collected and recorded from North Sevoke MPCA, Darjeeling district, West Bengal
- Annexure 8 Details of medicinal plant species collected and recorded from Sursuti MPCA, Jalpaiguri district, West Bengal
- Annexure 9 Details of medicinal plant species collected and recorded from Tonglu MPCA, Singalila National Park, Darjeeling district, West Bengal
- Annexure 10 List of families and number of medicinal plant species recorded in seven MPCAs
- Annexure 11 Details of families and number of medicinal plant species across life-form categories
- Annexure 12 Details of disturbance parameters used for assessing the MPCA sites by scoring method
- Annexure 13 Details of non-native (exotic) medicinal plants recorded in MPCAs
- Annexure 14 Details of medicinal plant voucher specimens that are prepared for digital herbarium
- Annexure 15 List of woody plant species (>30 cm) enumerated in the sampling quadrats of 20m x 20m size in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal
- Annexure 16 List of plant species with ≤ 30 cm plant size enumerated in the sampling of 5m x 5m size placed within 20m x 20m quadrats

seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

- Annexure 17 List of herbs, shrubs and plant seedlings enumerated in the sampling of 1m x 1m size placed in four corners of 20m x 20m quadrats seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal
- Annexure 18 List and details of respondents, who participated in the community survey, from villages neighbouring seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal
- Annexure 19 Operational guidelines for Central Sector Schemes on Conservation, Development and Sustainable Management of Medicinal Plants released by the National Medicinal Plants Board (NMPB), Govt. of India.

EXECUTIVE SUMMARY

The State Forest Department of West Bengal has established seven Medicinal Plants Conservation Areas (MPCAs) across the state in the year between 2007 and 2009 identifying natural habitats that are relatively undisturbed forest areas hosting rich diversity of medicinal plants, and maintained as in-situ conservation sites to conserve and protect the medicinal plant resources covering different forest types in the state. At the time of establishment of MPCAs, a checklist of medicinal plants for each MPCA was prepared. Overall, there were 891 medicinal plant species recorded. This is around 32% of total medicinal plant diversity of the West Bengal state (2800 species). Out of 891 species, 241 were trees, while 232 and 410 species were shrubs and herbs respectively. MPCA-wise medicinal plant species recorded were 30, 154, 206, 249, 209, 216 and 254 respectively in Bonnie camp, Dhotrey, Garpanchkot, North Rajabhatkhawa, North Sevoke, Sursuti and Tonglu.

Considering the importance of the maintenance of MPCAs, the West Bengal Forest Department sanctioned this project to revisit the seven MPCAs and evaluate the current status in terms of understanding the coverage of medicinal plants especially threatened plants within MPCA areas, and also estimating the population of plants across plant types viz. trees and climbers/lianas (adults, sapling, seedlings), shrubs and herbs. The outcomes of this project would provide information to plan better resource management and strategies at state level. The knowledge and data gathered from the questionnaire surveys followed by training and capacity building programs conducted among community members under this project would reveal the extent of community's understanding on medicinal plants conservation and sustainable use. This would give us scope to explore multiple opportunities to involve local community members in the institutional set up for conservation interventions related to conservation and sustainable use.

As a first step in this project, the detailed profile of seven MPCAs was prepared with the secondary information collated from various document sources to understand the nature and characteristics of MPCA sites selected in West Bengal. Site disturbance levels for seven MPCAs were assessed by scoring 15 factors and sites were grouped into three disturbance categories. Of the seven MPCAs, Bonnie camp is the only 'least disturbed' site (score less than 18), whereas a moderate level of disturbance (score 18–36) is operative in the remaining MPCAs (Table 5). None of the MPCAs are categorised under 'highly disturbed' category (score >36), as all of them are located inside the Protected Areas (PAs). Based on the field

observations, the current status of seven MPCAs was described covering following aspects: entrance structure, boundary information, disturbance level, communication and interpretation utilities, trekking paths, departmental interventions, and presence of important medicinal plants.

Systematic mapping of MPCA landscapes with a help of satellite images provide insights on the areas or locations where the protection is needed, and how efficiently and effectively it could be undertaken. An innovative application of using open-source GIS (Q GIS ver. 2.8.2) software technology was used for mapping the seven MPCA landscapes in the state. The mapping process was carried out with latitude and longitude coordinates collected along the boundary of MPCAs to develop the spatial distribution maps for each MPCA.

In the next step, the qualitative assessment was attempted to reinventorise and document the medicinal plant diversity across seven MPCAs through conducting seasonal vegetation surveys. The qualified and experienced botanists conducted the botanical surveys in all seven MPCAs and collected medicinal plant samples in reproductive stages for herbarium specimen with appropriate field number and notes. This exercise was repeated in all the seasons to familiarise with the vegetation in different phenological stages and also to record the existence of even ephemerals. The botanical surveys conducted under this study yielded a total of 1270 medicinal plant species that are wild and naturalized to seven MPCA sites (Table 6). The current study captured 45.3% of state medicinal plants diversity with 379 species newly recorded across seven MPCA sites. This amounts to be a 42.5 percent increase in the species diversity.

Assessment	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa
2008-2009	30	154	206	249
2019-2020	96	313	329	340
% increase	220%	103%	60%	36%

Assessment	North Sevoke	Sursuti	Tonglu	Total
2008-2009	209	216	254	891
2019-2020	343	387	304	1270
% increase	64%	79%	20%	42.5%

Medicinal plant species recorded in seven MPCAs belonged to 167 families. Species-rich families were Fabaceae (82 species), Asteraceae (64 species), Rubiaceae (58 species), Poaceae (53 species) and Orchidaceae (50 species). Out of 167 families, there were 130 families (78%) represented by less than 10 medicinal plant species, while 50 families had single species representation. The analysis of plant life-forms revealed that herbs are represented by 53% of species diversity, followed by trees (21%), shrubs (13%) and climbers (11%).

Assessment	Total	Trees	Climbers/lianas	Shrubs	Herbs
2008-2009	891*	241 (27%)	-	232 (26%)	410 (46%)
2019-2020	1270	267 (21%)	167 (13%)	170 (13%)	666 (52%)

* 8 species were unidentified

A total of 744 plant species (59%) was present only in any one MPCA. The number of unique species, i.e., species present only in that site, ranged between 230, 165 and 162 species respectively in Garpanchkot, Tonglu and Dhotrey MPCAs and 37 species each in North Rajabhatkhawa and North Sevoke MPCAs. The cluster dendrogram drawn using presence or absence data with similarity matrix revealed that North Sevoke and Sursuti are the closest MPCAs in terms of species sharing. Tonglu and Dhotrey MPCAs formed a separate cluster from other MPCA sites. There were 40 medicinal plant species having threatened status recorded in seven MPCAs. The number of medicinal plant species across different threatened status categories are: 14 Vulnerable; 19 Endangered; 1 Near Threatened; 6 Critically Endangered. Out of 40 threatened medicinal plants, 25 are under trade, while 16 are in high trade with volumes exceeding 100MT of dry weight per annum.

MPCA	No. of plants unique to MPCA	No. of threatened plants	No. of exotic plants
Bonnie camp	68 (71%)	4 (4%)	34 (35%)
Dhotrey	162 (52%)	5 (1.6%)	9 (3%)
Garpanchkot	230 (70%)	10 (3%)	40 (12%)
North Rajabhatkhawa	37 (11%)	17 (5%)	28 (8%)
North Sevoke	37 (11%)	16 (4.7%)	29 (8%)
Sursuti	48 (12%)	15 (3.9%)	35 (9%)
Tonglu	167 (55%)	9 (3%)	3 (1%)
Total	744 (59%)	40 (3%)	

Out of 1270 medicinal plant species recorded across seven MPCAs, there are 80 (6%) non-native (exotic) plants. Bonnie camp MPCA has highest proportion of non-native plants, while the percentage of exotic plants was less than 5 percent in Dhotrey and Tonglu MPCAs. There are around 42 places of origin from 21 continental regions. Out of 80 non-native species, 44 have tropical and sub-tropical American origin and the remaining species are largely from the tropical and sub-tropical old-world countries.

Threatened status	No. of species	Traded	High traded*
Critically Endangered	6	5	3
Endangered	19	10	8
Near Threatened	1	1	1
Vulnerable	14	9	4
Total	40	25	16

* Trading >100 MT of dry weight per year

As an interesting outcome of qualitative assessment, three angiospermic taxa, namely, *Ixora anthroantha* Bremek. (Rubiaceae), *Psychotria erratica* var. *pedunculata* Hook.f. (Rubiaceae) and *Peliosanthes violacea* var. *minor* Baker (Asparagaceae) have been collected from North Sevoke MPCA and later found to be a first record of occurrence for the state of West Bengal.

Ixora anthroantha Bremek - Bremekamp (1959) described *I. anthroantha* without fruits, and stated fruits not yet seen. However, during the present study, the plants were found in fruiting state, and hence the morphological features of fruits and seeds were provided.

Psychotria erratica var. *pedunculata* Hook.f. - In India, this variety was known to occur only in Sikkim. The present collection from North Sevoke MPCA showed its extended distribution in West Bengal. Thorough explorations in adjacent regions are necessary to quantify its population and the extend of occurrence of this species.

Peliosanthes violacea Wall. ex Baker var. *minor* Baker - According to Roy (2018), it is an endemic species confined to Assam (Cachar) and Meghalaya (Khasi hills). However, the present record of its occurrence from North Sevoke MPCA showed its extended distribution in West Bengal state. The intensive survey in the entire North Eastern region would reveal its exact range of distribution in India. This variety differs from other varieties in leaf size and number of longitudinal veins, slightly upward facing flowers and floral bract shorter than flowers.

The quantitative assessment of medicinal plants especially of conservation concern species was undertaken to quantify the population of medicinal plants through standardised sampling procedures and to assess the growth and structure of plant population in the seven MPCAs. Field works for ecological survey were carried out using nested quadrat method. In a single 20m x 20m quadrat, which is used for the enumeration of woody plants of above 30cm gbh, one 5m x 5m sub-quadrats within (nested quadrats) for shrubs or saplings (≤ 30 cm gbh size) and four 1m x 1m plots within the 5m x 5m sub-quadrats were laid for herbs or seedlings.

A total of 214 woody plant species (>30 cm gbh) belonging to 142 genera and 60 families were recorded in 169 quadrats of 20m x 20m size measuring 6.76 ha across seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal. Woody plant species richness was as low as 11 species per 0.8 ha in Bonnie camp MPCA to as high as 64 species per 1.96 ha in Garpanchkot MPCA and 63 species per 0.8 ha in North Sevoke MPCA through intermediate figures of 28, 32, 52 and 54 species per 0.8 ha in the other MPCAs Tonglu, Dhotrey, North Rajabhatkhawa and Sursuti respectively. There were a maximum of 1014 individuals of woody plants with >30 cm gbh size in Garpanchkot MPCA followed by 387, 360, 307, 254, 249 and 87 stems respectively in 0.8 ha quadrat areas in Tonglu, Dhotrey, North Rajabhatkhawa, Sursuti, North Sevoke and Bonnie camp.

A total of 189 plant species (≤ 30 cm gbh) belonging to 150 genera and 65 families were recorded in 169 quadrats of 5m x 5m quadrat placed in 20m x 20m size across seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal. Plant species richness was as low as 14 species per 0.8 ha in Bonnie camp MPCA to as high as 62 species per 1.96 ha in Garpanchkot MPCA and 40 species per 0.8 ha in North Sevoke MPCA through intermediate figures of 38, 34, 29 and 24 species per 0.8 ha in the other MPCAs North Rajabhatkhawa, Dhotrey, Sursuti and Tonglu respectively. Garpanchkot MPCA had 331 individuals of plant species with ≤ 30 cm gbh size enumerated in sampling area followed by Tonglu (186 stems), Bonnie camp (146 stems), Dhotrey (122 stems), North Sevoke (96 stems), North Rajabhatkhawa (87 stems) and Sursuti (79 stems).

The sampling of 1m x 1m sub-quadrats in the four corners of 20m x 20m quadrats yielded a total of 446 plant species belonging to 317 genera and 107 families across seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal. Overall, it was 35 percent of medicinal plant species check listed across seven MPCAs. Species richness was 21, 91, 97, 108, 136, 94, 73 respectively for the MPCA sites Bonnie camp, Dhotrey, Garpanchkot, North

Rajabhatkhawa, North Sevoke, Sursuti and Tonglu. The maximum number of plants were enumerated in Tonglu MPCA (4127 individuals) followed by Garpanchkot (2375), North Rajabhatkhawa (1872), Bonnie camp (1805), North Sevoke (1555), Dhotrey (1120) and Sursuti (806).

Species-area curves for plant species enumerated in non-contiguous 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats were drawn for all seven MPCAs. In Bonnie camp and Tonglu MPCAs, species curve reached an asymptote in all three plant types indicating adequate sampling effort. However, in other MPCAs, species curve did not stabilise with the current sampling efforts. The non-stabilizing species-area curves apparently indicate that the area sampled was not sufficient. In that case, the richness estimator values (ICE) were examined for projected species richness. If species area curves attained the asymptote, then the richness estimators would indicate that increase in sampling efforts would not add substantial increase to number of species observed.

Tree species richness and abundance decreased with increasing girth class except for the largest size class (>100 cm) in all seven MPCAs. The lower girth classes (31-40, 41-50 cm) contributed large proportion of woody plant species richness in the following MPCAs: Bonnie camp, Garpanchkot, North Rajabhatkhawa and Sursuti. The contribution of basal area of woody plant species in higher girth class (>100 cm) to the total stand basal area was 95 percent in Dhotrey, 86 percent in North Sevoke, 80 percent in Sursuti, 84 percent in North Rajabhatkhawa and 44 percent in Tonglu. The structure of forest stand based on the density displayed a clear reverse J-shaped curve only in Bonnie camp and Garpanchkot MPCAs (Figure 38). In other MPCAs, structure varied across gbh classes as plant individuals had moderate representation in all gbh classes especially in Tonglu MPCA.

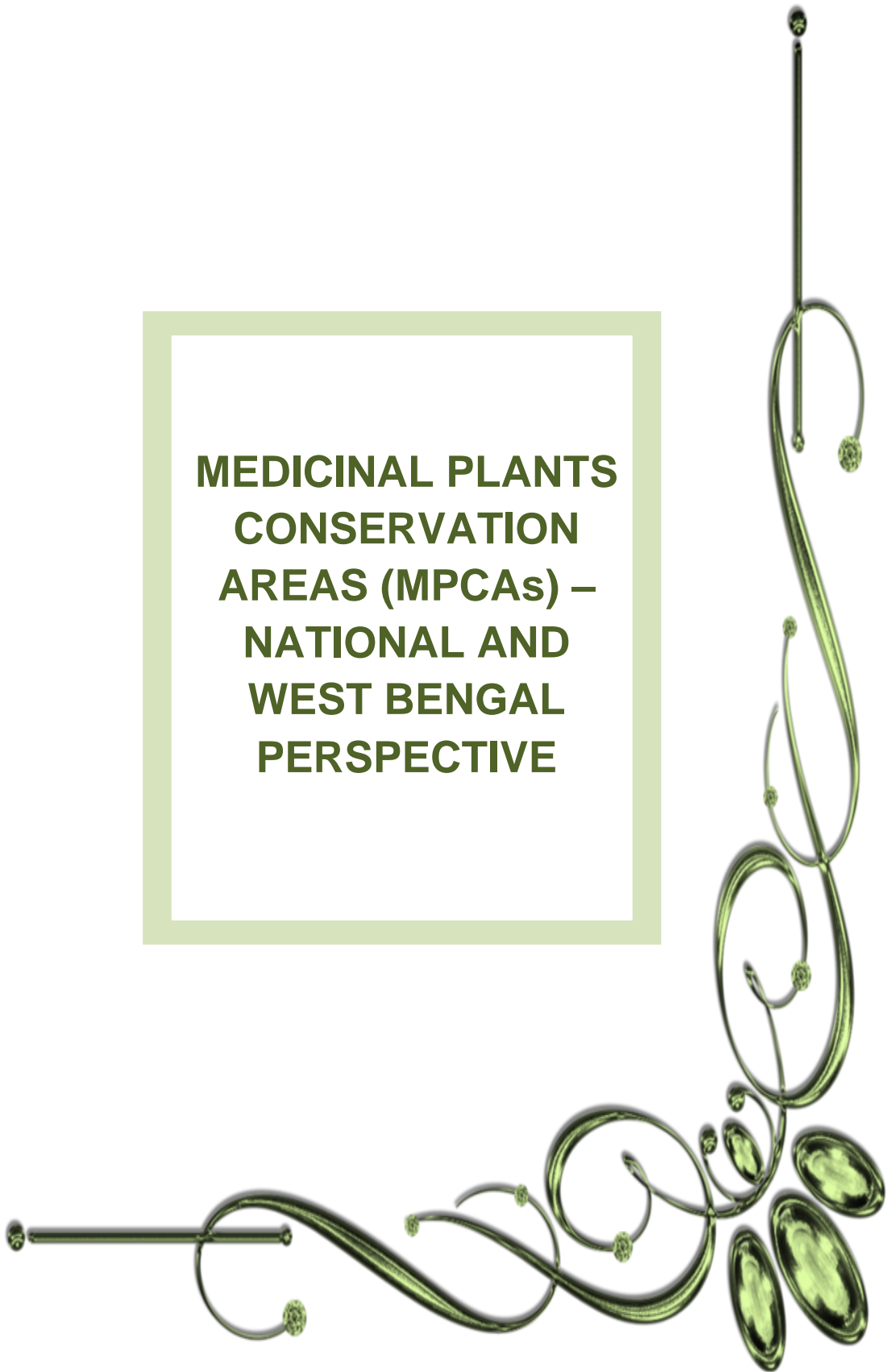
Out of 40 threatened plant species recorded in the qualitative assessment, 23 plants were found in the quadrat study. Overall, 12 woody plant species belonging to threatened species category was recorded in 20m x 20m sampled quadrats, while the number of plants with ≤ 30 cm gbh size belonging to threatened species category was 11 species across seven MPCAs. Out of 40 threatened medicinal plants, 17 species were recorded in the sampled sub-quadrats (1m x 1m). There were six threatened plants namely, *Cinnamomum bejolghota*, *Gynocardia odorata*, *Machilus glaucescens*, *Mesua ferrea*, *Stereospermum colais*, *Xylocarpus granatum*, found to have representation in adult (20m x 20m), sapling (5m x 5m) and seedling (1m x 1m) stages.

A community study was conducted to understand the community's knowledge and understanding on medicinal plants and their involvement in maintaining and protecting MPCAs through using questionnaire formats for documentation of information from community members in villages that are neighbouring MPCAs. Two approaches: focus group discussions and interactive meetings with village members attempted in seven MPCAs revealed that there have been variations among community members across seven MPCAs in the awareness and knowledges of local village members on medicinal plants and MPCAs, their dependency on medicinal plants through collection and their current involvement in monitoring and management of MPCAs. Overall, the respondents from faraway villages have no or less awareness about medicinal plants and its uses for handling common health issues. Similarly, their involvement in MPCA related activities were nil in many MPCAs. Local community members shared the information about various medicinal plants available in the surrounding forests including MPCA and details of their usual collection.

As part of this project, training programs titled 'Training on the sustainable management and conservation of medicinal plants' were organised targeting local community members residing close to the MPCAs. In all the villages, the younger generation was unaware of the identity and use of most medicinal plants. It was interesting to note that that many local people around the MPCA wanted a handout or training for identification of endangered medicinal plants. People associated with MPCAs were urged to conserve, cultivate and value add to the medicinal plants and local biodiversity.

The overarching outcome of this project is very promising in a way that the existing network of MPCAs are proving to be a gene pool of medicinal plants of the state especially a number of conservation concern species with good and viable population. Seven MPCAs representing different forest ecosystems and landscapes of the state are found to be rich in medicinal plant diversity in terms of number of species, number of threatened species, etc. In the network of seven MPCAs, only a 45 percent of West Bengal state's medicinal plants diversity could be covered. That means, there are still more potential medicinal plants rich forest sites, which could be established as MPCAs. As part of conclusion, number of recommendations for medicinal plants conservation and its sustainable use have been described in details. In the end, these recommendations were converted into activities or projects that are eligible for fundings from the NMPB through Central Sector scheme. This exercise was intended to support the West Bengal Forest Department to make proposals in the prescribed formats for availing necessary fundings from the NMPB.

**MEDICINAL PLANTS
CONSERVATION
AREAS (MPCAs) –
NATIONAL AND
WEST BENGAL
PERSPECTIVE**





Chlorophytum nepalense

Medicinal Plants Conservation Areas (MPCAs)

The Foundation for Revitalisation of Local Health Traditions (FRLHT), currently known as the University of Trans-disciplinary Health Sciences and Technology (TDU), recognized the global concern on the conservation of natural resources in general and medicinal plants in specific, and initiated a pioneering program across country i.e. the establishment of in-situ conservation sites for medicinal plants, named as ‘Medicinal Plant Conservation Areas (MPCAs)’. In the last two and half decades, a network of 108 MPCAs has been established across 13 Indian states involving the State Forest Departments and local communities with financial support from external funding agencies including DANIDA, UNDP and GEF grants under the guidance of Ministry of Environment, Forests and Climate Change (MoEF & CC), Government of India (Figure 1). The list of MPCAs established sofar in 13 states is provided in Annexure 1. Now the representative populations of more than 3500 medicinal plant species are being conserved in the wild through the network of MPCAs.

The establishment of a network of MPCAs across different ecological zones is critical for conserving intra-specific gene pools of threatened and endemic medicinal plants, with special focus on species that are known to be in high volume trade. If their gene pools are not urgently conserved, these valuable medicinal species may soon go extinct. In that context, the central purpose of establishing MPCA network has been the in-situ conservation of the genetic diversity of wild populations of highly traded species with special focus on endemics and threatened species in order to firstly ensure their long term survival and secondly to provide access to breeders of reproductive material for selection, breeding and also for ex-situ cultivation and plantations.

Following are the four specific objectives of national MPCA program

- ❖ In-situ conservation of populations of medicinal botanicals of India that occur in the wild (excluding exotics and purely cultivated species) across a network of MPCAs
- ❖ Species focused MPCAs for in-situ conservation of gene pools of high priority (endemics, high volume trade) species which are currently under threat (IUCN criteria) due to population decline
- ❖ Species recovery programs for critically endangered species
- ❖ Augmentation programs in degraded forest habitats for tree species in high volume trade

Figure 1. States having Medicinal Plants Conservation Areas (MPCAs)

Four important criteria were applied for the selection of forest areas for the establishment of MPCAs. They are (1) the forest area with rich medicinal plants species (preferably endemic species) diversity; (2) undisturbed area by biotic factors as much as possible; (3) fairly larger area (about 200-500 ha) for better management; (4) reasonably accessible. The presence of viable population of conservation concern species was taken into consideration when MPCAs are established for specific species (conservation concern/threatened medicinal plants). There are two approaches to be followed for the selection of MPCA sites: (1) capturing maximum diversity of medicinal plants; (2) capturing conservation concern

medicinal plants. To cover maximum medicinal plant diversity, MPCAs were established across different forest types and forest landscapes.

The scientific execution of MPCA network needs four kinds of prior information: (1) knowledge about medicinal plant species, which are in high volume trade, and are largely sourced from wild forest habitats; (2) threatened status of medicinal plants as per IUCN criteria especially for high-traded and/or endemic species; (3) reliable information on the natural geographical distribution of the high-traded and endemic or threatened species; (4) ready access to data base on the medicinal flora of region. Based on this information, forest managers and policy makers are supposed to decide on the establishment of MPCA at a specific site.

There are eight steps strategy followed for the execution of this MPCA program:

1. Create database on medicinal plants of India (from referenced medical literature including ethno botany and ethno medicine sources) with accurate correlation between vernacular, Sanskrit and botanical names
2. Generate sub-databases of medicinal plants of every State, District and Taluka in the country
3. Generate geographical distribution data on medicinal plants of India (sourced from floras, herbaria) and place it on appropriate GIS platforms particularly for species of conservation concern
4. Identify medicinal botanicals in all India trade with accurate correlation between trade and botanical names
5. Apply IUCN criteria to identify threatened medicinal botanicals at State levels
6. In respect of high priority threatened species, undertake genetic sampling across their distribution range in order to identify hot-spots of intra-specific genetic variability of threatened species
7. Identify ecologically suitable sites for creation of MPCAs for in-situ conservation of both species diversity and for species of conservation concern
8. Review the gaps at State levels every 3 years in the national in-situ conservation MPCA program

The conservation of the gene pools of threatened species is expected to be done in at least one and at times in more than one hotspot of their genetic diversity. The number of MPCAs needed to conserve gene pool of a particular species depends on the extent of its

distribution range. For example, an endemic species may require only one MPCA to conserve its gene pool, but a widely distributed species may require several MPCAs to capture its diverse gene pool. The number of MPCAs established currently is far less than the required number of MPCAs to capture the diversity of wild medicinal plants in the country. This is because the 108 MPCAs established could capture only little more than half of the wild medicinal plants of India. Forest ecosystems generally have different patterns of species composition and distribution pattern. Some species exhibit gregarious distribution and some are sparsely distributed. Some forest patches show high diversity, while some are dominated by few species only.

Realising the importance of a network of wild gene banks for medicinal plants, the National Medicinal Plant Board (NMPB), Government of India, is currently involved in establishing Medicinal Plant Conservation and Development Areas (MPCDAs) through State Forest Department across the country. There are 72 MPCDAs already established by the NMPB across 13 states (Biswas et al., 2017). According to NMPB website, as of 30th November 2016, around 18,889.45 hectares of forest cover have been brought under MPCDAs (96 in numbers) in India. Besides, the NMPB extends financial support for the establishment and maintenance of MPCDAs across country under their central sector scheme. Though MPCDA program has been best implemented by State Forest Departments with the support and coordination from the NMPB, considering the complexity of the program, a technical support for the program from competent knowledge institutions is certainly warranted for the execution of this program at national level.

Establishing Medicinal Plants Conservation Areas (MPCAs) – from the West Bengal perspective

As part of the implementation of National Program on Promoting Conservation of Medicinal Plants and Traditional Knowledge for Enhancing Health and Livelihood Security (CCF-II project no. 13047) in West Bengal, the State Forest Department established a network of Medicinal Plants Conservation Areas (MPCAs) across the state. Based on the inputs from the Conservation Assessment and Management Prioritisation (CAMP) workshop, different conservation sites were identified for in-situ conservation of medicinal plants. These sites were selected in order to cover each of the four major biogeographic zones of West Bengal, different forest types, the distribution and abundance of high-traded and threatened medicinal plants and habitats important for them. Following criteria were considered at the

time of selecting potential sites for the establishment of MPCAs in West Bengal: (1) sites with a varied diversity of vegetation comprising medicinal plants; (2) relatively undisturbed patch with reasonable accessibility; (3) sites representing a particular forest/vegetation type; (4) sites traditionally known for its medicinal plant richness; (5) a compact block under Biodiversity Conservation Working Circle in territorial and wild life areas so that no felling operations are legal; (6) sites that are part of Protected Area or Reserve Forest or Tiger Reserve area, etc. with legal protection. Subsequently, seven sites were identified for establishing MPCAs in order to protect the critically endangered and endangered medicinal plant species under the CCF-II project (Table 1 and 2, Figure 2).

Table 1. Locations of seven MPCAs in West Bengal

Sl.No	MPCA	Forest range	Forest division	District
1	Bonnie camp	Raidighi	24-Parganas (South)	24-Parganas (South)
2	Garpanchkot	Raghunathpur	Kangsabati (North)	Purulia
3	North Rajabhatkhawa	Buxaduar	Buxa Tiger Reserve (East)	Jalpaiguri
4	Sursuti	Lataguri	Jalpaiguri	Jalpaiguri
5	North Sevoke	10 th mile	Wildlife-I	Jalpaiguri
6	Dhotrey	Dhotrey	Darjeeling	Darjeeling
7	Tonglu	Tonglu	Darjeeling	Darjeeling

Figure 2. Map locations of seven MPCAs in West Bengal

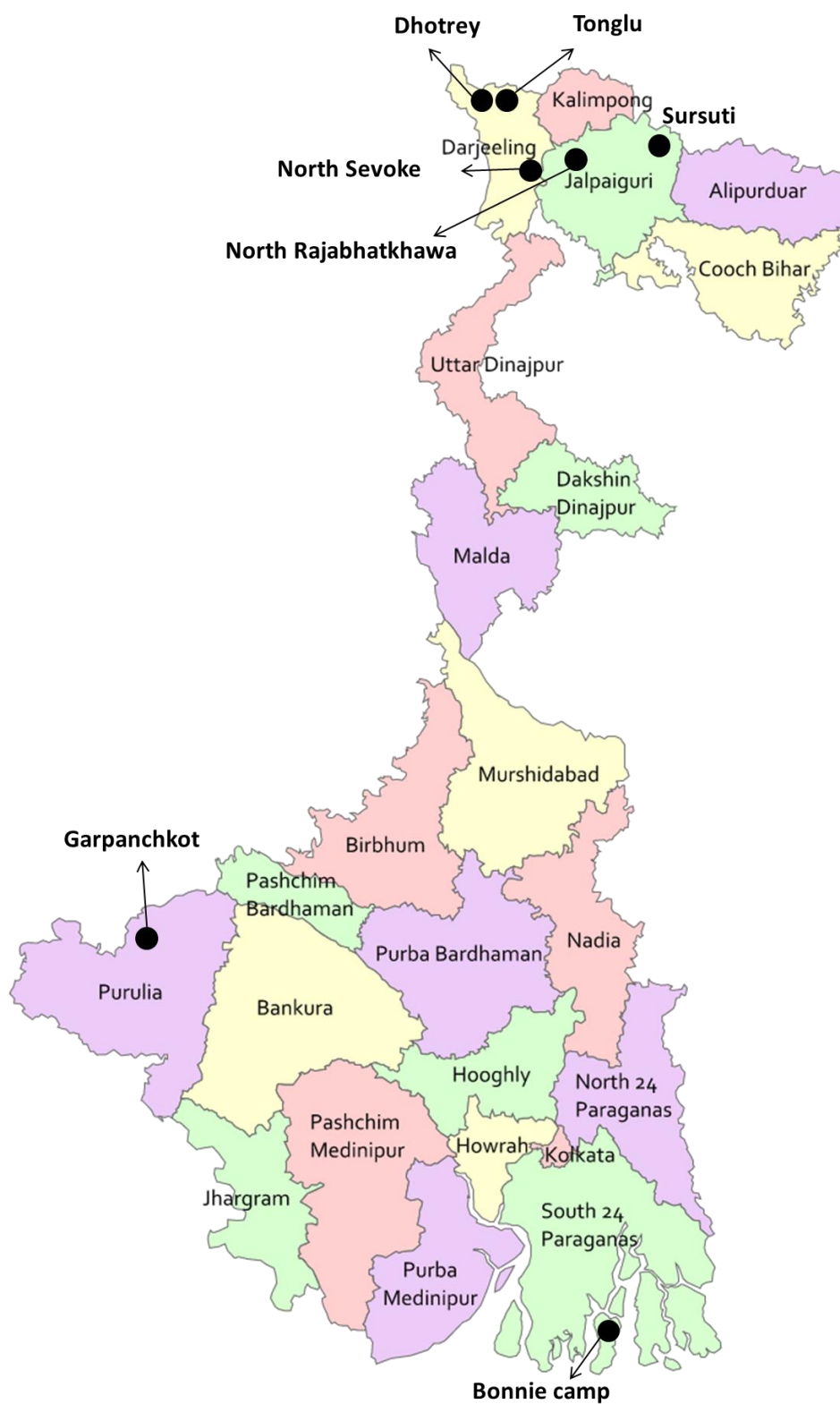


Table 2. Details of seven MPCAs established in West Bengal

Name of MPCA	Year Established	Forest types	Area (ha)	Latitude	Longitude	Diversity of medicinal plants*
Bonnie Camp	2008-09	Littoral and Swamp – Mangrove (4B)	300	21° 83'	88° 63'	30
Dhotrey	2008-09	Montane wet temperate (11B)	180	27° 05'	88° 07'	154
Garpanchkot	2008-09	Tropical dry deciduous (5B)	250	23° 63'	86° 77'	206
North Rajabhatkhawa	2008-09	Tropical moist deciduous (3C)	400	26° 68'	89° 55'	249
North Sevoke	2008-09	Tropical moist deciduous (3C)	100	26° 87'	88° 45'	209
Sursuti	2008-09	Tropical moist deciduous (3C)	100	26° 63'	86° 77'	216
Tonglu	2008-09	Montane wet temperate (11B)	230	27° 03'	88° 08'	254

*based on the inventory data collected at the time of MPCA establishment

MPCA sites were carefully identified by the West Bengal Forest Department with inputs taken from the CAMP workshop and consultations with subject experts and local forest officers. They were established to capture the gene pools of the regenerating populations of high-traded endemics and threatened medicinal plants that were assessed during the CAMP workshop. Nevertheless, there is a lack or inadequacy of field data especially about the medicinal flora, traded and threatened species or their geographical distribution. It is important to generate relevant field data atleast for the prioritised species and followed by the ground truthing and assessment to examine the changes in population of conservation concern medicinal plants. Better understanding and knowledge of different components in the MPCAs are expected to strengthen the MPCA program, and ensure the protection of gene pools of medicinal plants in its natural landscapes.

Considering the importance of this project, an agreement was signed to implement the project titled 'Revisiting the 7 old Medicinal Plants Conservation Areas (MPCAs) in West Bengal' (Project No. Cons/WB-01/2016) between the Office of the Conservator of Forests, Research Circle, West Bengal Forest Department and the University of Trans-disciplinary Health Sciences & Technology (TDU) in December 2015. This project was proposed to evaluate the status of seven MPCAs already established in West Bengal under CCF-II project during 2007-2009. The study was expected to analyze the strengths and gaps in the MPCA program of West Bengal. At the time of establishment, field data on plant diversity was collected to prepare a checklist of medicinal plants of each MPCA. The resurvey of old MPCAs was intended to understand the dynamics of change in the forest community especially among medicinal plants. In the previous survey, the presence of threatened plants was noted, but the population of those plants was not measured and assessed. It is important that population and regeneration status of conservation concern plants are measured to understand whether the size and locations of MPCAs are acting as a refugium of medicinal plants by conserve the genetic diversity.

In the end of this project, it is expected that there will be better understanding of medicinal plants diversity and their population status in MPCAs. Besides, this project would measure the awareness and knowledge of local community members in relation to conservation of medicinal plants in MPCAs and their willingness to participate in the management of MPCAs.

**PROJECT
OBJECTIVES**



Project Objectives

The overarching objective of this project was to revisit the seven MPCAs in West Bengal that were established in 2008-09 under CCF-II program to understand the current status of MPCAs in terms of medicinal plants diversity and population level through thorough botanisation surveys and quadrat assessment. Following activities were planned to be undertaken covering seven MPCAs:

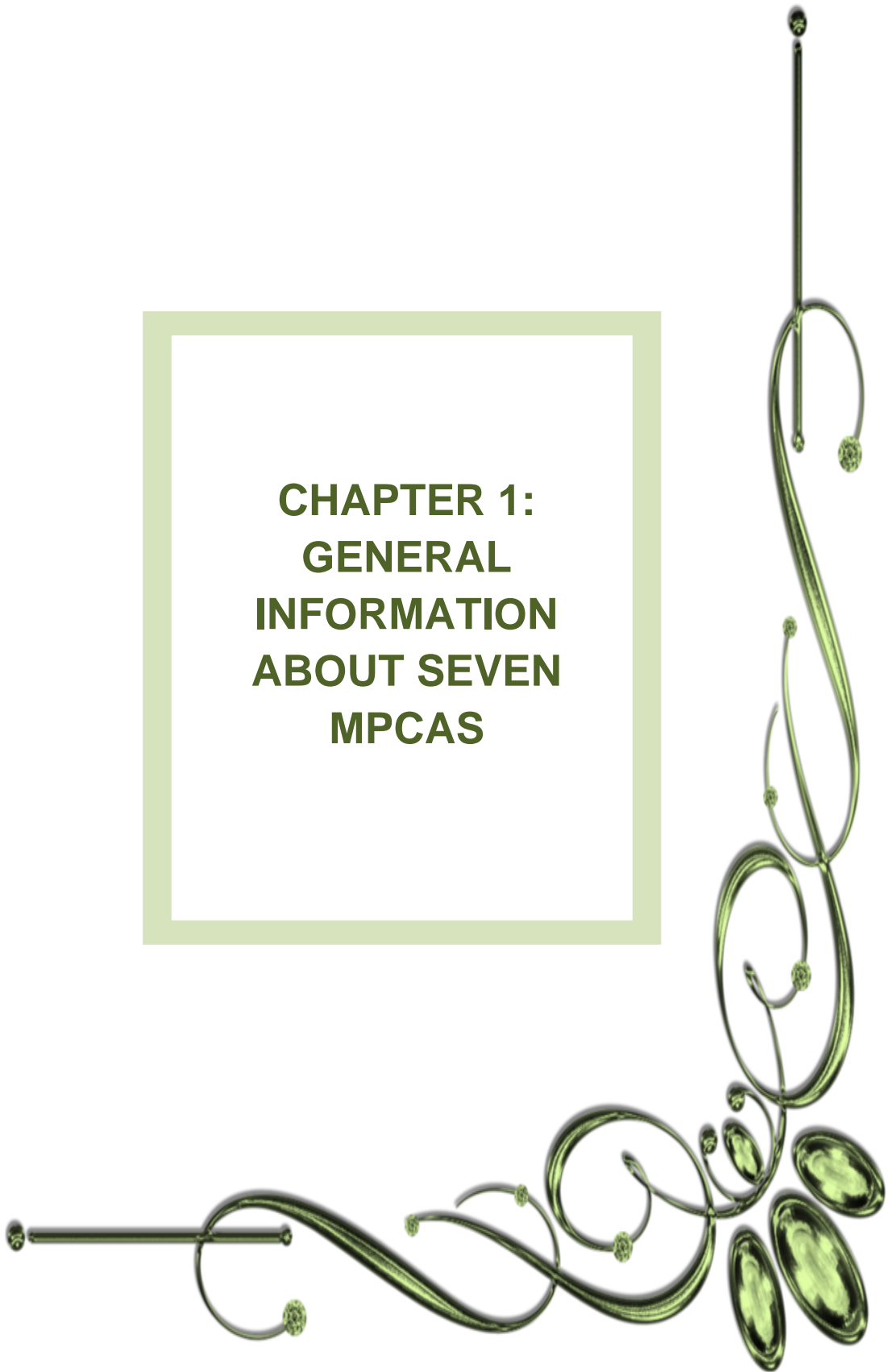
- ❖ reinventorisation and documentation of medicinal plants diversity in the MPCAs;
- ❖ conducting vegetation surveys in the MPCAs;
- ❖ measuring the overall diversity of medicinal plants;
- ❖ measuring the species diversity and frequency of medicinal plants in each MPCA;
- ❖ preparing the spatial maps of MPCAs determining the boundaries in all directions;
- ❖ examining the extent of community participation initiatives undertaken towards engaging MPCAs for improvements;
- ❖ organising orientation program for the forest officials and the local communities for the better management of MPCAs

Following are the tangible deliverables expected from the implementation of this project

- ❖ A checklist of medicinal plants recorded in seven MPCAs (overall and MPCA-wise)
- ❖ Spatial distribution maps of seven MPCAs using GIS tools
- ❖ Population assessment of medicinal plants especially conservation concern species through quadrat study
- ❖ Assessment of community awareness and understanding of medicinal plants and their involvement in MPCAs
- ❖ Major threats identified in the MPCAs and recommendation for management of selected species
- ❖ Training programs for local forest officials placed in the MPCA areas
- ❖ Preparation of digitization of herbarium of medicinal plants

In the end, this project is expected to generate information and knowledge on medicinal plant species diversity and their status in seven MPCAs of West Bengal. So that better resource management and strategies can be planned at the state level. It would also provide the scope and opportunity available for the participation of local community members.

**CHAPTER 1:
GENERAL
INFORMATION
ABOUT SEVEN
MPCAS**



Suaeda maritima



1.1 Introduction

In West Bengal, forests cover an area of 11,879 sq. km, which is 13.38% of the state's geographical area (India State of Forest Report 2019). State is rich in the biodiversity of both flora and fauna. Vegetation in West Bengal varies from temperate and sub-alpine forests of Darjeeling to Estuarine plains of Sundarban. Forests in West Bengal have a rich assemblage of diverse habitats and vegetation designated with the help of eight different forest types. The diverse fauna and flora of West Bengal possess the combined characteristics of the Himalayan, sub-Himalayan and Gangetic plain. Covering just 2.7% of the Indian landmass it is home to 12.27% of Indian biodiversity known till date. The state has more than 7000 species of described flora including bacteria, algae, fungi, bryophytes, pteridophytes and angiosperms and more than 10000 species of described fauna. According to the database developed by the Foundation for Revitalisation of Local Health Traditions (FRLHT), the checklist of medicinal plants of West Bengal consists of a total of 2800 taxa. Out of 2800 medicinal plant species recorded in West Bengal, a large portion of species, around 80-85% are sourced from wild, out of which, around 46% of medicinal plant species are herbs, followed by trees (23%) shrubs (21%) and climbers (10%). These plants spread over different types of ecosystem like mountain ecosystem of the north, forest ecosystem extending over the major part of the state, freshwater ecosystem, semiarid ecosystem in the western part, mangrove ecosystem in the south and coastal marine ecosystem along the shoreline.

As part of conservation efforts, the FRLHT in collaboration with West Bengal Forest department had conducted series of threat assessment workshops involving 53 subject experts to identify conservation concern species and locate their wild populations across the state. The Conservation Assessment and Management Prioritisation (CAMP) workshop was conducted on Kolkata in December 2007 to assess medicinal plant species for Red Listed status following IUCN guidelines. Out of 148 medicinal plants proposed for assessment, 46 species were assessed for threatened status. The breakup of taxa is as follows: Critically Endangered (CR): 6, Endangered (EN): 19, Vulnerable (VU): 15, Near Threatened (NT): 3 and Least Concern (LC): 3. One of the important outcomes of organising CAMP workshop was the identification of flagship species and of potential sites for the establishment of MPCAs in West Bengal. To conserve and protect the medicinal plant resources in the wild, as part of in-situ conservation methods, the State Forest Department with technical support from

the FRLHT has established seven Medicinal Plants Conservation Areas (MPCAs) between 2008 and 2010 across different forest types in West Bengal.

After the CAMP Workshop, the short listed areas were identified, surveyed and demarcated using a GPS system. The establishment of the MPCAs involved demarcation of the area as an entry point activity. This was followed by botanical inventorization through sampling process, enumeration and plant specimen collection, preparation of herbarium through processing and accession of specimens. The detailed profile of seven MPCAs was prepared with the secondary information collated from various document sources to understand the nature and characteristics of MPCA sites selected in West Bengal.

Table 3. Detailed profile of seven MPCAs established in West Bengal

Site details	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
Location information							
Forest Range	Raidighi	Dhotrey	Raghunathpur	Buxaduar	10 th mile	Lataguri	Tonglu
Sub-division	Diamond harbour	Darjeeling	Raghunathpur	Alipurduar	Kurseong	Rangpur	Darjeeling
Forest Division	24-Parganas (South)	Darjeeling	Kangsabati (North)	Buxa Tiger Reserve (East)	Wildlife-I	Jalpaiguri	Darjeeling
Block	Mathurapur II	Selimbong 3 & 4, Kankibong 1	Neturia	North Rajabhatkhawa-8 & 9	North Sevoke 1(a) & 1(b)	Sursuti	Tonglu 2, Kankibong 3, Kankibong 4
District	24-Parganas (South)	Darjeeling	Purulia	Jalpaiguri	Darjeeling	Jalpaiguri	Darjeeling
Nearby villages	Maipit-Sombarer Bazar, Nalgara, Raidighi	Dhotrey, Palmajua, Relling, Samsu-Majua	Baghnara, Sewlibari, Puyapur, Lalpur	Santalbari, Rajabhatkhawa	10 th mile, Sevoke bazar, Chamakdangi, Toribari, Singhijihora	Baradigh, Bamani Basti, Bichabhanga & Sursuti	Dhotrey, Relling, Selingbong, Palmajua
Distance from nearest towns	Raidighi (4 hrs by boat)	Maneybhanjyang (25 km)	Raghunathpur (25 km)	Alipurduar (25 km) 28 th mile Jayanthi	Siliguri (20 km)	Lataguri (8 km)	Maneybhanjyang (19 km)
Approach from nearby places	By road & train: Raidighi (4 hrs by boat)	By road: Dhotrey (21 km) By train: Ghoom (47 km)	By road: Raghunathpur (24 km); By train: Adra	By road: Rajabhatkhawa (10 km); By train:	By road & train: Siliguri (20 km); By train: Siliguri	By road: Siliguri (75 km); Lataguri (8 km)	By road: Maneybhanjyang (19 km); Dhotrey (8 km)

General information about seven MPCAs

Site details	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
	Diamond harbour to Raiighi (96 km)		(32 km)	Rajabhatkhawa (10 km)	(27 km)	By train: Chalsa (12 km)	By train: Ghoom (47 km)
Area covered (in ha)	300	180	250	400	100	100	230
Latitude & Longitude	N 21° 50' E 88° 38'	N 27° 03' E 88° 04'	N 23° 38' E 86° 46'	N 26° 41' E 89° 33'	N 26° 52' E 88° 27'	N 26° 45' E 88° 47'	N 27° 02' E 88° 05'
Waterbodies (inside & outside)	River, perennial water, seasonal water source and wetland & marshes	Perennial hill streams, Lhodoma river catchment, which ultimately join river Teesta	Spring, rain-fed streams	Dima, Jainty, Bala rivers, streams and Jhoras like Buxa Jhora, Guenala & Hatinala	Teesta river, two spring fed water courses. Mahanadi & Gulma khola and Nandi khola water course	Rivers like Chel, Neora Mal and Teesta and perennial Jhoras – Bamoni Jhora, Sursuti Jhora & Monpala Jhora	Perennial hill streams, Lhodoma river catchment which ultimately join river Teesta
Climate information							
Temperature in °C (at nearby station)	Max: 38; Min: 13.7	Max: 21; Min: 8.7	Max: 45; Min: 9	Max: 33; Min: 11	Max: 36; Min: 12	Max: 32; Min: 15.5	Max: 21; Min: 8.7
Precipitation in mm (at nearby station)	1924.2	3624.2	1375.2	3600	3500	3390.8	3624.2

General information about seven MPCAs

Site details	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
Seasons & monsoons	Tropical monsoon with seasonally excessive rainfall and hot summer in sites; Three typical seasons: summer (Feb-May), South-west monsoon (Jun-Sep), winter (Oct-Jan); Rains mainly from South-West monsoon between June to September; The ascending south west monsoon laden with moisture from the Bay of Bengal account for > 80% of the total rainfall received in the region. High altitude regions remains dry during the winters with occasional precipitation in the form of snow.						
Soil information							
Rock formation	Alluvial clay, Sundarban delta	Darjeeling Gneis, unaltered sedimentary rock, metamorphic rock	Upper Gondwana sedimentaries; Blackstone indicating lava sedimenta	Himalayan formation of Darjeeling Gneis, represented by slates, phyllite, quartzite, dolomite, mica, graphite, Schist	Pleistocene, Miocene, Permian, Arachean	Miocene, Permo carboniferous, Precambrian	Unaltered sedimentary rock, metamorphic rock
Soil type	Clay soil, heavy soil, sandy soil with clay, sandy soil, silty soil	Sandy loam, red & yellow podzolic soil	Red lateritic, sedimentary	Boulders in the sub-soil and alluvial soil with gravels on the surface and in some places sandy loam on the surface	Sandy loam but dark coloured ue to the deposition of ash from repeated forest fires	Sandy to clay loam with thin layer of humus	Sany loam, red & yellow podzolic soil
Vegetation information							
Vegetation type	Littoral &	Northern	Northern	North India	North India	North India	Northern

General information about seven MPCAs

Site details	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
	swamp forest mangrove	montane wet temperate	Tropical ry deciduous	Moist deciduous	Moist deciduous	Moist deciduous	montane wet temperate
Canopy structure		Three-layered (upper, middle & under story)					Three-layered (upper, middle & under story)
Dominant/important species	<i>Heritiera</i> , <i>Excoecaria</i> , <i>Ceriops</i> , <i>Sylocarpus</i> , <i>Bruguiera</i>	<i>Castanopsis indica</i> , <i>C. tribuloides</i> , <i>Quercus pachphyll</i> , <i>Q. lamellose</i> , <i>Q. lineata</i> , <i>Acer campbellii</i> , <i>Meliosma wallichii</i> , <i>Eurya japonica</i> , <i>Symplocos theiolia</i> , <i>Taxus baccata</i>	<i>Shorea robusta</i> , <i>Madhuca indica</i> , <i>Bridelia squamosa</i> , <i>Terminalia spp.</i> , <i>Tectona grandis</i> , <i>Bursera serrata</i> , <i>Holarrhena pubescense</i> , <i>Asparagus racemosus</i>	<i>Shorea robusta</i> , <i>Michelia champaca</i> , <i>Sterculia villosa</i> , <i>Gmelina arborea</i> , <i>Terminalia spp.</i> , <i>Acacia spp.</i> , <i>Leea indica</i> , <i>Tinospora cordifolia</i> , <i>Mucuna pruriens</i> .	<i>Careya arborea</i> , <i>Terminalia crenulata</i> , <i>Tetrameles nudiflora</i> , <i>Sterculia</i> , <i>Gmelina arborea</i> , <i>Bauhinia purpurea</i> , <i>Oroxylum indicum</i> , <i>Clerodenron viscosum</i>	<i>Shorea robusta</i> , <i>Michelia champaca</i> , <i>Sterculia villosa</i> , <i>Gmelina arborea</i> , <i>Terminalia spp.</i> , <i>Acacia spp.</i> , <i>Leea indica</i> , <i>Tinospora sp.</i>	<i>Acer campbellii</i> , <i>Magnolia campbellii</i> , <i>Quercus spp.</i> <i>Rhododendron barbatum</i> , <i>R. triflorum</i> , <i>R. arboretum</i> , <i>Viburnum erubescens</i> , <i>Daphne bhoula</i> , <i>Berberis sp.</i> <i>Aconitum sp.</i>
Administration information							
Legal status	Protected Forests	Reserved Forests	Protected Forests	Tiger Reserve	Wildlife Sanctuary	Reserved Forests	Reserved Forests
Local community information							

General information about seven MPCAs

Site details	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
FPCs/EDCs & area assigned	Ambikanagar (500 ha), Nagenabad (500 ha), Domkal (500 ha), Kishori Mohanpur (2500 ha)	Dhotrey FPC (301 ha); Relling FPC (304.72 ha)	Bagmara FPC (100 ha), Puapur FPC (50 ha), Lalpur (30 ha), Sewlibari (20 ha)	Buxa road EDC (1809 ac)	10 th mile (1147 ha), Sevoke bazar (1222 ha), Chamkdanghi (1033)	Sawa Phulli FPC(559.26 ha); 1064 Kumarpara FPC (653.15 ha)	Dhotrey FPC (301 ha); Relling FPC (304.72 ha)
Means of livelihood	Agriculture, fishing, honey collection	Agriculture, livestock, NTFP collection, forestry work	Agriculture	NTFP collection, forestry work	Fuelwood & charcoal making, forestry work	Daily labour	Agriculture, livestock, NTFP collection, forestry work
Percentage of NTFP collectors	nil	~50%	Very less	~10%	Very less	~10-15%	~50%

1.3 Disturbance levels

Site disturbance levels were assessed by scoring 15 factors that are reported to disturb the intrinsic nature of ecological and anthropological interactions present in the MPCAs, which include distance from the human habitation, nature of surroundings, access to MPCA, boundary wall/fence, presence of RET species, regeneration ability, vegetation canopy openness, trekking paths, tourist attractions, public entry inside MPCA, details of resource removal from MPCA, fire incidences, weed and invasive species, and departmental activities (Annexure 2). Based on the site disturbance scores arrived for each MPCA, sites are grouped into three disturbance categories. Sites with disturbance score less than 18 was categorized as 'least disturbed', while sites with disturbance score more than 36 were considered as 'highly disturbed'. Sites with score between 18 and 36 were treated as 'moderately disturbed'. Sites with low score experience least disturbance, while high score reveal a high level of anthropogenic disturbance in the site. The categorization of MPCA sites was made to examine whether the population levels of medicinal plants in each MPCA are differed across the disturbance categories.

Overall disturbance levels of the seven studied MPCA sites ranged from the lowest score of 16 in Bonnie camp MPCA to a maximum of 30 in Garpanchkot (Table 4). Of the seven MPCAs, Bonnie camp is the only least disturbed site (score less than 18), whereas a moderate level of disturbance (score 18–36) is operative in the remaining MPCAs (Table 5). None of the MPCAs are categorised under 'highly disturbed' category, as all of them are located inside the Protected Areas (PAs). Having faced the anthropogenic pressures due to the presence of tourist attractions, more trekking paths, resource removal and vulnerability to fire incidences, evne the 'moderately disturbed' MPCA sites are vulnerable with less resilient nature to any pressure either posed by intrinsic nature or anthropogenic influence. Bonnie camp MPCA, being a part of Sundarbans Protected Areas and well-known Bengal tiger habitat, though relatively having less number of medicinal plant species because of the nature of ecosystem, is the least disturbed site enhancing landscape heterogeneity as well as protecting the microclimates.

Table 4. Assessment of disturbance levels in MPCA sites by scoring 15 factors

Sl. No	Site elements	Bonn	Dhot	Garp	N.Raja	N.Sevo	Surs	Tong
1	Nature of surroundings – sides surrounded either by agricultural lands/plantations or human settlements (4) 1 = One side only 2 = Two sides 3 = Three sides 4 = All four sides	0	3	2	2	1	1	1
2	Boundary wall/fence around MPCA especially areas bordering with human settlements/non-forest landscapes (5) 0 = Barbed wire fencing in all four sides 1 = Barbed wire fencing in part of sides 2 = Barbed wire fencing in sites bordering roads 3 = Barbed wire fencing in sites nearing the entrance 4 = no boundary walls/fence	4	4	4	4	4	4	4
3	Access to MPCA site from main road/human settlement (2) 1 = mud road 2 = Metal road/concrete road	1	1	1	1	1	1	1
4	Distance from human settlement (5) 1 = >500 meters from site 2 = 100 – 500 meters from site 3 = 100 meters from site 4 = houses bordering with MPCA 5 = houses within MPCA	1	2	1	1	1	1	3
5	Presence of RET species (3) 1 = > 10 species 2 = 5 – 10 species	3	2	2	1	1	1	2

General information about seven MPCAs

Sl. No	Site elements	Bonn	Dhot	Garp	N.Raja	N.Sevo	Surs	Tong
	3 = < 5 species							
6	Regeneration of conservation concern species (seedling and sapling stages) (3) 1 = > 10 species 2 = 5 – 10 species 3 = < 5 species	1	2	1	1	1	1	2
7	Vegetation canopy openness (3) 1 = Small canopy gaps, but few 2 = Small canopy gaps, but many 3 = Large canopy openness	3	1	2	1	1	2	1
8	Number of trekking paths (3) 1 = One 2 = Two 3 = More than two	0	2	3	2	1	2	1
9	Frequency of general public entry inside MPCA areas (3) 1 = Occasional 2 = Pilgrimage times 3 = Fair & festival times	1	1	1	1	1	1	1
10	Presence of tourist attraction (5) 1 = Water falls 1 = Temple structure 1 = Passage to towns 1 = Historical or ancient sites 1 = Trekking areas	1	1	3	1	1	1	1
11	Resource extraction (6) 1 = Firewood	0	5	4	3	3	3	3

General information about seven MPCAs

Sl. No	Site elements	Bonn	Dhot	Garp	N.Raja	N.Sevo	Surs	Tong
	1 = Fodder 1 = Timber 1 = Medicinal plants 1 = Soil or manure 1 = Water for agricultural/domestic purpose							
12	Vulnerability of fire incidences (4) 0 = No history of fire incidences 1 = Less chance 2 = Moderate chance 3 = High chance	0	2	2	2	2	2	1
13	Extent of area vulnerable for fire incidences (4) 0 = No history of fire incidences 1 = < 10 ha 2 = 10-50 ha 3 = > 50 ha	0	1	1	1	2	2	1
14	Presence of weed and invasive species (3) 1 = 1-5 weed species 2 = 6-10 weed species 3 = more than 10 weed species	1	1	2	2	1	1	1
15	Departmental activities apart from what is approved (3) 0 = No interventions undertaken 1 = Planting of plant materials 1 = Removal of NTFPs and fuelwood 1 = Grazing of animals	0	1	1	1	0	1	1

Tong - Tonglu; **Dhot** - Dhotrey; **N.Raja** - North Rajabhatkhawa; **N.Sevo** - North Sevoke; **Surs** - Sursuti; **Garp** - Garhpanchkot; **Bonn** - Bonnie camp

Table 5. Seven MPCA sites across disturbance categories

Site disturbance category	MPCA sites (Score)
Least Disturbed (>18)	Bonnie camp (16)
Moderately disturbed (18 to 36)	Dhotrey (29), Garhpanchkot (30), North Rajabhatkhawa (24), North Sevoke (21), Sursuti (24), Tonglu (24)
Highly disturbed (>36)	none

1.4 Current status of MPCAs

Following are the MPCA site wise observations made during the field surveys on their current status

MPCA site	Bonnie Camp
Entrance structure	An entrance board on two pillars is there to recognize the MPCA. However, the names and other description need to be written properly. Descriptive boards for other related information are also needed. No evidence of plastic debris, other waste materials are found near entrance area. The gate is open for public entry into the MPCA area. The MPCA entrance is on the left side of the water way from the Matla river to Bidyadhar River. There is no specific footpath across the MPCA. Grazing is common in the MPCA by wild boar and deer.
Boundary information	Boundary (300 ha area) is well defined in the topographical sheets. The MPCA is situated in a small island. The water way which connects the Kishorimohanpur village in the West to Sundarban National Park in the East across the Bidyadhar River on the other side touches the MPCA on its Western boundary. The MPCA is surrounded by small river channels. The area is also traversed by many small channels. Local people use these small channels to reach inside the MPCA and other part of the forest for collection of various NTFPs.
Disturbance level*	Highly disturbed Moderately Disturbed Least disturbed Disturbance score = 16 out of 55
Communication and interpretation utilities	There is a camp of Forest Department and a temple around 500 meter away from the MPCA boundary but as such no interpretation center exist in the MPCA area till date. The MPCA is in a small island. The water way which connects the Kishorimohanpur Village in the West to Sundarban National Park in the East across the Bidyadhar River on the other side touches the MPCA on its Western boundary.
Trekking paths	There are no clear-cut footpaths inside the MPCA.

and routes	
Departmental Interventions	Departmental interventions including soil conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Nypa fruticans</i> (Arecaceae), <i>Lumnitzera racemosa</i> (Combretaceae), <i>Sonneratia caseolaris</i> (Lythraceae), <i>Xylocarpus granatum</i> (Meliaceae)

MPCA site	Dhotrey
Entrance structure	Entrance with arch gate is there. However, it needs re-painting. No evidence of plastic debris, other waste materials are found near entrance area. The gate is open for public entry into the MPCA area. The MPCA entrance is on the road which leads to an interior forest village Sellempong. There is a footpath across the MPCA which reaches to a village called Chotahatta. Grazing is common in the periphery of the MPCA .
Boundary information	Boundary (180 ha area) is well defined in the topographical sheets. Stones are rarely placed along the MPCA border especially near public footpath. The road which connects Dhotrey village to Sellempong village becomes the boundary on the east side of the MPCA. The stone chips road itself is a boundary on one side as the MPVA area is on steep watershed. MPCA area can be expanded in the eastern and northern side to cover larger area under MPCA. The community composition of the forests located in the eastern side is quite different from the western side due to the variation in the aspects.
Disturbance level*	Highly disturbed Moderately disturbed Least Disturbed Disturbance score = 29 out of 55
Communication and interpretation	There is no interpretation center. However, local people are engaged as guide to the tourist and they sometime explain about the MPCA. There are attractions like trekking in the area as it has

utilities	variation in landscape and along the altitudinal gradient. However, there is a occasionally used trek from Dhotrey village to Chotahatta village
Trekking paths and routes	There is one there is a occasionally used trek from Dhotrey village to Chotahatta village. Besides, there are few small trekking paths intersecting the MPCA area.
Departmental Interventions	Departmental interventions including soil and water conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Aconitum palmatum</i> (Ranunculaceae), <i>Aconitum spicatum</i> (Ranunculaceae), <i>Panax pseudoginseng</i> subsp. <i>Himalaicus</i> (Araliaceae), <i>Swertia chirayita</i> (Gentianaceae), <i>Taxus wallichiana</i> (Taxaceae), <i>Thalictrum chelidonii</i> (Ranunculaceae), <i>Berberis aristata</i> (Berberidaceae), <i>Paris polyphylla</i> (Melanthiaceae), <i>Rubia cordifolia</i> (Rubiaceae), <i>Rubia manjith</i> (Rubiaceae), <i>Valeriana hardwickei</i> (Rubiaceae), <i>Zanthoxylum armatum</i> (Rutaceae).

MPCA site	Garpanchkot
Entrance structure	A well-constructed entrance gate is there to recognize the MPCA on the right side of the main road which leads towards Panchet Dam from Gobagmore. However, it needs re-paining. Descriptive boards for other related information are needed. No evidence of plastic debris, other waste materials are found near entrance area. The entrance gate is kept locked to avoid public entry in two or four wheeler vehicles and misuse of MPCA area. Though the MPCA entrance is on the roadside, the entry by common public through this gate is rare. Forest watchers are on guard. The MPCA is on the south-west facing watershed, which has undulated hillocks, swampy land on the periphery foothill area with small stream and gullies. There is a footpath across the MPCA. Grazing by cattle is common in the periphery of the MPCA especially from the western

	side
Boundary information	Boundary (250 ha area) is well defined in the topographical sheets. Pillars are rarely placed along the MPCA border. The stone-slab stairs and twining road is there inside the MPCA. Small narrow footpaths are traversing across the MPCA.
Disturbance level*	Highly disturbed Moderately disturbed Least Disturbed Disturbance score = 30 out of 55
Communication and interpretation utilities	There is no interpretation center for the MPCA. However, there is a center cum counter near the Forest Corporation Tourist Lodge for selling the local products by the local SHG and JFMC members.
Trekking paths and routes	There are few roads inside the MPCA for patrolling and monitoring of the forest by the Front line staff of the Forest Department. Besides, there are few small footh paths intersecting the MPCA area. There is a natural border on the western side of the MPCA by the tar road going from Gobagmore to Panchetdam.
Departmental Interventions	Departmental interventions including soil and water conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Aegle marmelos</i> (Malvaceae), <i>Asparagus racemosus</i> (Asparagaceae), <i>Azadirachta indica</i> (Meliaceae), <i>Buchanania lanzan</i> (Anacardiaceae), <i>Butea monosperma</i> var. <i>lutea</i> (Fabaceae), <i>Curculigo orchioides</i> (Hypoxidaceae), <i>Dioscorea bulbifera</i> (Dioscoreaceae), <i>Gloriosa superba</i> (Colchicaceae), <i>Gymnema sylvestre</i> (Apocynaceae), <i>Helicteres isora</i> (Malvaceae), <i>Hemidesmus indicus</i> (Apocynaceae), <i>Holarrhena pubescens</i> (Apocynaceae), <i>Oroxylum indicum</i> (Bignoniaceae), <i>Hygrophila auriculata</i> (Acanthaceae), <i>Ichnocarpus frutescens</i> (Apocynaceae), <i>Litsea glutinosa</i> (Ebenaceae), <i>Madhuca longifolia</i> var. <i>latifolia</i> (Sapotaceae), <i>Nyctanthes arbor-tristis</i> (Oleaceae), <i>Phyllanthus emblica</i> (Phyllanthaceae), <i>Rauwolfia tetraphylla</i> (Apocynaceae), <i>Stephania japonica</i> var. <i>discolor</i> (Menispermaceae), <i>Tinospora</i>

cordifolia (Menispermaceae), *Terminalia chebula* (Combretaceae),
Stereospermum suaveolens (Bignoniaceae)

MPCA site	North Rajabhatkhawa (NRVK)
Entrance structure	An entrance board on a pillar is there to recognize the MPCA. However, it needs renovation and re-painting. Descriptive boards for other related information are needed. No evidence of plastic debris, other waste materials are found near entrance area. The gate is open for public entry into the MPCA area. The MPCA entrance is on the right side of the road which leads to an interior forest village 28 miles. There is a footpath across the MPCA. Grazing is common in and around the periphery of the MPCA.
Boundary information	Boundary (400 ha area) is well defined in the topographical sheets. Stones are rarely placed along the MPCA border especially near public footpath. The road which connects North Rajabhatkhawa to 28 mile village becomes the boundary on the east side of the MPCA. The tar road has gone across the MPCA area. This MPCA has unique geographical setup where the strong streams of hilly River Jayanti flows on East and west side of the MPCA. Although, the river gets dried and shrunk during the winter season but during rainy season it becomes a mighty one. The community composition of the forests located in the eastern and the western side does not have much contrasting scenario as the aspect does not change here.
Disturbance level*	Highly disturbed Moderately disturbed Least Disturbed Disturbance score = 24 out of 55
Communication and interpretation utilities	There is an interpretation center for whole Buxa Tiger Reserve in the Rajabhatkhawa area but not specifically for the MPCA.
Trekking paths and routes	There are few roads inside the MPCA for transportation to various surrounding villages. Besides, there are few small trekking paths

	intersecting the MPCA area.
Departmental Interventions	Departmental interventions including soil and water conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Alpinia calcarata</i> (Zingiberaceae), <i>Andrographis paniculata</i> (Acanthaceae), <i>Aphanamixis polystachya</i> (Meliaceae), <i>Aristolochia indica</i> (Aristolochiaceae), <i>Asparagus racemosus</i> (Asparagaceae), <i>Cayratia pedata</i> (Vitaceae), <i>Celastrus paniculatus</i> (Celastraceae), <i>Centella asiatica</i> (Apiaceae), <i>Cinnamomum bejolghota</i> (Lauraceae), <i>Costus speciosus</i> (Zingiberaceae), <i>Gynocardia odorata</i> (Achariaceae), <i>Hemidesmus indicus</i> (Apocynaceae), <i>Holarrhena pubescens</i> (Apocynaceae), <i>Ichnocarpus frutescens</i> (Apocynaceae), <i>Mucuna sempervirens</i> (Fabaceae), <i>Murraya koenigii</i> (Rutaceae), <i>Paederia foetida</i> (Rubiaceae), <i>Phyllanthus emblica</i> (Phyllanthaceae), <i>Piper longum</i> (Piperaceae), <i>Rauwolfia serpentina</i> (Apocynaceae), <i>Stereospermum colais</i> (Bignoniaceae), <i>Terminalia chebula</i> (Combretaceae), <i>Wrightia arborea</i> (Apocynaceae), <i>Zanthoxylum rhetsa</i> (Rutaceae)

MPCA site	North Sevoke
Entrance structure	An entrance board on two pillars is there to recognize the MPCA. However, it needs renovation and re-painting. Descriptive boards for other related information are needed. No evidence of plastic debris, other waste materials are found near entrance area. The entrance gate is kept locked to avoid public entry in two or four wheeler vehicles and misuse of MPCA area. Though the MPCA entrance is on the roadside, the entry by common public is rare. Forest watchers are on guard especially during the season when big animals are sighted inside the MPCA area. The MPCA entrance is on the left side of the road which leads to an interior forest patch having little hillocks, swampy land and small stream and gullies.

	There is a footpath across the MPCA. Grazing is rare in the MPCA
Boundary information	Boundary (100 ha area) is well defined in the topographical sheets. Pillars are rarely placed along the MPCA border. The stone chip road is there inside the MPCA.
Disturbance level*	Highly disturbed Moderately Disturbed Least Disturbed Disturbance score = 21 out of 55
Communication and interpretation utilities	There is no interpretation center for the MPCA.
Trekking paths and routes	There are few roads inside the MPCA for patrolling and monitoring of the forest by the Front line staff of the Forest Department. Besides, there are few small foothpaths paths intersecting the MPCA area. There is a natural border on the northern side of the MPCA by the River “Sevoke Khola”.
Departmental Interventions	Departmental interventions including soil and water conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Abelmoschus moschatus</i> (Malvaceae), <i>Alpinia calcarata</i> (Zingiberaceae), <i>Abrus pulchellus</i> (Fabaceae), <i>Aristolochia indica</i> (Aristolochiaceae), <i>Aphanamixis polystachya</i> (Meliaceae), <i>Celastrus paniculatus</i> (Celastraceae), <i>Chlorophytum tuberosum</i> (Asparagaceae), <i>Cinnamomum bejolghota</i> (Lauraceae), <i>Dioscorea prazeri</i> (Dioscoreaceae), <i>Drosera burmanni</i> (Droseraceae), <i>Gmelina arborea</i> (Lamiaceae), <i>Gynocardia odorata</i> (Achariaceae), <i>Hemidesmus indicus</i> (Apocynaceae), <i>Holarrhena pubescens</i> (Apocynaceae), <i>Oroxylum indicum</i> (Bignoniaceae), <i>Phyllanthus emblica</i> (Phyllanthaceae), <i>Piper longum</i> (Piperaceae), <i>Stephania japonica</i> var. <i>discolor</i> (Menispermaceae), <i>Stereospermum colais</i> (Bignoniaceae), <i>Terminalia chebula</i> (Combretaceae)

MPCA site	Sursuti
Entrance structure	An entrance board on a pillar is there to recognize the MPCA. However, it needs renovation and re-painting. Descriptive boards for other related information are needed. No evidence of plastic debris, other waste materials are found near entrance area. The gate is open for public entry into the MPCA area. The MPCA entrance is on the left side of the road which leads to an interior forest patch having a swampy land and small perennial stream. There is a footpath across the MPCA. Grazing is common in and around the periphery of the MPCA.
Boundary information	Boundary (100 ha area) is well defined in the topographical sheets. Stones are rarely placed along the MPCA border. The stone chip road is there inside the MPCA. Tourist vehicle and safari moves almost every day across the MPCA.
Disturbance level*	Highly disturbed Moderately disturbed Least Disturbed Disturbance score = 24 out of 55
Communication and interpretation utilities	There is no interpretation center for the MPCA.
Trekking paths and routes	There are few roads inside the MPCA for transportation to various surrounding villages. Besides, there are few small trekking paths intersecting the MPCA area.
Departmental Interventions	Departmental interventions including soil and water conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Alpinia calcarata</i> (Zingiberaceae), <i>Abrus pulchellus</i> (Fabaceae), <i>Aristolochia indica</i> (Aristolochiaceae), <i>Aphanamixis polystachya</i> (Meliaceae), <i>Cinnamomum bejolghota</i> (Lauraceae), <i>Drosera burmanni</i> (Droseraceae), <i>Gynocardia odorata</i> (Achariaceae), <i>Hemidesmus indicus</i> (Apocynaceae), <i>Holarrhena pubescens</i> (Apocynaceae), <i>Hyptis suaveolens</i> (Lamiaceae), <i>Oroxylum</i>

indicum (Bignoniaceae), *Phyllanthus emblica* (Phyllanthaceae), *Piper longum* (Piperaceae), *Stephania japonica* var. *discolor* (Menispermaceae), *Stereospermum colais* (Bignoniaceae), *Wrightia arborea*

MPCA site	Tonglu
Entrance structure	<p>Entrance with arch gate is severely damaged. No evidence of plastic debris, other waste materials are found near entrance area. The entrance gate need to be renovated and repainting of arch may be needed. The gate is open for public entry into the MPCA area. The MPCA entrance is on the roadside, there is a footpath across the MPCA. Grazing is common in the periphery and leopard attack on cattle is witnessed inside the MPCA.</p>
Boundary information	<p>Boundary (230 ha area) is well defined in the topographical sheets. Stones are rarely placed along the MPCA border especially near public footpath. The road which connects Darjeeling to Sandakpu becomes the boundary on the south-east side of the MPCA. The concrete road itself is a boundary on one side as the area is of having steep watershed. MPCA area can be expanded in the eastern and northern side to cover larger area under MPCA. The community composition of the forests located in the eastern side is quite different from the western side due to the variation in the aspects.</p>
Disturbance level*	<p>Highly disturbed Moderately disturbed Least Disturbed Disturbance score = 24 out of 55</p>
Communication and interpretation utilities	<p>There is no interpretation center. However, local people are engaged guide to the tourist and they sometime explain about the MPCA. There are attractions like trekking in the area as it has variation in landscape and along the altitudinal gradient. However, there is a good trek from Dhotrey village to Tonglu with paved stones across the MPCA.</p>
Trekking paths	<p>There is one good trek from Dhotrey village to Tonglu with paved</p>

and routes	stones which goes across the MPCA. Besides, there are few small trekking paths intersecting the MPCA area.
Departmental Interventions	Departmental interventions including soil and water conservation measures were undertaken until funds are allocated for MPCA. After that, interventions are being carried out as and when necessary.
Important medicinal plant species recorded	<i>Aconitum ferox</i> (Ranunculaceae), <i>Aconitum palmatum</i> (Ranunculaceae), <i>Aconitum spicatum</i> (Ranunculaceae), <i>Allium wallichii</i> (Amaryllidaceae), <i>Berberis aristata</i> (Berberidaceae), <i>Panax pseudoginseng</i> subsp. <i>Himalaicus</i> (Araliaceae), <i>Paris polyphylla</i> (Melanthiaceae), <i>Picrorhiza kurroa</i> (Plantaginaceae), <i>Rubia manjith</i> (Rubiaceae), <i>Swertia chirayita</i> (Gentianaceae), <i>Swertia hookeri</i> (Gentianaceae), <i>Taxus wallichiana</i> (Taxaceae), <i>Thalictrum foliolosum</i> (Ranunculaceae),

1.5 Research activities undertaken

To collate the information related to research studies undertaken in MPCA and adjoining areas in West Bengal, following keywords were used in 'Google Scholar' webpage: MPCA, West Bengal, Medicinal Plants, Sursuti, Bonnie camp, Sevoke, Rajabhatkhawa, Tonglu, Dhotrey, Terai, Duar and Darjeeling. The presence of these keywords was made compulsory during the search. The resulting search results were further scrutinised to list the studies that gave emphasis on medicinal plants. The shortlisted studies were read through and pertinent details were collected from each study. Following are the information gathered from 15 most relevant studies that included MPCA and adjoining areas.

Biswas, Kishor, Chandra Ghosh, and A. P. Das. (2020) Status of medicinal plants in MPCAs and adjoining areas in terai-duars region of West Bengal, India. *Plant Archives* 20(2), 4833-4844.

This study recorded the occurrence of 397 species of medicinally important plants belonging to 283 genera and 96 families, including 9 spp. of pteridophytes. Most of the recorded plants were herbs and found to be used medicinally and few for their aromatic property. Of these, 38 species were recognized as threatened ones. Comparison with previous report nicely showed fruitfulness of establishing the MPCAs to conserve threatened medicinal and accompanying non-medicinal plants those required conservational attention. It also suggests proper conservation strategies to protect this important green wealth of the country.

Pramanik, Barin Kumar, and Debabrata Das. (2015) Preliminary phytosociological study of medicinal plants conservation area (MPCA) at forests of Buxa Tiger Reserve (BTR) and Gorumara National Park. *Journal of Environmental Science, Toxicology, Food Technology* 9(4): 64-77.

The study reflects the phytosociological characters of vegetation of Lataguri area in Jalpaiguri forest Division at Jalpaiguri District, West Bengal. The study area was the Lataguri Range (Gorumara) of Bichabhanga-1 of Jalpaiguri Forest Division, which included within the 200 Ha forest area represented as 'Susruti' medicinal plant conservation area (MPCA). Here, Diversity Index (H) value of tree species at Bichabhanga 1 (Lataguri Forest Range) of Gorumara National Park was found as 0.97, whereas dominance Index (cd) of tree species was observed as value 1.11, Evenness Index (e) and Species Richness Index (d) of tree species were observed as 0.97 and 3.64 respectively. The shrubby vegetation is somehow

different which exhibits old stock of vegetation as a whole in the same forest. Herbaceous vegetation exhibits heterogeneous distribution from place to place and from microsite to micro-site which vary with the alterations of seasons. The only one important medicinal plants of commercial kind found in the forest was species like *Abelmoscus moschatus*. Seasonal study of more sites for MPCA research is needful to analyze the comprehensive data to establish the community composition of the floral elements in near future. Felling of unwanted type including looping must be stopped in the restricted site. Collection of Orchids, ferns, medicinal plants and mushrooms including other Non Timber Forest Produces (NTFPs) should be checked through rigorous monitoring of vegetation departmentally or/and including Forest Protection Committees or/and Eco Development Committees. Need to check forest fire and illegal collection of wood and logs must be copped. Training for the local people and forest workers including students and teachers /scientists should be involved for better management of resource and conservation of nature and natural resources.

Choudhury, D. (2015). Distribution and chemo taxonomy of some members of lauraceae in Terai and Duars (Doctoral dissertation, University of North Bengal).

The Terai and Duars region politically constitute the plains of Darjeeling, whole of Jalpaiguri and Alipurduar District in West Bengal. This dissertation recorded the occurrence of 26 species covering 9 genera of Laurels were reported growing in Terai-Duars region. Artificial Dichotomous Keys for the recorded genera and species were constructed based on significant reliable and easily observable vegetative, flower and fruit characters. All these species were enumerated alphabetically accompanied by local names, salient features, exsiccatus, availability status, flowering and fruiting periods, occurrence in Terai & Duars region and world distribution. The species of Laurels are economically very important mainly these are used as medicinal resources.

Das, A.P., C. Ghosh, A. Sarkar, R. Biswas, K. Biswas, D. Chowdhury, A. Lama, S. Muktan and A. Chowdhury (2010). Preliminary report on the Medicinal Plants from three MPCAs in Terai and Duars of West Bengal, India. *Pleione* 4(1): 90 - 101.

Four season floristic survey in these MPCAs resulted in the record of 309 species of potential Medicinal Plants. Out of these, 25 species are representing the list of 46 threatened species.

Biswas, K., & Das, A. P. (2021). Rare, Endemic and Threatened Plants of Terai–Duars Belt of West Bengal, India. *Indian J. Applied & Pure Bio. Special Volume*, 40, 45.

Being located at the foot of the Darjeeling part of the Eastern Himalayas, Terai-Duars region is very rich in phytodiversity and unique habitats of a number of rare, endemic and threatened elements. This study documented a total of 41 species (22 Endemic, 9 Endangered, 2 Near Threatened, 6 Vulnerable and 1 Critically Endangered) belonging to 27 families. Uncontrolled increase in anthropogenic activities leading to destruction and fragmentation of vegetations, invasion of exotic aggressive species were detected as the major threats. Though the forest departments have taken initiative to protect these plant resources by establishment of Medicinal Plants Conservation Areas (MPCA) in this belt but their objective is restricted only to the medicinal plants and their habitats. A number of medicinal as well as non-medicinal or medicinally less known threatened plants are there outside MPCAs which are but still lacking conservational attention. This study suggested further extensive study on the RET elements, their population structure and status, major threats to them and to frame the proper conservational strategies.

Ravikumar, K., Dhatchanamoorthy, N., Arisdason, W., & Saha, D. (2019). Distributional records for three little-known and rare flowering plants from West Bengal, India. *Pleione* 13 (1), 198-202.

Three angiospermic taxa, *Ixora anthroantha* Bremek. (Rubiaceae), *Psychotria erratica* var. *pedunculata* Hook.f. (Rubiaceae) and *Peliosanthes violacea* var. *minor* Baker (Asparagaceae) have been collected from the North Sevoke Medicinal Plants Conservation Area located at the feet of Darjeeling Hills, West Bengal, India during 2017. These are now reported here as first record of occurrence for the state of West Bengal.

D'Souza, N. M., Ishwar, N. M., Sumra, I., & Vyas, P. (2017). Participatory Wetland Management: A Solution to Conservation Challenges in the Sundarbans Biosphere Reserve. *Wetland Science*, 575–587.

The study assessed the effectiveness of JFMCs in conservation of natural resources in the Sundarbans. The active efforts of the Forest Department and JFMCs to look after the families who have suffered due to human-wildlife conflicts have served to build trust with the communities. This in turn has made local communities more responsive to the conservation interventions being piloted and implemented by the Forest Department.

Thapa, N. (2016). Studies on the Pteridophytic flora of Darjiling Hills. Ph. D Thesis. University of North Bengal, Siliguri.

This study attempted taxonomic enumeration and documentation of pteridophyte flora of Darjiling hills with preparation of artificial keys for easy identification. Ecological status of individual species taking into consideration the horizontal and vertical distribution of the different species of pteridophyte in the hills of Darjiling.

Rodda, S.R., Thumaty, K.C., Jha, C.S. and Dadhwal, V.K. (2016). Seasonal variations of carbon dioxide, water vapor and energy fluxes in tropical Indian mangroves. *Forests* 7: 35.

This study shown high daytime uptake of CO₂ over three forests in Sundarban, India; -2.5 to $45.9 \mu\text{mol m}^{-2} \text{s}^{-1}$ over Bonnie Camp during summer, 2011.

Das, D. (2017). Ecological Studies on VA-Mycorrhizal Fungal Spore Density in Rhizosphere Soil of Dutch white Clover Plant Community in Darjeeling Himalaya. *Journal of Research in Agriculture and Animal Science* 4(11), 1-7.

Clover of white kind in Darjeeling is common which is interesting as fodder as well as soil binder. Clover plants have been studied along with seasonal variation of vesicular mycorrhizal fungal spore density in rhizospheric soils of Darjeeling Himalaya for potential use of those species in near future as mycorrhizal biofertilizers. Soil samples were collected in post monsoon during 2014-2015 from 5 selected study sites in Darjeeling region. Separation of VAM fungal spores from each soil sample was done by using wet sieving and decanting technique method. The soil composition showed varied degree of spore numbers as it perhaps due to the high variation of soil organic matter (SOM). Among the spore studied maximum spore was under the genus *Glomus*, followed by *Gigaspora*.

Santanu Saha (2015) Diversity of medicinal plants and their conservation in Darjeeling Hills of Eastern Himalayas, India. S. K. Tripathi (Ed.) *Biodiversity in Tropical Ecosystems*, 423-459

Majority of the species of the Darjeeling region is characterized by great medicinal importance and thus the species are facing high degree of threat. A case study was carried out in four distinguishable forest subtypes (Sites 1, 2, 3 and 4) of Singalila range located between 1800 m and 3100 m altitudinal gradient. A total of 6, 8 and 41 medicinally important tree, shrub and herb species were recorded. Site 1 (1800 m) had the best richness, density and diversity of species amongst all - though the over all values in other Sites were also good. The evenness and diversity values were relatively high. However, status of some plants like, *Aconitum*, *Swertia*, *Astilbe*, *Ophiopogon*, *Litsea*, *Zanthoxylum* were unsatisfactory.

Ethnomedicinal uses of the recorded plants together with in-situ and ex-situ conservation were discussed. Finally domestication of commercially viable species was recommended.

Anurag Chowdhury, Monoranjan Chowdhury and A. P. Das. (2015). *Polygonum hastatosagittatum* Makino (Polygonaceae): a new distributional record for India. Asian Journal of Biological Life Sciences, 4(1), 38-40.

Few specimens of *Polygonum hastatosagittatum* Makino, Polygonaceae, were recognized from the bulk collection of wetland plants from the natural water bodies in Duars of Himalayan biodiversity hotspot regions of West Bengal, India. This species is first time recorded from the territory of India. The taxonomic features, pollination, ecological notes and photographs of the species are provided.

Das, A.P. & Yadav, S.R. (2011). Distribution of *Gnetum montanum* Markgraf (Gnetaceae) in Terai and Duars of West Bengal, India. Pleione 5(1): 205 – 207.

Field surveys in many parts of Terai and Duars of West Bengal during 2009 – 2011, including Mahananda Wildlife Sanctuary, Chapramari Wildlife Sanctuary, Sursuti Reserve Forests (Lataguri), Gorumara National Park, Raja Bhatkhawa Forests, Buxa Forests, etc. recorded the occurrence of *Gnetum montanum* in different forests of the study area. It is interesting to note that the species is quite often found in different forests throughout this range, starting from Mahananda Wildlife Sanctuary in the east to Buxa Tiger Reserve on the west. Preferred fodder for elephants; local people use paste of inflorescence in skin diseases and seeds against fever.

Choudhury D, Biswas R, Mandal P, Das AP. (2013) Diversity of *Cinnamomum* Schaeffer (Lauraceae) in Terai and Duars region of West Bengal, India. Pleione 7(2):441–48

From the survey six species of *Cinnamomum* were collected from different parts of Terai & Duars region in West Bengal. One artificial dichotomous key has been prepared for their easy recognition and species were enumerated below alphabetically accompanied by local names, salient features, exsiccatae, availability status, flowering and fruiting time, occurrence in Terai & Duars region and geographic distribution. Hence, this study reveals that the species of *Cinnamomum* are very important for economic point of view. But over exploitation of some *Cinnamomum* species, especially collection of bark and leaves cause serious damage to the population of these plants. Besides this, due to loss of habitats caused by deforestation, monoculture and extensive tourism adversely affect the rich diversity of *Cinnamomum* in this

region. So, an urgent attention is required to protect these valuable species from destruction in their original habitat. Though none of these local species are under threat for their survival, even then it is important to look for the maintenance of their good population structure in the natural habitat.

Gupta SK and Mandal P (2014). Diversity of *Litsea* Lamarck (Lauraceae) in Terai and Duars regions of West Bengal, India. *Pleione*, 8(1):68-78. 23.

From the present survey, nine species of *Litsea* were recorded. An artificial Key for the recorded species were constructed based on significant vegetative, flower and fruit characters. All these species were enumerated below alphabetically accompanied by local names, salient features, exsiccatus, availability status, flowering and fruiting time, occurrence in Terai & Duars region and geographic distribution. The present collection of the species from Terai and Duars is a new record of its occurrence in West Bengal. Present study also indicates that several medicinal as well as economically useful species of *Litsea* are important assets in the vegetation of Terai and Duars belt. However, with the rapid extension of human settlement areas, establishment of tea gardens, metalled roads, illegal timber extraction, monoculture plantations (mostly with fast growing exotic species), extensive tourism related activities and other socio-economic developmental activities adversely affecting the rich diversity of pristine vegetation of the entire area in which most of the presently recorded species of *Litsea* are surviving. The activities in the name of ‘eco-tourism’ are creating havoc in many places especially in the Lataguri – Gorumara region. Active steps for the conservation under proper surveillance are deemed essential since a thorough scientific research is certain to reveal their benevolent aspects as well as ecological functions.

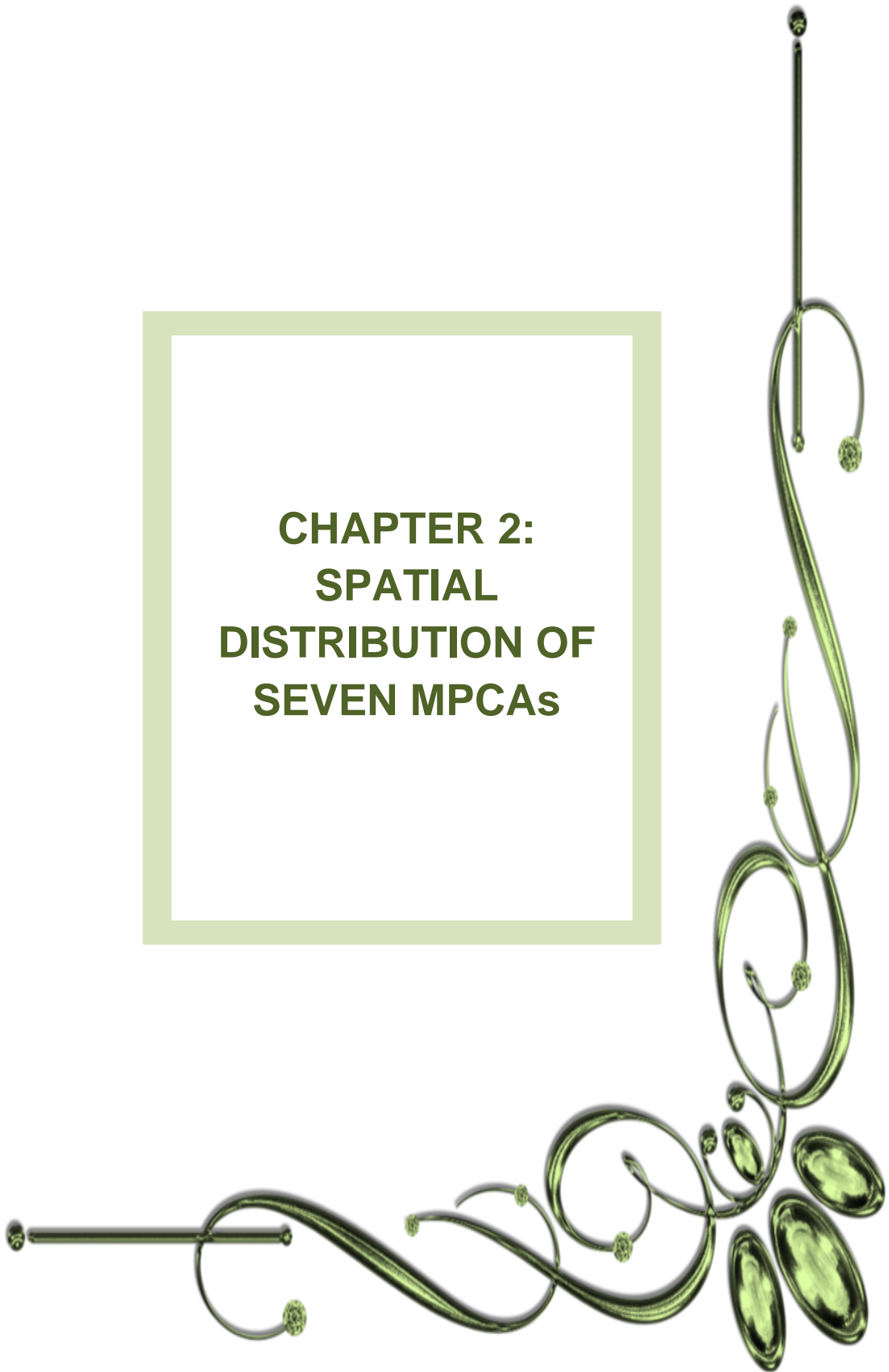
Purnima Mallick, (2020). Scientific Forest Resource Management: A Trajectory Towards Bioeconomy – A Case Study of Jalpaiguri District. *Business Spectrum*, Special Volume March 2020, 27-36.

This study addressed how the forest resources of Jalpaiguri are utilized. To fulfil this objective both primary and secondary data have been collected. Some forest officers from Jalpaiguri, Baikunthapur and Gorumara National Park of the district have been randomly selected to obtain the information on forest management. This study reveals that increasing demand for forest products, inappropriate management practices leads to depletion of forest resources here in this district. So, scientific forest resource management system with the

context of evolving bioeconomy model may be helpful for the protection and preservation of renewable biological resource.

Anonymous (2009) Management Plan of Tonglu and Dhotrey Medicinal Plant Conservation Area. DFO, Silviculture (Hills) Division, Darjeeling India

**CHAPTER 2:
SPATIAL
DISTRIBUTION OF
SEVEN MPCAs**





Marking of MPCA boundary by taking GPS coordinates

2.1 Introduction

Systematic mapping of landscapes that are rich in medicinal plant populations with a help of current technical advances in acquiring satellite images provides insight into the areas or locations where the conservation has to be initiated. Such maps are required to understand the extent of protection needed and how efficiently and effectively it could be undertaken. The lat long coordinates measured along the boundaries become the baseline data for measuring the spatial distribution of any selected landscape. One of the objectives of this project was to develop the spatial distribution maps of seven MPCAs in West Bengal using spatial mapping tools. This was attempted through documentation of secondary information available in the previous MPCA report and GIS mapping of the boundary of seven MPCAs to arrive at a complete picture of spatial distribution of seven MPCAs.

2.2 Methodology

Firstly, site information documented in the previous MPCA report, prepared as part of CCF-II program, was collected. Following details: latitude, longitude, altitude, boundaries of the seven MPCA locations, were gathered from the report. An innovative application of using open source GIS (Q GIS ver 2.8.2) software technology was envisaged for mapping the seven MPCA landscape in the state. This task involves map generation with actual location information. The geographical distribution maps were developed for seven MPCA sites using GIS tool. This tool used vector and raster formats (vector format was used for administrative boundaries and occurrence records, while raster format was used for the altitude sourced from ALOSWorld3D-30m (AW3D30) version 2.2). The information was processed from multiple measurements latitude and longitude coordinates at seven MPCAs undertaken during the field surveys of botanical team. These maps are expected to provide reliable information to forest managers, researchers and decision makers, and guide the conservation activities to be undertaken in the MPCA areas.

2.3 MPCA-wise satellite map showing the boundaries

The mapping process was carried out to understand the spatial distribution of seven MPCAs established in West Bengal. Through this exercise, the precise locations of MPCAs were depicted in the state map with the information provided by current field surveys. The GPS coordinates of multiple locations along the boundary is provided in Annexure 2.



Figure 3. Locations of seven MPCAs depicted in the state map of West Bengal

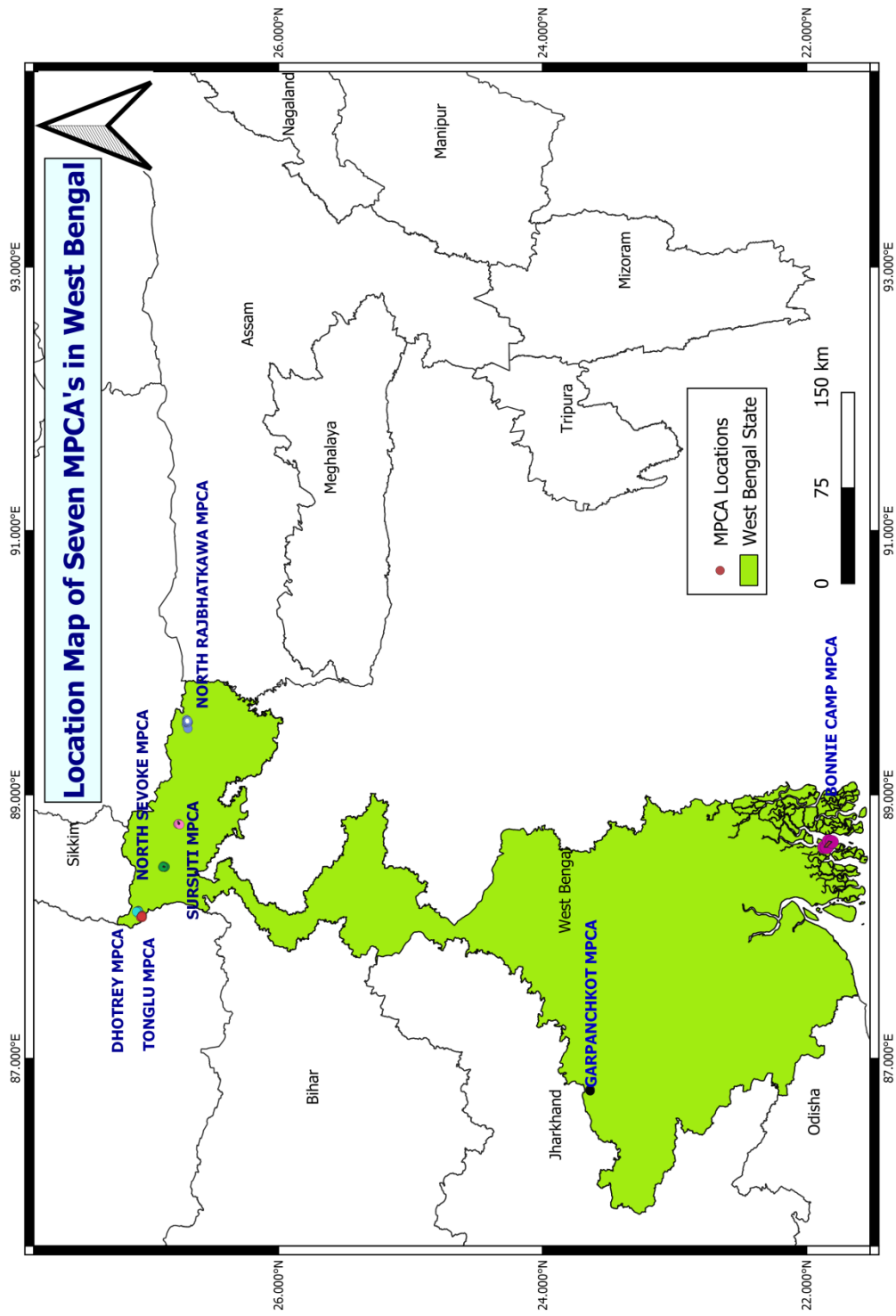


Figure 4. Spatial distribution map of Bonnie camp MPCA



sathya.sangeetha@tdu.edu.in
GIS@CCNR@TDU-28.12.21

Figure 5. Spatial distribution map of Dhotrey MPCA

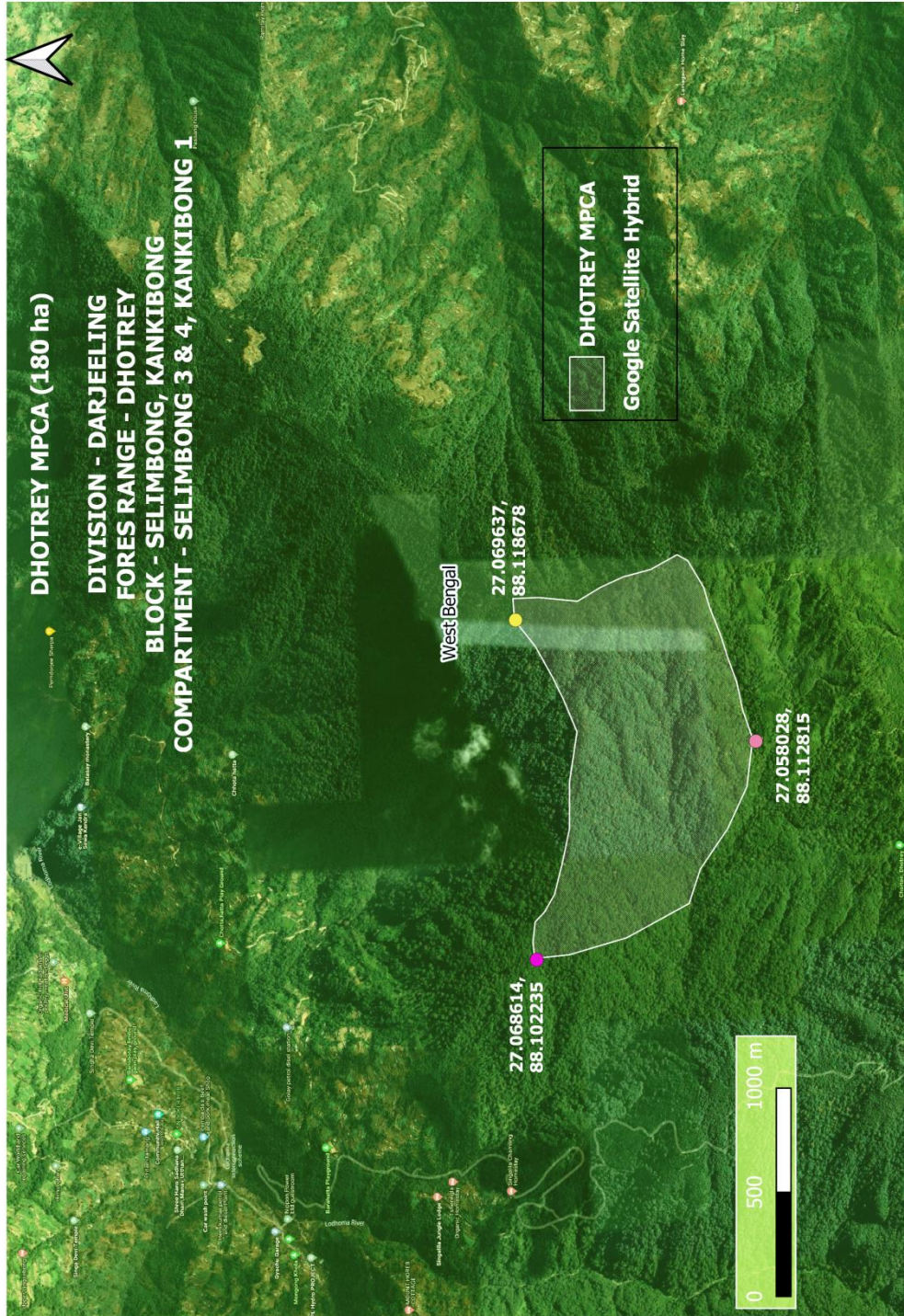


Figure 6. Spatial distribution map of Garpanchkot MPCA

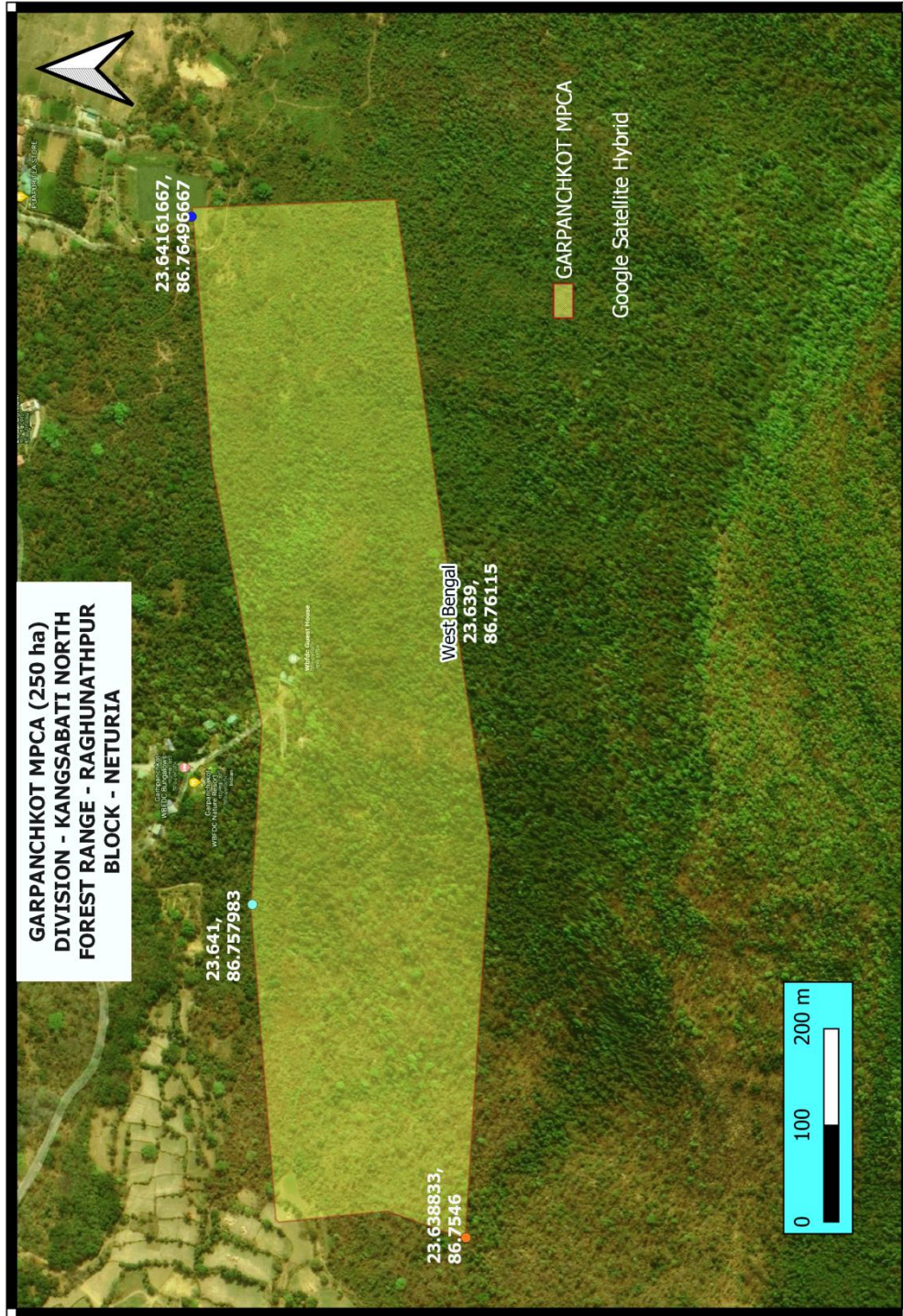


Figure 7. Spatial distribution map of North Rajabhatkhawa MPCA



Figure 8. Spatial distribution map of North Sevoke MPCA

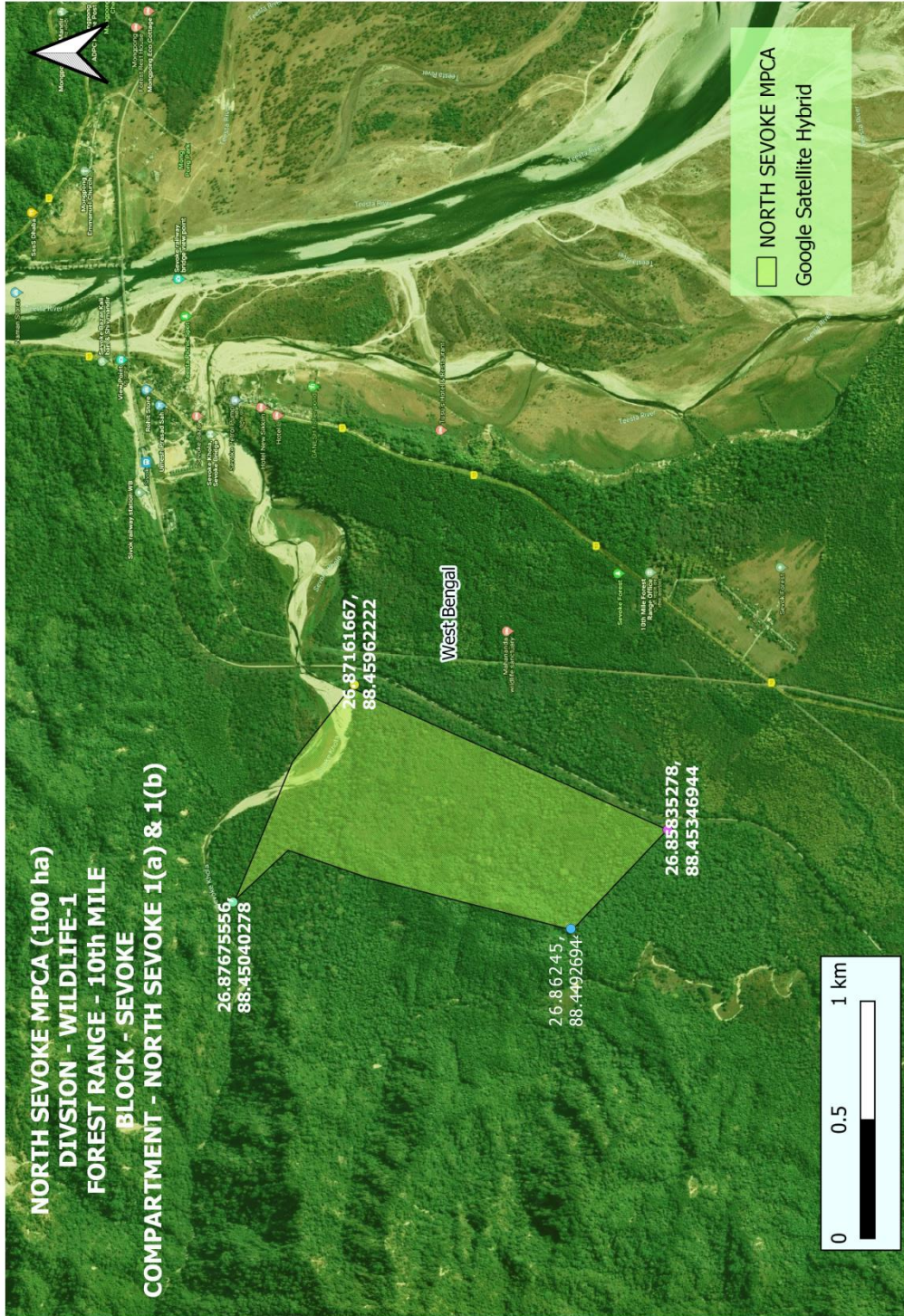


Figure 9. Spatial distribution map of Sursuti MPCA

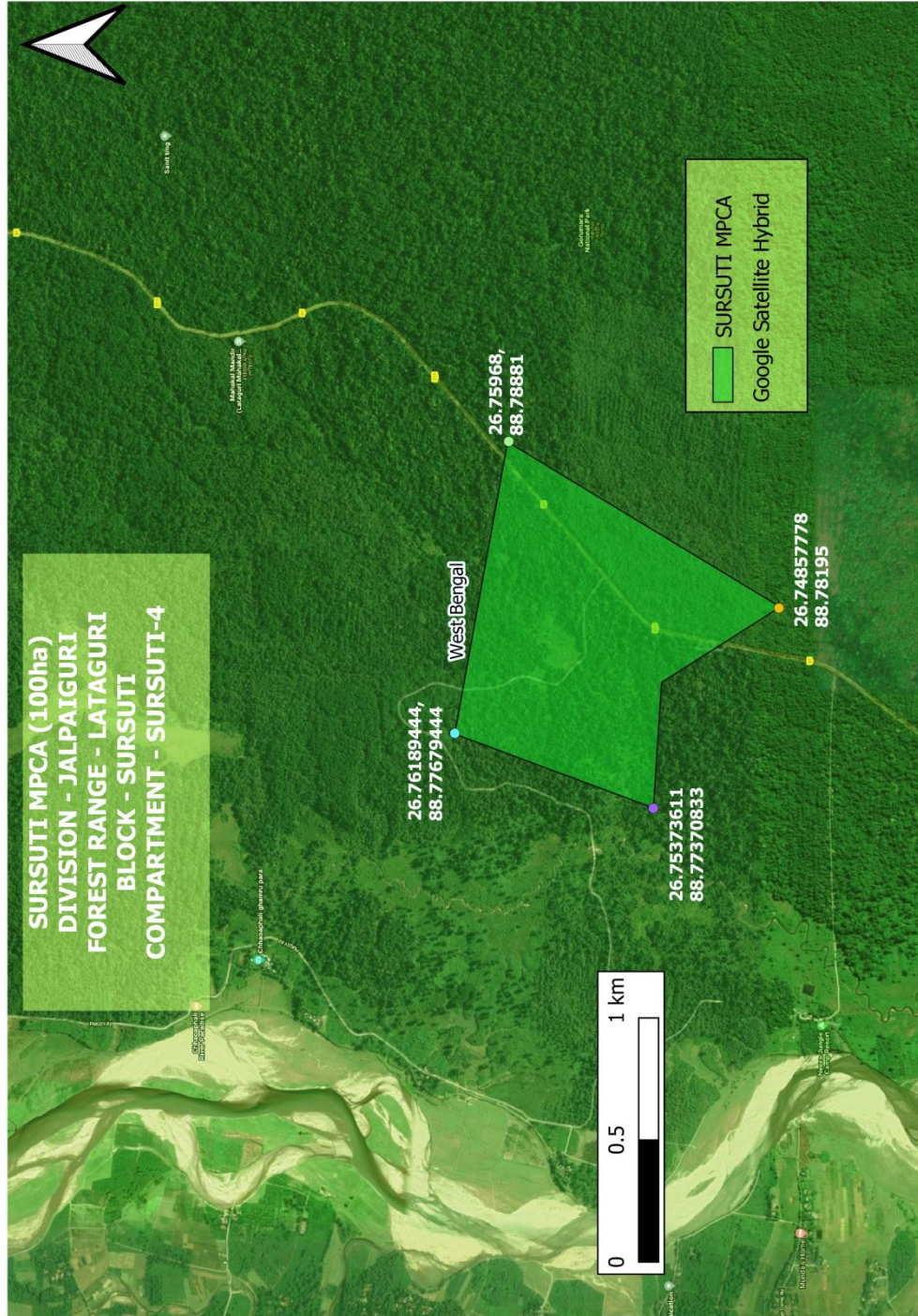
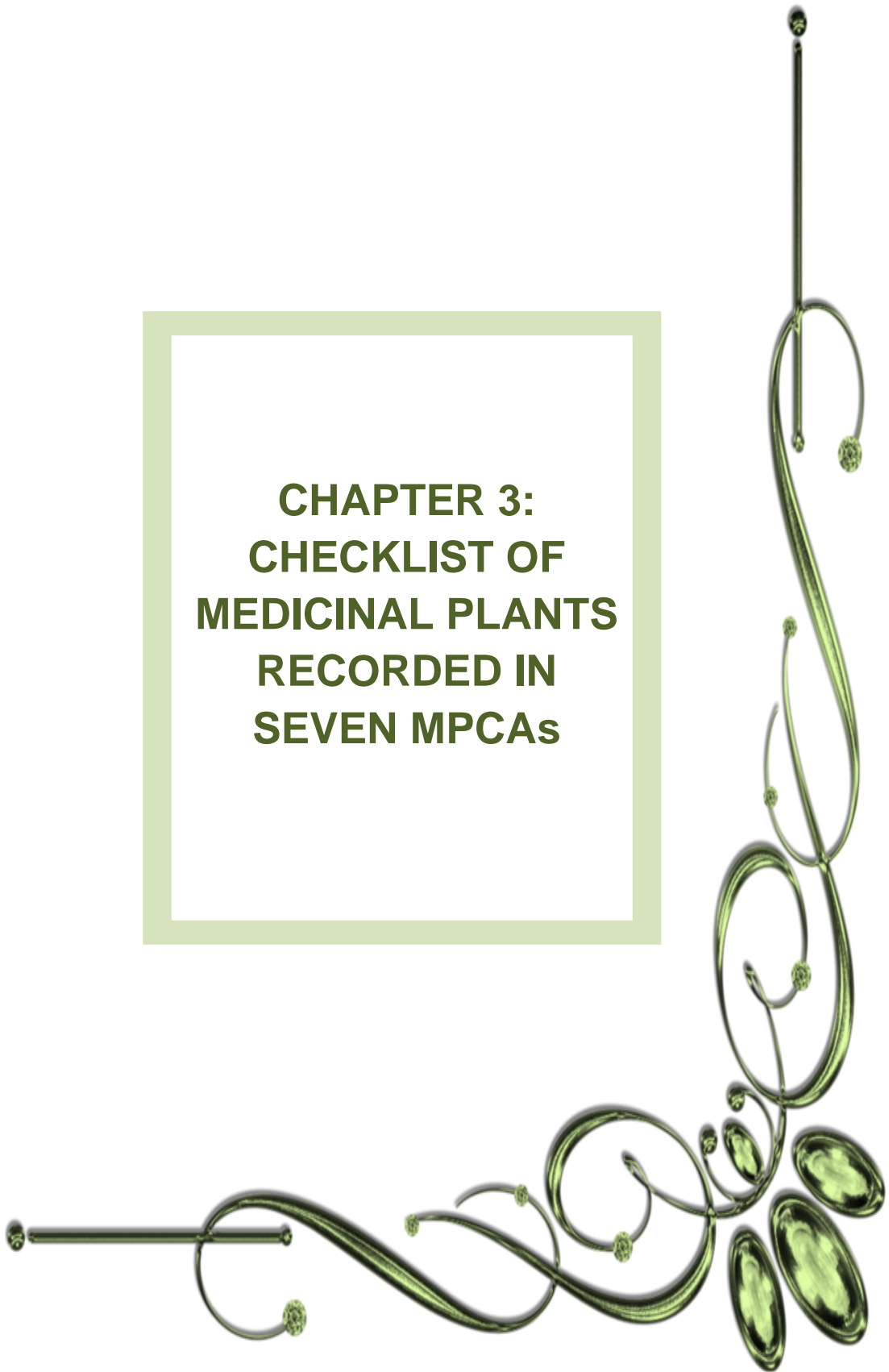


Figure 10. Spatial distribution map of Tonglu MPCA



**CHAPTER 3:
CHECKLIST OF
MEDICINAL PLANTS
RECORDED IN
SEVEN MPCAs**





Eriocapitella vitifolia

3.1 Introduction

It is a known fact that every species in the world has an inherent range of genetic identities contributing to its genetic richness and diversity. It is important that species are conserved in its natural habitats in order to undergo natural evolutionary process as a way to maintain their genetic diversity and viable populations on its own. Though there are sanctuaries, protected areas, national parks, etc. accomplishing the conservation and protection of wild natural habitats, plants of medicinal values need special attention as they are extracted in large volumes from their natural habitats. If the extraction of medicinal plants from wild continues to happen in the pace, some of them would be eliminated from their natural habitats. In this context, natural habitats, which are relatively undisturbed forest areas hosting rich diversity of medicinal plants especially of conservation concern species, need to be identified and maintained as in-situ conservation sites aka Medicinal Plants Conservation Areas (MPCAs).

The State Forest Department of West Bengal has established seven Medicinal Plants Conservation Areas (MPCAs) to conserve and protect the medicinal plant resources covering different forest types in the state. At the time of establishment of MPCAs, the listing of medicinal plant species was done. Apart from this botanical exercise, there have not been any further research works planned or initiated to understand the distribution, growth and functioning of medicinal plants captured in the MPCA network across the state. The absence of knowledge and information about many aspects of MPCAs has given less scope for forest managers and other relevant stakeholders to measure the impact of conserving medicinal plants and also to maintain the MPCAs in the long run. This study was intended to reinventorise and document the medicinal plants diversity in seven MPCAs through conducting seasonal vegetation surveys. This study is expected to achieve (1) the confirmation of continuous presence of medicinal plant species that are already documented in the previous botanical surveys, and (2) the documentation of new medicinal plant species that are missed during the previous botanical surveys.

3.2 Methodology

The qualitative assessment of medicinal plants especially of conservation concern species was undertaken from October 2017 to October 2021 in 7 MPCAs in West Bengal to capture the maximum medicinal flora present in MPCAs. The qualified and experienced botanists from FRLHT, Bengaluru conducted the botanical surveys in all 7 MPCAs. The medicinal

plants species in reproductive stages were collected for herbarium specimen with appropriate field number and notes. Floristic inventory was conducted repeatedly in all the seasons to familiarise with the vegetation in different phenological stages and to record the existence of even ephemerals. The preparation of botanical profiles of the vegetation would help us to locate the populations of conservation concern medicinal plant species in the MPCAs. The repeated surveys in all the seasons covering different plant phenological phases would enable us to assess the change in the population status of various priority species. Other species observed were recorded for their presence in the three MPCAs.

Specimens were processed in the field station every evening as per the standard method such as treatment with spirit, tagged with the specimen field no. and pressed with the help of herbarium press. They were brought to the FRLH Herbarium at the end of the survey tour and further processed. These voucher specimens were then mounted on the standard herbarium sheets, properly pasted and stitched wherever required (particularly having large fruits or capsules with seeds). They were then identified by the expert taxonomist consulting various related published flora viz., Flora of West Bengal, Flora of Bhutan, Flora of India and various herbaria and rawdrugs repository viz., Herbarium in University of North Bengal, Siliguri, Herbarium in Botany Department, Calcutta University and National Herbarium on Medicinal Plants, FRLHT, Bengaluru. They are then properly labelled with the standard labels having taxonomic and habitat information. These specimens are being scanned and digitized by entering the related data in the specified formats. This study was intended to prepare a consolidated checklist of medicinal plant species in all 7 MPCAs.

Following are the sampling methods to inventory the new plant species in the MPCA sites and also to account the presence of plant species that were already recorded in the database:

- ❖ A checklist of plant species that are already recorded in the database is prepared for each MPCA site
- ❖ Datasheets are prepared separately for each MPCA site and used during the field survey
- ❖ Floristic inventory is planned to be conducted in two field surveys: pre-monsoon and post-monsoon period
- ❖ In the field, plant inventorisation is conducted using the trails that are already established in the MPCA sites.
- ❖ GPS readings and elevation data will be recorded at MPCA locations

- ❖ Along the trail, the plants (canopy trees, lianas, climbers, shrubs and herbs) that are present in 20 meters in either direction from the trail are accounted. During the plant inventurisation, plant species that are found to be new record are added to the checklist and their phenological status is noted. In the case of plants that are already included in the checklist, the current status is only recorded.
- ❖ During the field survey, plant species that were already included in the checklist is examined for their presence, besides adding new plant species to the checklist.
- ❖ In the case of new record of plant species, photographs of plant parts are taken and voucher specimens are collected for further confirmation of species identification
- ❖ The voucher specimens were preserved systematically and stored in the FRLH Herbarium for future references
- ❖ In addition, these preserved voucher specimens were scanned as part of digitisation of herbarium specimens
- ❖ New plant species that are recorded during the field survey are examined for endemism referring pertinent literatures and list of species endemic to West Bengal from the MPCA sites is also prepared. Besides, the list of species belonging to threatened category is also prepared following FRLHT's CAMP report
- ❖ To examine the species similarity among sites an agglomerative hierarchical clustering is performed, using Jaccard's index

Prior to the field survey, the information was given well in advance through emails and phone calls to concerned Divisional Forest Officers and Range Forest Officers to take permission, and also to make logistic arrangements. It has been made sure in every field trip to MPCAs to meet the concerned ACFs and RFOs to brief them about this project. In all the field surveys, frontline staffs have accompanied the botanisation team members to facilitate field activities.

3.3 Number of medicinal plants recorded across 7 MPCAs

Following the approved and well-designed research methods, field surveys were carried out to reinventorise the medicinal plant species in 7 MPCA sites, and also to account the presence of plant species that were already recorded during the previous botanical surveys. It was decided to conduct pre-monsoon and post-monsoon field surveys in each MPCA site to capture maximum number of medicinal plant species of different life forms especially herbs and annuals that are expected to be in full growth and bloom after monsoon rains.

The seasonal botanical surveys undertaken at the time of establishment of seven MPCAs captured as many as 891 species. This is around 32% of total medicinal plant diversity of the West Bengal state (2800 species). The botanical surveys conducted under this study yielded a total of 1270 medicinal plant species that are wild and naturalized to seven MPCA sites (Table 6). The current study captured 45.3% of state medicinal plants diversity with 379 species newly recorded across seven MPCA sites. The numerical account of medicinal plant species documented in each MPCA is provided in Table 7. The details of MPCA-wise medicinal plant diversity are provided in Annexure 3-9.

Table 6. An account of medicinal plants diversity documented in previous surveys at the time of establishment and current surveys in seven MPCAs

MPCA	Medicinal plants diversity	
	Recorded earlier	Current study
Bonnie camp	30	96
Dhotrey	154	313
Garpanchkot	206	329
North Rajabhatkawa	249	340
North Sevoke	216	343
Susruti	216	387
Tonglu	254	304
Overall	891	1270

Table 7. Checklist of medicinal plant species that are recorded in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1	<i>Abelmoschus moschatus</i>	Malvaceae	Herb	0	0	0	0	1	0	0
2	<i>Abies densa</i>	Pinaceae	Tree	0	1	0	0	0	0	1
3	<i>Abrus precatorius</i>	Fabaceae	Climber	0	0	1	0	0	0	0
4	<i>Abrus pulchellus</i>	Fabaceae	Climber	0	0	0	1	1	1	0
5	<i>Abutilon indicum</i>	Malvaceae	Herb	1	0	1	0	0	0	0
6	<i>Acacia caesia</i>	Fabaceae	Liana	0	0	0	0	0	1	0
7	<i>Acacia pennata</i>	Fabaceae	Liana	0	0	0	0	1	1	0
8	<i>Acampe papillosa</i>	Orchidaceae	Herb	0	0	0	1	1	1	0
9	<i>Acanthus ilicifolius</i>	Acanthaceae	Herb	1	0	0	0	0	0	0
10	<i>Acanthus volubilis</i>	Acanthaceae	Herb	1	0	0	0	0	0	0
11	<i>Acer campbellii</i>	Sapindaceae	Tree	0	1	0	0	0	0	1
12	<i>Acer pectinatum</i>	Sapindaceae	Tree	0	0	0	0	0	0	1
13	<i>Acer sikkimense</i>	Sapindaceae	Tree	0	1	0	0	0	0	1
14	<i>Achyranthes aspera</i>	Amaranthaceae	Herb	0	0	1	1	1	1	0
15	<i>Achyranthes bidentata</i>	Amaranthaceae	Herb	0	1	0	1	1	1	0
16	<i>Achyrospermum densiflorum</i>	Lamiaceae	Herb	0	0	0	1	1	1	0
17	<i>Acilepis dendigulensis</i>	Asteraceae	Herb	0	0	1	0	0	0	0
18	<i>Acmella paniculata</i>	Asteraceae	Herb	0	0	1	0	1	1	0
19	<i>Acmella radicans</i>	Asteraceae	Herb	0	0	1	0	0	0	0
20	<i>Acmella uliginosa</i>	Asteraceae	Herb	0	0	1	1	1	1	0
21	<i>Aconitum ferox</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
22	<i>Aconitum palmatum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
23	<i>Aconitum spicatum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
24	<i>Acrostichum aureum</i>	Pteridaceae	Herb	1	0	0	0	0	0	0
25	<i>Actinidia strigosa</i>	Actinidiaceae	Liana	0	0	0	0	0	0	1
26	<i>Actinodaphne obovata</i>	Lauraceae	Tree	0	0	0	1	1	1	0
27	<i>Actinodaphne</i> sp.	Lauraceae	Tree	0	0	0	0	1	0	0
28	<i>Adenostemma lavenia</i>	Asteraceae	Herb	0	0	0	0	1	1	0
29	<i>Adiantum edgeworthii</i>	Pteridaceae	Herb	0	1	0	0	0	0	0
30	<i>Adiantum lunulatum</i>	Polypodiaceae	Herb	0	0	1	0	0	0	0
31	<i>Adina cordifolia</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
32	<i>Aegialitis rotundifolia</i>	Plumbaginaceae	Shrub	1	0	0	0	0	0	0
33	<i>Aegiceras corniculatum</i>	Primulaceae	Shrub	1	0	0	0	0	0	0
34	<i>Aegle marmelos</i>	Rutaceae	Tree	0	0	1	0	0	0	0
35	<i>Aerides multiflorum</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
36	<i>Aerva lanata</i>	Amaranthaceae	Herb	0	0	1	0	0	0	0
37	<i>Aerva sanguinolenta</i>	Amaranthaceae	Herb	0	0	0	0	1	1	0
38	<i>Aeschynanthus hookeri</i>	Gesneriaceae	Herb	0	1	0	0	0	0	0
39	<i>Aeschynanthus micranthus</i>	Gesneriaceae	Herb	0	0	0	1	0	1	0
40	<i>Aeschynanthus parviflorus</i>	Gesneriaceae	Herb	0	0	0	0	0	1	0
41	<i>Afrohybanthus enneaspermus</i>	Violaceae	Herb	0	0	1	0	0	0	0
42	<i>Agapetes hookeri</i>	Ericaceae	Herb	0	1	0	0	0	0	0
43	<i>Agapetes serpens</i>	Ericaceae	Shrub	0	1	0	0	0	0	0
44	<i>Ageratum conyzoides</i>	Asteraceae	Herb	1	0	1	1	0	1	0
45	<i>Ageratum houstonianum</i>	Asteraceae	Herb	0	1	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
46	<i>Aglaia perviridis</i>	Meliaceae	Tree	0	0	0	1	1	1	0
47	<i>Aglaia spectabilis</i>	Meliaceae	Tree	0	0	0	1	0	0	0
48	<i>Agrimonia pilosa var. nepalensis</i>	Rosaceae	Herb	0	0	0	0	0	0	1
49	<i>Agrostis micrantha</i>	Poaceae	Herb	0	0	0	0	0	0	1
50	<i>Ailanthus excelsa</i>	Simaroubaceae	Tree	0	0	1	0	0	0	0
51	<i>Ailanthus integrifolia</i>	Simaroubaceae	Tree	0	0	0	1	1	1	0
52	<i>Ainsliaea aptera</i>	Asteraceae	Herb	0	0	0	0	0	0	1
53	<i>Ainsliaea latifolia</i>	Asteraceae	Herb	0	1	0	0	0	0	1
54	<i>Ajuga lobata</i>	Lamiaceae	Herb	0	0	0	0	0	0	1
55	<i>Alangium chinense</i>	Cornaceae	Shrub	0	0	0	1	1	1	0
56	<i>Alangium salviifolium</i>	Cornaceae	Tree	0	0	1	0	0	0	0
57	<i>Albizia lebbek</i>	Fabaceae	Tree	0	0	1	0	0	0	0
58	<i>Albizia odoratissima</i>	Fabaceae	Tree	0	0	1	0	0	0	0
59	<i>Allium wallichii</i>	Amaryllidaceae	Herb	0	0	0	0	0	0	1
60	<i>Allophylus cobbe</i>	Sapindaceae	Shrub	0	0	0	1	0	0	0
61	<i>Allophylus simplicifolius</i>	Sapindaceae	Shrub	0	0	0	0	1	1	0
62	<i>Alnus nepalensis</i>	Betulaceae	Tree	0	1	0	0	0	0	0
63	<i>Alocasia fallax</i>	Araceae	Herb	0	0	0	1	1	1	0
64	<i>Alocasia macrorrhizos</i>	Araceae	Herb	0	0	1	0	0	1	0
65	<i>Alpinia calcarata</i>	Zingiberaceae	Herb	0	0	0	1	1	1	0
66	<i>Alstonia scholaris</i>	Apocynaceae	Tree	0	0	0	1	1	1	0
67	<i>Alternanthera paronychioides</i>	Amaranthaceae	Herb	1	0	0	0	0	0	0
68	<i>Alternanthera sessilis</i>	Amaranthaceae	Herb	1	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
69	<i>Alysicarpus monilifer</i>	Fabaceae	Herb	0	0	1	1	0	0	0
70	<i>Amaranthus spinosus</i>	Amaranthaceae	Herb	0	0	1	0	0	0	0
71	<i>Amaranthus viridis</i>	Amaranthaceae	Herb	0	0	1	0	0	0	0
72	<i>Amischotolype hookerii</i>	Commelinaceae	Herb	0	0	0	1	1	1	0
73	<i>Amoora wallichii</i>	Meliaceae	Tree	0	0	0	0	0	1	0
74	<i>Amorphophallus paeoniifolius</i>	Araceae	Herb	0	0	1	0	0	0	0
75	<i>Ampelocissus barbata</i>	Vitaceae	Climber	0	0	0	1	1	1	0
76	<i>Ampelocissus latifolia</i>	Vitaceae	Climber	0	0	1	0	0	0	0
77	<i>Ampelocissus sikkimensis</i>	Vitaceae	Climber	0	0	0	1	1	1	0
78	<i>Anaphalis busua</i>	Asteraceae	Herb	0	0	0	0	0	0	1
79	<i>Anaphalis contorta</i>	Asteraceae	Herb	0	1	0	0	0	0	1
80	<i>Anaphalis margaritacea</i>	Asteraceae	Herb	0	1	0	0	0	0	1
81	<i>Anaphalis royleana</i>	Asteraceae	Herb	0	1	0	0	0	0	0
82	<i>Anaphalis triplinervis</i>	Asteraceae	Herb	0	1	0	0	0	0	1
83	<i>Andrographis paniculata</i>	Acanthaceae	Herb	0	0	1	1	0	0	0
84	<i>Androsace sarmentosa</i>	Primulaceae	Herb	0	0	0	0	0	0	1
85	<i>Anemone howellii</i>	Ranunculaceae	Herb	0	1	0	0	0	0	0
86	<i>Angiopteris evecta</i>	Marattiaceae	Herb	0	0	0	0	0	1	0
87	<i>Anisomeles heyneana</i>	Lamiaceae	Herb	0	1	0	0	1	1	0
88	<i>Anisomeles indica</i>	Lamiaceae	Herb	0	0	1	1	1	1	0
89	<i>Anthogonium gracile</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
90	<i>Antidesma acidum</i>	Phyllanthaceae	Shrub	0	0	0	0	0	1	0
91	<i>Antidesma montanum</i>	Phyllanthaceae	Tree	0	0	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
92	<i>Antigonon leptopus</i>	Polygonaceae	Climber	0	0	1	0	0	0	0
93	<i>Aphanamixis polystachya</i>	Meliaceae	Tree	0	0	0	1	1	1	0
94	<i>Apluda mutica</i>	Poaceae	Herb	0	0	1	0	0	0	0
95	<i>Aporosa lindleyana</i>	Euphorbiaceae	Tree	0	0	0	0	1	0	0
96	<i>Aralia leschenaultii</i>	Araliaceae	Tree	0	0	0	0	0	0	1
97	<i>Ardisia elliptica</i>	Myrsinaceae	Shrub	0	0	0	1	1	1	0
98	<i>Ardisia solanacea</i>	Primulaceae	Shrub	0	0	0	1	1	1	0
99	<i>Argentina anserina</i>	Rosaceae	Herb	0	0	0	0	0	0	1
100	<i>Argentina lineata</i>	Rosaceae	Herb	0	1	0	0	0	0	1
101	<i>Argentina microphylla</i>	Rosaceae	Herb	0	0	0	0	0	0	1
102	<i>Argentina polyphylla</i>	Rosaceae	Herb	0	0	0	0	0	0	1
103	<i>Argyreia roxburghii</i>	Convolvulaceae	Climber	0	0	0	1	1	1	0
104	<i>Arisaema concinnum</i>	Araceae	Herb	0	1	0	0	0	0	0
105	<i>Arisaema costatum</i>	Araceae	Herb	0	1	0	0	0	0	0
106	<i>Arisaema cuspidatum</i>	Araceae	Herb	0	0	0	0	0	1	0
107	<i>Arisaema erubescens</i>	Araceae	Herb	0	1	0	0	0	0	1
108	<i>Arisaema griffithii</i>	Araceae	Herb	0	0	0	0	0	0	1
109	<i>Arisaema jacquemontii</i>	Araceae	Herb	0	1	0	0	0	0	1
110	<i>Arisaema nepenthoides</i>	Araceae	Herb	0	0	0	0	0	0	1
111	<i>Arisaema speciosum</i>	Araceae	Herb	0	1	0	0	0	0	0
112	<i>Arisaema tortuosum</i>	Araceae	Herb	0	1	0	0	0	0	0
113	<i>Aristolochia griffithii</i>	Aristolochiaceae	Climber	0	0	0	0	0	0	1
114	<i>Aristolochia indica</i>	Aristolochiaceae	Climber	0	0	1	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
115	<i>Aristolochia tagala</i>	Aristolochiaceae	Climber	0	0	0	1	1	1	0
116	<i>Artemisia indica</i>	Asteraceae	Herb	0	1	0	0	0	0	1
117	<i>Artemisia vulgaris</i>	Asteraceae	Herb	0	1	0	0	0	0	0
118	<i>Artocarpus chama</i>	Moraceae	Tree	0	0	0	1	1	1	0
119	<i>Artocarpus chaplasha</i>	Moraceae	Tree	0	0	0	0	1	1	0
120	<i>Arundinaria racemosa</i>	Poaceae	Herb	0	1	0	0	0	0	1
121	<i>Arundinella bengalensis</i>	Poaceae	Herb	0	0	0	0	0	0	1
122	<i>Arundinella nepalensis</i>	Poaceae	Herb	0	1	0	0	0	0	1
123	<i>Ascocentrum ampullaceum</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
124	<i>Asparagus racemosus</i>	Asparagaceae	Climber	0	0	1	1	0	0	0
125	<i>Aspidopterys nutans</i>	Malpighiaceae	Climber	0	0	0	1	0	0	0
126	<i>Asplenium erectum</i>	Aspleniaceae	Herb	0	0	0	1	1	1	0
127	<i>Aster sikkimensis</i>	Asteraceae	Herb	0	0	0	0	0	0	1
128	<i>Aster tricephalus</i>	Asteraceae	Herb	0	0	0	0	0	0	1
129	<i>Astilbe rivularis</i>	Saxifragaceae	Herb	0	1	0	0	0	0	0
130	<i>Athyrium biserrulatum</i>	Aspleniaceae	Herb	0	0	0	1	1	1	0
131	<i>Athyrium foliolosum</i>	Aspleniaceae	Herb	0	0	0	0	0	0	1
132	<i>Avicennia alba</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
133	<i>Avicennia marina</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
134	<i>Avicennia officinalis</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
135	<i>Axonopus compressus</i>	Poaceae	Herb	0	0	0	1	1	1	0
136	<i>Ayenia grandifolia</i>	Malvaceae	Climber	0	0	0	1	1	1	0
137	<i>Ayenia herbacea</i>	Malvaceae	Herb	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
138	<i>Azadirachta indica</i>	Meliaceae	Tree	0	0	1	0	0	0	0
139	<i>Azanza lampas</i>	Malvaceae	Shrub	0	0	1	0	0	0	0
140	<i>Baccaurea ramiflora</i>	Phyllanthaceae	Tree	0	0	0	1	1	1	0
141	<i>Balakata baccata</i>	Euphorbiaceae	Tree	0	0	0	1	1	1	0
142	<i>Baliospermum montanum</i>	Euphorbiaceae	Shrub	0	0	0	1	0	0	0
143	<i>Barleria cristata</i>	Acanthaceae	Herb	0	0	0	1	0	0	0
144	<i>Barleria prionitis</i>	Acanthaceae	Herb	0	0	1	0	0	0	0
145	<i>Barleria strigosa</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
146	<i>Bauhinia acuminata</i>	Fabaceae	Shrub	0	0	0	1	1	1	0
147	<i>Bauhinia vahlii</i>	Fabaceae	Liana	0	0	0	1	1	1	0
148	<i>Bauhinia variegata</i>	Fabaceae	Tree	0	0	0	1	1	1	0
149	<i>Bauhinia malabarica</i>	Fabaceae	Tree	0	0	0	0	0	1	0
150	<i>Begonia aconitifolia</i>	Begoniaceae	Herb	0	1	0	0	0	0	0
151	<i>Begonia josephi</i>	Begoniaceae	Herb	0	1	0	0	0	0	0
152	<i>Benkara fasciculata</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
153	<i>Berberis angulosa</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
154	<i>Berberis aristata</i>	Berberidaceae	Shrub	0	1	0	0	0	0	1
155	<i>Berberis hookeri</i>	Berberidaceae	Shrub	0	1	0	0	0	0	1
156	<i>Berberis insignis</i>	Berberidaceae	Shrub	0	1	0	0	0	0	1
157	<i>Berberis thomsoniana</i>	Berberidaceae	Shrub	0	1	0	0	0	0	1
158	<i>Berberis umbellata</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
159	<i>Berberis wallichiana</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
160	<i>Berchemia floribunda</i>	Rhamnaceae	Shrub	0	0	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
161	<i>Betula alnoides</i>	Betulaceae	Tree	0	1	0	0	0	0	0
162	<i>Bidens biternata</i>	Asteraceae	Herb	0	0	0	0	0	0	1
163	<i>Bidens pilosa</i>	Asteraceae	Herb	0	0	1	1	0	1	0
164	<i>Biophytum sensitivum</i>	Oxalidaceae	Herb	0	0	1	0	0	0	0
165	<i>Bischofia javanica</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
166	<i>Bistorta amplexicaulis</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
167	<i>Bistorta emodi</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
168	<i>Blumea axillaris</i>	Asteraceae	Herb	0	0	1	0	0	0	0
169	<i>Blumea bifoliata</i>	Asteraceae	Herb	0	0	1	0	0	0	0
170	<i>Blumea lacera</i>	Asteraceae	Herb	1	0	1	0	0	0	0
171	<i>Boehmeria macrophylla</i> var. <i>macrophylla</i>	Urticaceae	Herb	0	0	0	0	1	1	0
172	<i>Boehmeria macrophylla</i> var. <i>scabrella</i>	Urticaceae	Herb	0	0	0	0	1	1	0
173	<i>Boehmeria platyphylla</i>	Urticaceae	Herb	0	0	0	0	1	0	0
174	<i>Boenninghausenia albiflora</i>	Rutaceae	Herb	0	1	0	0	0	0	0
175	<i>Bombax ceiba</i>	Malvaceae	Tree	0	0	1	1	1	1	0
176	<i>Bonnaya ciliata</i>	Linderniaceae	Herb	0	0	1	0	0	0	0
177	<i>Borassus flabellifer</i>	Arecaceae	Tree	0	0	1	0	0	0	0
178	<i>Bosmania membranacea</i>	Polypodiaceae	Herb	0	1	0	0	0	0	0
179	<i>Bothriochloa pertusa</i>	Poaceae	Herb	0	0	1	0	0	0	0
180	<i>Botrychium daucifolium</i>	Ophioglossaceae	Herb	0	0	1	0	0	0	0
181	<i>Brachiaria eruciformis</i>	Poaceae	Herb	0	0	0	1	1	1	0
182	<i>Brachiaria reptans</i>	Poaceae	Herb	1	0	0	0	0	0	0
183	<i>Brachypterum scandens</i>	Fabaceae	Liana	0	0	0	0	1	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
184	<i>Breynia vitis-idaea</i>	Phyllanthaceae	Shrub	0	0	1	0	0	0	0
185	<i>Bridelia glauca</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
186	<i>Bridelia retusa</i>	Phyllanthaceae	Tree	0	0	1	1	1	1	0
187	<i>Bridelia scandens</i>	Phyllanthaceae	Shrub	0	0	0	1	1	1	0
188	<i>Bridelia stipularis</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
189	<i>Bruguiera cylindrica</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
190	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
191	<i>Buchanania lanzan</i>	Anacardiaceae	Tree	0	0	1	0	0	0	0
192	<i>Buddleja colvilei</i>	Scrophulariaceae	Shrub	0	0	0	0	0	0	1
193	<i>Bulbophyllum cauliflorum</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
194	<i>Bulbophyllum gamblei</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
195	<i>Bulbophyllum hymenanthum</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
196	<i>Bulbophyllum leopardinum</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
197	<i>Bulbophyllum roxburghii</i>	Orchidaceae	Herb	0	0	0	1	0	1	0
198	<i>Bulbophyllum sarcophyllum</i>	Orchidaceae	Herb	0	0	0	1	1	1	0
199	<i>Bulbophyllum sp.</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
200	<i>Bulbophyllum umbellatum</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
201	<i>Bulbophyllum wallichii</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
202	<i>Butea monosperma</i>	Fabaceae	Tree	0	0	1	0	0	0	0
203	<i>Butea monosperma var. lutea</i>	Fabaceae	Liana	0	0	1	0	0	0	0
204	<i>Butea superba</i>	Fabaceae	Liana	0	0	1	0	0	0	0
205	<i>Caesalpinia crista</i>	Fabaceae	Liana	1	0	0	1	1	1	0
206	<i>Caesalpinia cucullata</i>	Fabaceae	Liana	0	0	0	0	0	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
207	<i>Cajanus scarabaeoides</i>	Fabaceae	Climber	0	0	1	0	0	0	0
208	<i>Calanthe brevicornu</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
209	<i>Calanthe puberula</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
210	<i>Calceolaria mexicana</i>	Calceolariaceae	Herb	0	1	0	0	0	0	1
211	<i>Callicarpa arborea</i>	Lamiaceae	Tree	0	0	0	1	1	1	0
212	<i>Callicarpa tomentosa</i>	Verbenaceae	Tree	0	0	0	1	1	1	0
213	<i>Campanula pallida</i>	Campanulaceae	Herb	0	0	0	0	0	0	1
214	<i>Canarium sikkimense</i>	Burseraceae	Tree	0	0	0	1	1	1	0
215	<i>Canarium strictum</i>	Burseraceae	Tree	0	0	0	0	1	0	0
216	<i>Canscora diffusa</i>	Gentianaceae	Herb	0	0	1	0	0	0	0
217	<i>Canthium coromandelicum</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
218	<i>Canthium rheedei</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
219	<i>Capparis acutifolia</i>	Capparaceae	Shrub	0	0	0	1	1	1	0
220	<i>Capparis acutifolia</i> subsp. <i>sabiifolia</i>	Capparaceae	Shrub	0	0	0	0	1	0	0
221	<i>Capparis olacifolia</i>	Capparaceae	Shrub	0	0	0	1	1	0	0
222	<i>Capparis spinosa</i>	Capparaceae	Shrub	0	0	1	0	0	0	0
223	<i>Capparis tenera</i>	Capparaceae	Shrub	0	0	0	1	0	1	0
224	<i>Capsicum annuum</i>	Solanaceae	Herb	0	0	1	0	0	0	0
225	<i>Cardiocrinum giganteum</i>	Liliaceae	Herb	0	0	0	0	0	0	1
226	<i>Carex cruciata</i>	Cyperaceae	Herb	0	1	0	0	0	0	1
227	<i>Carex decora</i>	Cyperaceae	Herb	0	0	0	0	0	0	1
228	<i>Carex filicina</i>	Cyperaceae	Herb	0	1	0	0	0	0	0
229	<i>Carex fusiformis</i>	Cyperaceae	Herb	0	0	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
230	<i>Carex inanis</i>	Cyperaceae	Herb	0	0	0	1	0	1	0
231	<i>Carex munda</i>	Cyperaceae	Herb	0	0	0	0	0	0	1
232	<i>Carex pulchra</i>	Cyperaceae	Herb	0	0	0	0	0	0	1
233	<i>Careya arborea</i>	Lecythidaceae	Tree	0	0	1	1	1	1	0
234	<i>Carissa spinarum</i>	Apocynaceae	Shrub	0	0	1	0	0	0	0
235	<i>Carpesium abrotanoides</i>	Asteraceae	Herb	0	1	0	0	0	0	0
236	<i>Caryota urens</i>	Arecaceae	Tree	0	0	0	0	0	1	0
237	<i>Casearia graveolens</i>	Salicaceae	Shrub	0	0	0	1	1	1	0
238	<i>Casearia vareca</i>	Salicaceae	Shrub	0	0	1	1	1	1	0
239	<i>Cassia fistula</i>	Fabaceae	Tree	0	0	1	1	0	0	0
240	<i>Cassia hirsuta</i>	Fabaceae	Herb	0	0	0	0	0	1	0
241	<i>Castanopsis argentea</i>	Fagaceae	Tree	0	0	0	1	1	1	0
242	<i>Castanopsis hystrix</i>	Fagaceae	Tree	0	1	0	0	0	0	1
243	<i>Castanopsis indica</i>	Fagaceae	Tree	0	0	0	1	1	1	0
244	<i>Catunaregam brandisii</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
245	<i>Catunaregam longispina</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
246	<i>Catunaregam spinosa</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
247	<i>Cautleya gracilis</i>	Zingiberaceae	Herb	0	1	0	0	0	0	1
248	<i>Cautleya gracilis var. robusta</i>	Zingiberaceae	Herb	0	1	0	0	0	0	1
249	<i>Cautleya spicata</i>	Zingiberaceae	Herb	0	1	0	0	0	0	1
250	<i>Cayratia pedata</i>	Vitaceae	Climber	0	0	1	1	0	0	0
251	<i>Cayratia trifolia</i>	Vitaceae	Climber	0	1	1	1	1	1	0
252	<i>Ceiba pentandra</i>	Malvaceae	Tree	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
253	<i>Celastrus paniculatus</i>	Celastraceae	Liana	0	0	0	1	1	1	0
254	<i>Cenchrus pedicellatus</i>	Poaceae	Herb	0	0	1	0	0	0	0
255	<i>Cenchrus setosus</i>	Poaceae	Herb	0	0	1	0	0	0	0
256	<i>Centella asiatica</i>	Apiaceae	Herb	1	1	1	1	1	1	0
257	<i>Cephalanthus tetrandra</i>	Rubiaceae	Tree	0	0	0	1	1	1	0
258	<i>Cerastium glomeratum</i>	Caryophyllaceae	Herb	0	0	0	0	0	0	1
259	<i>Ceriops decandra</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
260	<i>Ceriops tagal</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
261	<i>Chisocheton cumingianus</i>	Meliaceae	Tree	0	0	0	1	1	1	0
262	<i>Chloranthus elatior</i>	Chloranthaceae	Herb	0	0	0	1	0	1	0
263	<i>Chloris barbata</i>	Poaceae	Herb	1	0	1	0	0	0	0
264	<i>Chlorophytum nepalense</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
265	<i>Chlorophytum tuberosum</i>	Asparagaceae	Herb	0	0	0	0	1	1	0
266	<i>Chonemorpha fragrans</i>	Apocynaceae	Liana	0	0	0	1	1	1	0
267	<i>Chromolaena odorata</i>	Asteraceae	Herb	0	0	1	1	1	1	0
268	<i>Chrozophora rotleri</i>	Euphorbiaceae	Herb	0	0	1	0	0	0	0
269	<i>Chrysopogon aciculatus</i>	Poaceae	Herb	0	0	1	0	0	0	0
270	<i>Chrysopogon gryllus</i>	Poaceae	Herb	0	0	1	0	0	0	0
271	<i>Chrysosplenium lanuginosum</i>	Saxifragaceae	Herb	0	0	0	0	0	0	1
272	<i>Chukrasia tabularis</i>	Meliaceae	Tree	0	0	1	1	1	1	0
273	<i>Cinnamomum bejolghota</i>	Lauraceae	Tree	0	1	0	1	1	1	0
274	<i>Cinnamomum camphora</i>	Lauraceae	Tree	0	0	0	1	0	0	0
275	<i>Cinnamomum cecidodaphne</i>	Lauraceae	Tree	0	0	0	0	1	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
276	<i>Circaea alpina</i>	Onagraceae	Herb	0	0	0	0	0	0	1
277	<i>Cirsium falconeri</i>	Asteraceae	Herb	0	1	0	0	0	0	1
278	<i>Cirsium verutum</i>	Asteraceae	Herb	0	0	0	0	0	0	1
279	<i>Cirsium wallichii</i>	Asteraceae	Herb	0	0	0	0	0	0	1
280	<i>Cissampelos pareira</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
281	<i>Cissus adnata</i>	Vitaceae	Climber	0	0	1	0	0	0	0
282	<i>Cissus pallida</i>	Vitaceae	Climber	0	0	0	1	1	1	0
283	<i>Cissus woodrowii</i>	Vitaceae	Climber	0	0	0	1	0	1	0
284	<i>Claoxylon longipetiolatum</i>	Euphorbiaceae	Shrub	0	0	0	1	0	0	0
285	<i>Clausena excavata</i>	Meliaceae	Tree	0	0	0	1	1	1	0
286	<i>Clausena lansium</i>	Rutaceae	Shrub	0	0	1	0	0	0	0
287	<i>Cleistanthus collinus</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
288	<i>Clematis acuminata</i>	Ranunculaceae	Climber	0	0	0	0	0	0	1
289	<i>Clematis buchananiana</i>	Ranunculaceae	Climber	0	1	0	0	0	0	1
290	<i>Clematis montana</i>	Ranunculaceae	Climber	0	1	0	0	0	0	0
291	<i>Cleome rutidosperma</i>	Cleomaceae	Herb	0	0	0	0	0	1	0
292	<i>Cleome viscosa</i>	Cleomaceae	Herb	0	0	1	0	0	0	0
293	<i>Clerodendrum indicum</i>	Verbenaceae	Shrub	0	0	0	0	1	0	0
294	<i>Clerodendrum inerme</i>	Verbenaceae	Shrub	1	0	0	0	0	0	0
295	<i>Clerodendrum neriifolium</i>	Verbenaceae	Shrub	1	0	0	0	0	0	0
296	<i>Clerodendrum phlomidis</i>	Verbenaceae	Shrub	0	0	1	0	0	0	0
297	<i>Clerodendrum viscosum</i>	Verbenaceae	Shrub	0	0	1	1	1	1	0
298	<i>Clinopodium gracile</i>	Lamiaceae	Herb	0	0	0	1	0	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
299	<i>Clinopodium umbrosum</i>	Lamiaceae	Herb	0	1	0	0	1	1	0
300	<i>Coccinia grandis</i>	Cucurbitaceae	Climber	1	0	1	0	0	0	0
301	<i>Cochlospermum religiosum</i>	Bixaceae	Tree	0	0	1	0	0	0	0
302	<i>Coffea benghalensis</i>	Rubiaceae	Shrub	0	0	0	0	1	1	0
303	<i>Coix lacryma-jobi</i>	Poaceae	Herb	0	0	0	0	0	1	0
304	<i>Cola nitida</i>	Malvaceae	Tree	0	0	0	0	1	0	0
305	<i>Colebrookea oppositifolia</i>	Lamiaceae	Shrub	0	0	0	0	1	1	0
306	<i>Combretum roxburghii</i>	Combretaceae	Liana	0	0	1	0	1	0	0
307	<i>Commelina benghalensis</i>	Commelinaceae	Herb	0	0	1	1	0	1	0
308	<i>Commelina diffusa</i>	Commelinaceae	Herb	1	0	1	1	1	1	0
309	<i>Commelina longifolia</i>	Commelinaceae	Herb	1	0	0	1	1	1	0
310	<i>Commelina maculata</i>	Commelinaceae	Herb	0	0	1	0	0	0	1
311	<i>Commelina sikkimensis</i>	Commelinaceae	Herb	0	1	0	0	0	0	0
312	<i>Corallocarpus epigaeus</i>	Cucurbitaceae	Climber	0	0	0	1	0	0	0
313	<i>Corchorus aestuans</i>	Malvaceae	Herb	1	0	1	0	0	0	0
314	<i>Corydalis casimiriana</i>	Papaveraceae	Herb	0	0	0	0	0	0	1
315	<i>Corydalis chaerophylla</i>	Papaveraceae	Herb	0	1	0	0	0	0	1
316	<i>Corydalis longipes</i>	Papaveraceae	Herb	0	1	0	0	0	0	1
317	<i>Corylus ferox</i>	Betulaceae	Tree	0	0	0	0	0	0	1
318	<i>Costus speciosus</i>	Zingiberaceae	Herb	0	0	0	1	1	1	0
319	<i>Cotoneaster microphyllus</i>	Rosaceae	Shrub	0	0	0	0	0	0	1
320	<i>Cotoneaster pannosus</i>	Rosaceae	Tree	0	0	0	0	0	0	1
321	<i>Craniotome furcata</i>	Lamiaceae	Herb	0	1	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
322	<i>Craterostigma nummulariifolium</i>	Linderniaceae	Herb	0	1	0	0	0	0	0
323	<i>Crawfurdia speciosa</i>	Gentianaceae	Climber	0	1	0	0	0	0	1
324	<i>Crinum asiaticum</i>	Amaryllidaceae	Herb	0	0	1	0	0	1	0
325	<i>Crinum viviparum</i>	Amaryllidaceae	Herb	0	0	0	1	1	1	0
326	<i>Crotalaria alata</i>	Fabaceae	Herb	0	0	0	0	1	0	0
327	<i>Crotalaria albida</i>	Fabaceae	Herb	0	0	1	0	0	0	0
328	<i>Crotalaria epunctata</i>	Fabaceae	Herb	0	0	0	0	1	0	0
329	<i>Crotalaria montana</i>	Fabaceae	Herb	0	0	0	0	1	1	0
330	<i>Croton bonplandianus</i>	Euphorbiaceae	Herb	1	0	1	0	0	0	0
331	<i>Croton caudatus</i>	Euphorbiaceae	Shrub	0	0	0	1	1	1	0
332	<i>Croton persimilis</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
333	<i>Croton roxburghii</i>	Euphorbiaceae	Tree	0	0	0	1	1	1	0
334	<i>Cryptocoryne ciliata</i>	Araceae	Herb	1	0	0	0	0	0	0
335	<i>Cryptolepis buchananii</i>	Apocynaceae	Climber	0	0	1	0	0	0	0
336	<i>Cryptolepis sinensis</i>	Apocynaceae	Climber	0	0	0	1	1	1	0
337	<i>Cryptomeria japonica</i>	Cupressaceae	Tree	0	1	0	0	0	0	1
338	<i>Cucumis callosus</i>	Cucurbitaceae	Climber	0	0	0	1	0	0	0
339	<i>Cucumis melo</i>	Cucurbitaceae	Climber	1	0	0	0	0	0	0
340	<i>Curculigo orchioides</i>	Hypoxidaceae	Herb	0	0	1	1	1	1	0
341	<i>Curculigo trichocarpa</i>	Hypoxidaceae	Herb	0	0	0	1	1	1	0
342	<i>Curcuma amada</i>	Zingiberaceae	Herb	0	0	1	0	0	0	0
343	<i>Curcuma aromatica</i>	Zingiberaceae	Herb	0	0	1	0	0	0	0
344	<i>Curcuma zedoaria</i>	Zingiberaceae	Herb	0	0	1	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
345	<i>Cyanotis axillaris</i>	Commelinaceae	Herb	0	0	1	1	1	1	0
346	<i>Cyanotis cristata</i>	Commelinaceae	Herb	0	0	0	1	1	1	0
347	<i>Cyanthillium cinereum</i>	Asteraceae	Herb	1	0	1	1	0	1	0
348	<i>Cyathula prostrata</i>	Amaranthaceae	Herb	0	0	1	1	1	1	0
349	<i>Cyathula tomentosa</i>	Amaranthaceae	Herb	0	1	0	0	0	0	0
350	<i>Cyclea bicristata</i>	Menispermaceae	Climber	0	0	0	1	1	1	0
351	<i>Cyclea peltata</i>	Fabaceae	Climber	0	0	0	0	1	1	0
352	<i>Cynodon dactylon</i>	Poaceae	Herb	1	0	1	0	0	1	0
353	<i>Cynoglossum lanceolatum</i>	Boraginaceae	Herb	0	1	0	0	0	0	0
354	<i>Cyperus bulbosus</i>	Cyperaceae	Herb	1	0	0	0	0	0	0
355	<i>Cyperus castaneus</i>	Cyperaceae	Herb	0	0	0	0	0	1	0
356	<i>Cyperus compressus</i>	Cyperaceae	Herb	0	0	0	0	0	1	0
357	<i>Cyperus iria</i>	Cyperaceae	Herb	0	0	1	0	0	0	0
358	<i>Cyperus pangorei</i>	Cyperaceae	Herb	0	0	0	1	1	1	0
359	<i>Cyperus polystachyos</i>	Cyperaceae	Herb	1	0	0	0	0	0	0
360	<i>Cyperus rotundus</i>	Cyperaceae	Herb	1	0	1	0	0	0	0
361	<i>Dactylicapnos scandens</i>	Papaveraceae	Climber	0	1	0	0	0	0	0
362	<i>Dactyloctenium aegyptium</i>	Poaceae	Herb	0	0	1	0	0	0	0
363	<i>Dalbergia lanceolaria</i>	Fabaceae	Tree	0	0	1	0	0	0	0
364	<i>Dalbergia latifolia</i>	Fabaceae	Tree	0	0	1	0	0	0	0
365	<i>Dalbergia pinnata</i>	Fabaceae	Tree	0	0	0	1	1	1	0
366	<i>Dalbergia stipulacea</i>	Fabaceae	Shrub	0	0	0	1	1	1	0
367	<i>Daphne bholuva</i>	Thymelaeaceae	Shrub	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
368	<i>Daphne papyracea</i>	Thymelaeaceae	Shrub	0	1	0	0	0	0	1
369	<i>Decaspermum fruticosum</i>	Myrtaceae	Shrub	0	0	0	0	1	1	0
370	<i>Deeringia amaranthoides</i>	Amaranthaceae	Herb	0	0	0	1	1	1	0
371	<i>Dendrobium anceps</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
372	<i>Dendrobium cathcartii</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
373	<i>Dendrobium chryseum</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
374	<i>Dendrobium densiflorum</i>	Orchidaceae	Herb	0	0	0	1	0	1	0
375	<i>Dendrobium longicornu</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
376	<i>Dendrobium stuposum</i>	Orchidaceae	Herb	0	0	0	1	0	1	0
377	<i>Dendrocnide sinuata</i>	Urticaceae	Shrub	0	0	0	1	1	1	0
378	<i>Dendrophthoe falcata</i>	Loranthaceae	Herb	0	0	1	0	0	0	0
379	<i>Deparia japonica</i>	Aspleniaceae	Herb	0	1	0	0	0	0	0
380	<i>Derris trifoliata</i>	Fabaceae	Climber	1	0	0	0	0	0	0
381	<i>Desmodium gangeticum</i>	Fabaceae	Herb	0	0	0	0	0	1	0
382	<i>Desmodium heterocarpon</i>	Fabaceae	Herb	0	0	0	1	1	1	0
383	<i>Desmodium heterocarpon</i> var. <i>strigosum</i>	Fabaceae	Herb	0	0	0	1	1	1	0
384	<i>Desmodium heterophyllum</i>	Fabaceae	Herb	0	0	1	0	0	0	0
385	<i>Desmodium laxiflorum</i>	Fabaceae	Herb	0	0	0	1	0	1	0
386	<i>Desmodium motorium</i>	Fabaceae	Herb	0	0	1	0	0	0	0
387	<i>Desmodium oblongum</i>	Fabaceae	Herb	0	0	0	1	1	1	0
388	<i>Desmodium triangulare</i>	Fabaceae	Shrub	0	0	0	1	1	1	0
389	<i>Desmodium triflorum</i>	Fabaceae	Herb	0	0	1	1	0	1	0
390	<i>Desmodium volubile</i>	Fabaceae	Herb	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
391	<i>Dichanthium annulatum</i>	Poaceae	Herb	0	0	1	1	1	1	0
392	<i>Dichanthium aristatum</i>	Poaceae	Herb	0	0	0	1	1	1	0
393	<i>Dichroa febrifuga</i>	Hydrangeaceae	Herb	0	0	0	0	0	0	1
394	<i>Dichrocephala integrifolia</i>	Asteraceae	Herb	0	0	0	0	0	0	1
395	<i>Dicliptera bupleuroides</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
396	<i>Dicliptera paniculata</i>	Acanthaceae	Herb	0	0	1	0	0	0	0
397	<i>Dicliptera paniculata</i> var. <i>subaequibracteata</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
398	<i>Dictyospermum montanum</i>	Commelinaceae	Herb	0	0	0	1	1	1	0
399	<i>Dictyospermum ovalifolium</i>	Orchidaceae	Herb	0	0	0	1	1	1	0
400	<i>Didymocarpus oblongus</i>	Gesneriaceae	Herb	0	0	0	0	0	0	1
401	<i>Didymocarpus punduanus</i> var. <i>pulcher</i>	Gesneriaceae	Herb	0	1	0	0	0	0	0
402	<i>Digitaria ciliaris</i>	Poaceae	Herb	1	0	0	1	1	1	0
403	<i>Digitaria sanguinalis</i>	Poaceae	Herb	0	0	1	0	0	0	0
404	<i>Dillenia indica</i>	Dilleniaceae	Tree	0	0	0	1	1	1	0
405	<i>Dillenia pentagyna</i>	Dilleniaceae	Tree	0	0	1	1	1	1	0
406	<i>Dioscorea alata</i>	Dioscoreaceae	Climber	0	0	1	0	0	0	0
407	<i>Dioscorea bulbifera</i>	Dioscoreaceae	Climber	0	0	1	1	0	0	0
408	<i>Dioscorea floribunda</i>	Dioscoreaceae	Climber	0	0	1	0	0	0	0
409	<i>Dioscorea oppositifolia</i>	Dioscoreaceae	Climber	0	0	0	0	0	1	0
410	<i>Dioscorea prazeri</i>	Dioscoreaceae	Climber	0	0	0	1	1	1	0
411	<i>Dioscorea tomentosa</i>	Dioscoreaceae	Climber	0	0	0	0	1	1	0
412	<i>Diospyros ebenum</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
413	<i>Diospyros melanoxylon</i>	Ebenaceae	Tree	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
414	<i>Diospyros montana</i>	Ebenaceae	Tree	0	0	1	1	1	1	0
415	<i>Diospyros ovalifolia</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
416	<i>Diplazium esculentum</i>	Aspleniaceae	Herb	0	0	0	1	1	1	0
417	<i>Diplazium japonicum</i>	Aspleniaceae	Herb	0	1	0	0	0	0	0
418	<i>Diplazium polypodioides</i>	Aspleniaceae	Herb	1	0	0	0	0	0	0
419	<i>Diplocyclos palmatus</i>	Cucurbitaceae	Climber	0	0	1	0	0	0	0
420	<i>Diplopterygium glaucum</i>	Gleicheniaceae	Herb	0	1	0	0	0	0	0
421	<i>Distimake aegyptius</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
422	<i>Distimake quinquefolius</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
423	<i>Dracaena angustifolia</i>	Asparagaceae	Shrub	0	0	0	1	0	1	0
424	<i>Drosera burmanni</i>	Droseraceae	Herb	0	0	0	1	1	1	0
425	<i>Drymaria cordata</i>	Caryophyllaceae	Herb	0	1	0	1	1	1	0
426	<i>Drymaria diandra</i>	Caryophyllaceae	Herb	0	0	0	1	1	1	0
427	<i>Drynaria crassifolia</i>	Polypodiaceae	Herb	0	0	0	1	0	1	0
428	<i>Drynaria quercifolia</i>	Polypodiaceae	Herb	0	0	0	0	1	0	0
429	<i>Dryopteris chrysocoma</i>	Dryopteridaceae	Herb	0	1	0	0	0	0	1
430	<i>Dryopteris nodosa</i>	Polypodiaceae	Herb	0	0	0	0	0	0	1
431	<i>Dryopteris paleacea</i>	Polypodiaceae	Herb	0	0	0	0	0	0	1
432	<i>Dryopteris sikkimensis</i>	Polypodiaceae	Herb	0	0	0	1	1	1	0
433	<i>Duabanga grandiflora</i>	Lythraceae	Tree	0	0	0	1	1	1	0
434	<i>Duranta erecta</i>	Verbenaceae	Shrub	0	0	1	0	0	0	0
435	<i>Dysoxylum binectariferum</i>	Meliaceae	Tree	0	0	0	0	1	1	0
436	<i>Dysoxylum reticulatum</i>	Meliaceae	Tree	0	0	0	1	0	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
437	<i>Dysoxylum excelsum</i>	Meliaceae	Tree	0	0	0	0	0	1	0
438	<i>Eclipta prostrata</i>	Asteraceae	Herb	1	0	1	0	0	0	0
439	<i>Elaeagnus conferta</i>	Elaeagnaceae	Shrub	0	0	0	1	0	0	0
440	<i>Elaeocarpus sikkimensis</i>	Elaeocarpaceae	Tree	0	1	0	0	0	0	0
441	<i>Elatostema monandrum</i>	Urticaceae	Herb	0	0	0	1	1	1	0
442	<i>Elatostema obovatum</i>	Urticaceae	Herb	0	0	0	0	0	0	1
443	<i>Elatostema obtusum</i>	Urticaceae	Herb	0	1	0	0	0	0	0
444	<i>Elatostema platyphyllum</i>	Urticaceae	Herb	0	0	0	1	1	1	0
445	<i>Elatostema sessile</i>	Urticaceae	Herb	0	1	0	0	0	0	1
446	<i>Elatostema surculosum</i>	Urticaceae	Herb	0	0	0	0	0	0	1
447	<i>Elephantopus scaber</i>	Asteraceae	Herb	0	0	1	1	1	1	0
448	<i>Eleusine indica</i>	Poaceae	Herb	1	0	1	0	0	0	0
449	<i>Elsholtzia blanda</i>	Lamiaceae	Herb	0	1	0	0	0	0	1
450	<i>Elsholtzia flava</i>	Lamiaceae	Herb	0	1	0	0	0	0	0
451	<i>Elsholtzia fruticosa</i>	Lamiaceae	Herb	0	1	0	0	0	0	1
452	<i>Elsholtzia strobilifera</i>	Lamiaceae	Herb	0	1	0	0	0	0	1
453	<i>Embelia tsjeriam-cottam</i>	Myrsinaceae	Shrub	0	0	0	1	1	1	0
454	<i>Emilia sonchifolia</i>	Asteraceae	Herb	0	0	1	0	0	1	0
455	<i>Epilobium cylindricum</i>	Onagraceae	Herb	0	1	0	0	0	0	1
456	<i>Epilobium wallichianum</i>	Onagraceae	Herb	0	1	0	0	0	0	1
457	<i>Equisetum ramosissimum</i>	Equisetaceae	Herb	0	1	0	1	1	1	0
458	<i>Eragrostis gangetica</i>	Poaceae	Herb	0	0	0	1	1	1	0
459	<i>Eragrostis tenella</i>	Poaceae	Herb	0	0	1	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
460	<i>Eragrostis unioloides</i>	Poaceae	Herb	0	0	1	0	0	0	0
461	<i>Eranthemum pulchellum</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
462	<i>Eranthemum purpurascens</i>	Acanthaceae	Herb	0	0	1	0	0	0	0
463	<i>Eranthemum roseum</i>	Acanthaceae	Herb	0	0	0	1	0	0	0
464	<i>Eria discolor</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
465	<i>Eria lasiopetala</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
466	<i>Eria pumila</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
467	<i>Eriocapitella rupicola</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
468	<i>Eriocapitella vitifolia</i>	Ranunculaceae	Herb	0	1	0	0	0	0	0
469	<i>Eriochloa procera</i>	Poaceae	Herb	1	0	0	0	0	0	0
470	<i>Erycibe paniculata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
471	<i>Erythranthe nepalensis</i>	Phrymaceae	Herb	0	1	0	0	0	0	1
472	<i>Erythrina stricta</i>	Fabaceae	Tree	0	0	1	0	0	0	0
473	<i>Euonymus echinatus</i>	Celastraceae	Shrub	0	0	0	0	0	0	1
474	<i>Euonymus frigidus</i>	Celastraceae	Shrub	0	1	0	0	0	0	1
475	<i>Euonymus laxiflorus</i>	Celastraceae	Tree	0	0	0	1	0	1	0
476	<i>Euonymus viburnoides</i>	Celastraceae	Tree	0	0	0	0	0	0	1
477	<i>Euphorbia chamaesyce</i>	Euphorbiaceae	Herb	1	0	0	0	0	0	0
478	<i>Euphorbia heyneana</i>	Euphorbiaceae	Herb	0	0	1	0	0	0	0
479	<i>Euphorbia hirta</i>	Euphorbiaceae	Herb	0	0	1	0	0	0	0
480	<i>Euphorbia scordiifolia</i>	Euphorbiaceae	Herb	1	0	0	0	0	0	0
481	<i>Euphorbia thymifolia</i>	Euphorbiaceae	Herb	0	0	1	0	0	0	0
482	<i>Eurya acuminata</i>	Pentaphylacaceae	Shrub	0	1	0	1	0	1	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
483	<i>Eurya cerasifolia</i>	Pentaphylacaceae	Shrub	0	1	0	0	0	0	0
484	<i>Eurya japonica</i>	Pentaphylacaceae	Tree	0	1	0	0	0	0	0
485	<i>Evodia fraxinifolia</i>	Rutaceae	Tree	0	0	0	1	0	1	0
486	<i>Evodia lunu-ankenda</i>	Rutaceae	Tree	0	1	0	0	0	0	1
487	<i>Evolvulus alsinoides</i>	Convolvulaceae	Herb	0	0	1	0	0	0	0
488	<i>Evolvulus nummularius</i>	Convolvulaceae	Herb	1	0	1	0	0	0	0
489	<i>Exbucklandia populnea</i>	Hamamelidaceae	Tree	0	1	0	0	0	0	1
490	<i>Excoecaria agallocha</i>	Euphorbiaceae	Tree	1	0	0	0	0	0	0
491	<i>Falconeria insignis</i>	Euphorbiaceae	Tree	0	0	0	0	0	1	0
492	<i>Ficus cordata</i>	Moraceae	Tree	0	0	0	1	0	1	0
493	<i>Ficus curtipes</i>	Moraceae	Tree	0	0	0	1	1	1	0
494	<i>Ficus fistulosa</i>	Moraceae	Tree	0	0	0	0	1	1	0
495	<i>Ficus hederacea</i>	Moraceae	Tree	0	0	0	1	1	1	0
496	<i>Ficus hispida</i>	Moraceae	Tree	0	0	1	1	1	1	0
497	<i>Ficus mysorensis</i> var. <i>subrepanda</i>	Moraceae	Tree	0	0	0	0	1	1	0
498	<i>Ficus pumila</i>	Moraceae	Climber	0	0	0	1	0	0	0
499	<i>Ficus racemosa</i>	Moraceae	Tree	0	0	1	0	0	0	0
500	<i>Fimbristylis cymosa</i>	Cyperaceae	Herb	1	0	0	0	0	0	0
501	<i>Fimbristylis dichotoma</i>	Cyperaceae	Herb	0	0	1	0	0	0	0
502	<i>Fimbristylis ferruginea</i>	Cyperaceae	Herb	1	0	0	0	0	0	0
503	<i>Fimbristylis triflora</i>	Cyperaceae	Herb	1	0	0	0	0	0	0
504	<i>Fimbristylis tristachya</i> var. <i>subbispicata</i>	Cyperaceae	Herb	0	0	1	0	0	0	0
505	<i>Finlaysonia obovata</i>	Apocynaceae	Climber	1	0	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
506	<i>Flacourtia indica</i>	Salicaceae	Shrub	0	0	1	1	1	1	0
507	<i>Flacourtia jangomas</i>	Salicaceae	Tree	0	0	1	0	0	0	0
508	<i>Flemingia macrophylla</i>	Fabaceae	Shrub	0	0	0	0	0	1	0
509	<i>Flickengeria macraei</i>	Orchidaceae	Herb	0	0	0	0	0	1	0
510	<i>Flickingeria sp.</i>	Orchidaceae	Herb	0	0	0	0	1	0	0
511	<i>Floscopa scandens</i>	Commelinaceae	Herb	0	0	0	1	1	1	0
512	<i>Fragaria daltoniana</i>	Rosaceae	Herb	0	0	0	0	0	0	1
513	<i>Fragaria nubicola</i>	Rosaceae	Herb	0	1	0	0	0	0	1
514	<i>Galinsoga parviflora</i>	Asteraceae	Herb	0	1	0	0	0	0	0
515	<i>Galium aparine</i>	Rubiaceae	Herb	0	1	0	0	0	0	0
516	<i>Galium asperuloides</i>	Rubiaceae	Herb	0	0	0	0	0	0	1
517	<i>Galium elegans</i>	Rubiaceae	Herb	0	1	0	0	0	0	1
518	<i>Galium hirtiflorum</i>	Rubiaceae	Herb	0	0	0	0	0	0	1
519	<i>Galium hoffmeisteri</i>	Rubiaceae	Herb	0	1	0	0	0	0	0
520	<i>Gamblea ciliata</i>	Araliaceae	Tree	0	0	0	0	0	0	1
521	<i>Garcinia sp.</i>	Clusiaceae	Tree	0	0	0	1	0	1	0
522	<i>Gardenia gummifera</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
523	<i>Gardenia latifolia</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
524	<i>Garuga pinnata</i>	Bursaceae	Tree	0	0	0	0	1	0	0
525	<i>Gastrochilus obliquus</i>	Orchidaceae	Herb	0	0	0	1	1	1	0
526	<i>Gaultheria fragrantissima</i>	Ericaceae	Shrub	0	1	0	0	0	0	1
527	<i>Gaultheria hookeri</i>	Ericaceae	Shrub	0	1	0	0	0	0	0
528	<i>Gaultheria nummularioides</i>	Ericaceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
529	<i>Gentiana capitata</i>	Gentianaceae	Herb	0	1	0	0	0	0	1
530	<i>Gentiana pedicellata</i>	Gentianaceae	Herb	0	1	0	0	0	0	1
531	<i>Geophila repens</i>	Rubiaceae	Herb	0	0	0	1	0	0	0
532	<i>Geranium donianum</i>	Geraniaceae	Herb	0	1	0	0	0	0	0
533	<i>Geranium nepalense</i>	Geraniaceae	Herb	0	1	0	0	0	0	1
534	<i>Geranium procurrans</i>	Geraniaceae	Herb	0	1	0	0	0	0	0
535	<i>Girardinia diversifolia</i>	Urticaceae	Herb	0	1	0	1	0	0	0
536	<i>Gleichenia glauca</i>	Gleicheniaceae	Herb	0	1	0	0	0	0	0
537	<i>Glinus oppositifolius</i>	Molluginaceae	Herb	1	0	0	0	0	0	0
538	<i>Globba marantina</i>	Zingiberaceae	Herb	0	0	1	0	0	0	0
539	<i>Globba racemosa</i>	Zingiberaceae	Herb	0	1	0	0	0	0	0
540	<i>Gloriosa superba</i>	Colchicaceae	Climber	0	0	1	0	0	0	0
541	<i>Glycosmis mauritiana</i>	Rutaceae	Shrub	0	0	1	0	0	0	0
542	<i>Glycosmis pentaphylla</i>	Rutaceae	Shrub	0	0	0	1	0	1	0
543	<i>Glycosmis cyanocarpa</i> var. <i>cymosa</i>	Rutaceae	Shrub	0	0	0	0	0	1	0
544	<i>Gmelina arborea</i>	Lamiaceae	Tree	0	0	0	1	1	1	0
545	<i>Gnetum montanum</i>	Gnetaceae	Liana	0	0	0	1	1	1	0
546	<i>Gomphostemma lucidum</i>	Lamiaceae	Herb	0	0	0	0	0	1	0
547	<i>Gomphostemma lucidum</i> var. <i>intermedium</i>	Acanthaceae	Shrub	0	0	0	1	1	0	0
548	<i>Gomphostemma ovatum</i>	Lamiaceae	Herb	0	0	0	1	1	1	0
549	<i>Gomphostemma parviflorum</i>	Acanthaceae	Shrub	0	0	0	1	1	1	0
550	<i>Gonostegia triandra</i>	Urticaceae	Herb	0	1	0	0	0	0	0
551	<i>Gouania leptostachya</i>	Rhamnaceae	Liana	0	0	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
552	<i>Grewia hirsuta</i>	Malvaceae	Shrub	0	0	1	0	0	0	0
553	<i>Grewia rhamnifolia</i>	Malvaceae	Shrub	0	0	1	0	0	0	0
554	<i>Grewia serrulata</i>	Malvaceae	Shrub	0	0	0	1	1	1	0
555	<i>Grewia tenax</i>	Malvaceae	Shrub	0	0	0	1	1	1	0
556	<i>Grewia umbellata</i>	Malvaceae	Shrub	0	0	0	1	0	0	0
557	<i>Griffitharia vestita</i>	Rosaceae	Tree	0	0	0	0	0	0	1
558	<i>Guilandina bonduc</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
559	<i>Gymnema sylvestre</i>	Apocynaceae	Climber	0	0	1	0	0	0	0
560	<i>Gynocardia odorata</i>	Achariaceae	Tree	0	0	0	1	1	1	0
561	<i>Gynura bicolor</i>	Asteraceae	Herb	0	0	0	0	0	0	1
562	<i>Habenaria diphylla</i>	Orchidaceae	Herb	0	0	1	0	0	0	0
563	<i>Haldina cordifolia</i>	Rubiaceae	Tree	0	0	0	1	1	1	0
564	<i>Halenia elliptica</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
565	<i>Hedychium thyrsiforme</i>	Zingiberaceae	Herb	0	1	0	0	0	0	0
566	<i>Hedychium wardii</i>	Zingiberaceae	Herb	0	0	0	0	0	1	0
567	<i>Hedyotis burmanniana</i>	Rubiaceae	Herb	1	0	0	0	0	0	0
568	<i>Hedyotis scandens</i>	Rubiaceae	Herb	0	0	0	1	1	1	0
569	<i>Helichrysum luteoalbum</i>	Asteraceae	Herb	0	1	0	0	0	0	1
570	<i>Helicteres isora</i>	Malvaceae	Tree	0	0	1	0	0	0	0
571	<i>Heliotropium curassavicum</i>	Boraginaceae	Herb	1	0	0	0	0	0	0
572	<i>Heliotropium indicum</i>	Boraginaceae	Herb	0	0	1	0	0	0	0
573	<i>Helminthostachys zeylanica</i>	Ophioglossaceae	Herb	0	0	0	1	1	1	0
574	<i>Helwingia himalaica</i>	Helwingiaceae	Shrub	0	1	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
575	<i>Hemidesmus indicus</i>	Apocynaceae	Climber	0	0	1	1	1	1	0
576	<i>Hemidesmus indicus</i> var. <i>pubescens</i>	Apocynaceae	Climber	0	0	1	0	0	0	0
577	<i>Hemionitis chrysophylla</i>	Pteridaceae	Herb	0	0	0	0	0	0	1
578	<i>Hemionitis farinosa</i>	Pteridaceae	Herb	0	0	0	0	0	0	1
579	<i>Hemiphragma heterophyllum</i>	Plantaginaceae	Herb	0	1	0	0	0	0	1
580	<i>Henckelia pumila</i>	Gesneriaceae	Herb	0	1	0	0	0	0	0
581	<i>Henckelia urticifolia</i>	Gesneriaceae	Herb	0	1	0	0	0	0	0
582	<i>Heracleum wallichii</i>	Apiaceae	Herb	0	1	0	0	0	0	0
583	<i>Heritiera fomes</i>	Malvaceae	Tree	1	0	0	0	0	0	0
584	<i>Herminium clavigerum</i>	Orchidaceae	Herb	0	1	0	0	0	0	1
585	<i>Herpetospermum darjeelingense</i>	Cucurbitaceae	Climber	0	1	0	0	0	0	0
586	<i>Herpetospermum tonglense</i>	Cucurbitaceae	Climber	0	0	0	0	0	0	1
587	<i>Heteropogon contortus</i>	Poaceae	Herb	0	0	1	0	0	0	0
588	<i>Hibiscus sabdariffa</i>	Malvaceae	Herb	0	0	0	0	0	1	0
589	<i>Hiptage benghalensis</i>	Malpighiaceae	Shrub	0	0	0	1	1	1	0
590	<i>Hodgsonia macrocarpa</i>	Cucurbitaceae	Climber	0	0	0	1	1	1	0
591	<i>Holarrhena pubescens</i>	Apocynaceae	Tree	0	0	1	1	1	1	0
592	<i>Holboellia latifolia</i>	Lardizabalaceae	Liana	0	0	0	0	0	0	1
593	<i>Holmskioldia sanguinea</i>	Lamiaceae	Liana	0	0	0	0	0	1	0
594	<i>Homalium zeylanicum</i>	Flacourtiaceae	Tree	0	0	0	1	1	1	0
595	<i>Houttuynia cordata</i>	Saururaceae	Herb	0	1	0	0	0	0	0
596	<i>Huberantha cerasoides</i>	Annonaceae	Tree	0	0	1	0	0	0	0
597	<i>Hydnocarpus</i> sp.	Flacourtiaceae	Tree	0	0	0	0	1	1	0

Checklist of medicinal plants in seven MPCAs

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598	<i>Hydrangea aspera</i>	Hydrangeaceae	Shrub	0	0	0	0	0	0	1
599	<i>Hydrangea febrifuga</i>	Hydrangeaceae	Herb	0	1	0	0	0	0	0
600	<i>Hydrangea heteromalla</i>	Hydrangeaceae	Shrub	0	0	0	0	0	0	1
601	<i>Hydrilla verticillata</i>	Hydrocharitaceae	Herb	0	0	1	0	0	0	0
602	<i>Hydrocharis spongia</i>	Hydrocharitaceae	Herb	0	0	1	0	0	0	0
603	<i>Hydrocotyle himalaica</i>	Araliaceae	Herb	0	1	0	0	0	0	1
604	<i>Hygrophila auriculata</i>	Acanthaceae	Herb	1	0	1	0	0	0	0
605	<i>Hygrophila ringens</i>	Acanthaceae	Herb	1	0	0	0	0	0	0
606	<i>Hymenodictyon excelsum</i>	Rubiaceae	Tree	0	0	0	0	1	0	0
607	<i>Hymenodictyon orixense</i>	Rubiaceae	Tree	0	0	1	1	0	1	0
608	<i>Hypericum choisyanum</i>	Hypericaceae	Shrub	0	1	0	0	0	0	1
609	<i>Hypericum elodeoides</i>	Hypericaceae	Herb	0	1	0	0	0	0	1
610	<i>Hypericum hookerianum</i>	Hypericaceae	Shrub	0	1	0	0	0	0	1
611	<i>Hypericum monanthemum</i>	Hypericaceae	Herb	0	0	0	0	0	0	1
612	<i>Hypericum oblongifolium</i>	Hypericaceae	Shrub	0	1	0	0	0	0	0
613	<i>Hypericum patulum</i>	Hypericaceae	Shrub	0	1	0	0	0	0	0
614	<i>Hyptis suaveolens</i>	Lamiaceae	Herb	0	0	1	1	0	1	0
615	<i>Ichnocarpus frutescens</i>	Apocynaceae	Climber	0	0	1	1	1	1	0
616	<i>Ilex dipyrena</i>	Aquifoliaceae	Shrub	0	1	0	0	0	0	1
617	<i>Ilex godajam</i>	Aquifoliaceae	Tree	0	0	0	0	0	1	0
618	<i>Ilex kingiana</i>	Aquifoliaceae	Shrub	0	0	0	0	0	0	1
619	<i>Ilex sikkimensis</i>	Aquifoliaceae	Tree	0	1	0	0	0	0	1
620	<i>Impatiens arguta</i>	Balsaminaceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
621	<i>Impatiens cathcartii</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
622	<i>Impatiens discolor</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
623	<i>Impatiens drepanophora</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
624	<i>Impatiens hobsonii</i>	Balsaminaceae	Herb	0	0	0	0	0	0	1
625	<i>Impatiens jurpia</i>	Balsaminaceae	Herb	0	0	0	0	0	1	0
626	<i>Impatiens puberula</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
627	<i>Impatiens racemosa</i>	Balsaminaceae	Herb	0	1	0	0	0	0	1
628	<i>Impatiens radiata</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
629	<i>Impatiens radiata</i> var. <i>graciliflora</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
630	<i>Impatiens stenantha</i>	Balsaminaceae	Herb	0	1	0	0	0	0	1
631	<i>Impatiens urticifolia</i>	Balsaminaceae	Herb	0	1	0	0	0	0	1
632	<i>Impatiens trilobata</i>	Balsaminaceae	Herb	0	0	0	1	1	1	0
633	<i>Imperata cylindrica</i>	Poaceae	Herb	0	0	1	0	0	0	0
634	<i>Indigofera articulata</i>	Fabaceae	Herb	0	0	1	0	0	0	0
635	<i>Indigofera linnaei</i>	Fabaceae	Herb	0	0	1	0	0	0	0
636	<i>Inula cuspidata</i>	Asteraceae	Herb	0	0	0	0	0	0	1
637	<i>Ipomoea aquatica</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
638	<i>Ipomoea biflora</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
639	<i>Ipomoea cairica</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
640	<i>Ipomoea carnea</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
641	<i>Ipomoea marginata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
642	<i>Ipomoea obscura</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
643	<i>Ipomoea pes-caprae</i>	Convolvulaceae	Climber	1	0	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
644	<i>Ipomoea sagittata</i>	Convolvulaceae	Climber	1	0	0	0	0	0	0
645	<i>Ipomoea triloba</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
646	<i>Iris clarkei</i>	Iridaceae	Herb	0	0	0	0	0	0	1
647	<i>Isachne globosa</i>	Poaceae	Herb	0	1	0	0	0	0	0
648	<i>Isachne sikkimensis</i>	Poaceae	Herb	0	1	0	0	0	0	0
649	<i>Isodon coetsa</i>	Lamiaceae	Herb	0	1	0	0	0	0	0
650	<i>Isodon lophanthoides</i>	Lamiaceae	Herb	0	1	0	0	0	0	0
651	<i>Ixora anthroantha</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
652	<i>Ixora arborea</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
653	<i>Ixora brachiata</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
654	<i>Jacobaea graciliflora</i>	Asteraceae	Herb	0	0	0	0	0	0	1
655	<i>Jacobaea raphanifolia</i>	Asteraceae	Herb	0	0	0	0	0	0	1
656	<i>Jacquemontia paniculata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
657	<i>Jasminum dispernum</i>	Oleaceae	Climber	0	1	0	0	0	0	0
658	<i>Jasminum flexile</i>	Oleaceae	Climber	0	0	0	1	1	1	0
659	<i>Jatropha curcas</i>	Euphorbiaceae	Shrub	0	0	1	0	0	0	0
660	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Shrub	0	0	1	0	0	0	0
661	<i>Juglans regia</i>	Juglandaceae	Tree	0	1	0	0	0	0	0
662	<i>Juncus benghalensis</i>	Juncaceae	Herb	0	0	0	0	0	0	1
663	<i>Juncus bufonius</i>	Juncaceae	Herb	0	0	0	0	0	0	1
664	<i>Justicia prostrata</i>	Acanthaceae	Herb	0	0	1	0	0	0	0
665	<i>Kalanchoe pinnata</i>	Crassulaceae	Herb	0	0	1	0	0	0	0
666	<i>Koenigia campanulata</i>	Polygonaceae	Herb	0	0	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
667	<i>Koenigia mollis</i>	Polygonaceae	Herb	0	1	0	0	0	0	0
668	<i>Kyllinga monocephala</i>	Fabaceae	Herb	0	0	1	0	0	0	0
669	<i>Lactuca decipiens</i>	Asteraceae	Herb	0	1	0	0	0	0	0
670	<i>Lactuca dissecta</i>	Asteraceae	Herb	0	1	0	0	0	0	0
671	<i>Lagerstroemia flos-reginae</i>	Lythraceae	Tree	0	0	0	1	0	1	0
672	<i>Lagerstroemia parviflora</i>	Lythraceae	Tree	0	0	1	1	1	1	0
673	<i>Lannea coromandelica</i>	Anacardiaceae	Tree	0	0	1	0	0	0	0
674	<i>Lantana camara</i>	Verbenaceae	Shrub	0	0	1	1	0	0	0
675	<i>Laportea crenulata</i>	Urticaceae	Shrub	0	0	0	1	0	0	0
676	<i>Lasia spinosa</i>	Araceae	Herb	0	0	0	0	1	1	0
677	<i>Lasianthus sikkimensis</i>	Rubiaceae	Shrub	0	1	0	0	0	0	0
678	<i>Launaea intybacea</i>	Asteraceae	Herb	0	0	1	0	0	0	0
679	<i>Lecanthus peduncularis</i>	Urticaceae	Herb	0	1	0	0	0	0	0
680	<i>Leea asiatica</i>	Vitaceae	Shrub	0	0	0	1	0	0	0
681	<i>Leea guineensis</i>	Vitaceae	Shrub	0	0	0	1	0	1	0
682	<i>Leea indica</i>	Vitaceae	Shrub	0	0	0	1	1	1	0
683	<i>Lepidagathis incurva</i> var. <i>incurva</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
684	<i>Lepisanthes deficiens</i>	Sapindaceae	Tree	0	0	0	1	0	1	0
685	<i>Leptochloa panicea</i>	Poaceae	Herb	1	0	0	0	0	0	0
686	<i>Leptopetalum biflorum</i>	Rubiaceae	Herb	1	0	0	0	0	0	0
687	<i>Lessingianthus robustus</i>	Asteraceae	Herb	0	0	0	0	0	0	1
688	<i>Leucas decemdentata</i>	Lamiaceae	Herb	0	0	1	0	0	0	0
689	<i>Leucosceptrum canum</i>	Lamiaceae	Shrub	0	1	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
690	<i>Leycesteria glaucophylla</i>	Caprifoliaceae	Herb	0	1	0	0	0	0	1
691	<i>Leycesteria gracilis</i>	Caprifoliaceae	Shrub	0	1	0	0	0	0	0
692	<i>Ligusticopsis wallichiana</i>	Apiaceae	Herb	0	0	0	0	0	0	1
693	<i>Limnophila chinensis</i>	Plantaginaceae	Herb	0	0	1	0	0	1	0
694	<i>Lindenbergia grandiflora</i>	Orobanchaceae	Herb	0	0	0	1	1	1	0
695	<i>Lindera assamica</i>	Lauraceae	Tree	0	1	0	0	0	0	0
696	<i>Lindernia oppositifolia</i>	Linderniaceae	Herb	0	0	0	0	1	1	0
697	<i>Liparis bootanensis</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
698	<i>Liparis petiolata</i>	Orchidaceae	Herb	0	0	0	0	0	0	1
699	<i>Lippia javanica</i>	Verbenaceae	Shrub	0	0	1	0	0	0	0
700	<i>Lithocarpus fenestratus</i>	Fagaceae	Tree	0	1	0	0	0	0	0
701	<i>Lithocarpus pachyphyllus</i>	Fagaceae	Tree	0	1	0	0	0	0	1
702	<i>Litsea albescens</i>	Lauraceae	Tree	0	1	0	0	0	0	0
703	<i>Litsea elongata</i>	Lauraceae	Tree	0	1	0	0	0	0	0
704	<i>Litsea glutinosa</i>	Lauraceae	Tree	0	0	1	0	0	0	0
705	<i>Litsea javanica</i>	Lauraceae	Tree	0	1	0	0	0	0	0
706	<i>Litsea lancifolia</i>	Lauraceae	Tree	0	0	0	1	0	0	0
707	<i>Litsea salicifolia</i>	Lauraceae	Tree	0	0	0	0	0	1	0
708	<i>Litsea sericea</i>	Lauraceae	Tree	0	0	0	0	0	0	1
709	<i>Litsea monopetala</i>	Lauraceae	Tree	0	0	0	0	0	1	0
710	<i>Lobelia montana</i>	Campanulaceae	Herb	0	1	0	0	0	0	0
711	<i>Lobelia nummularia</i>	Campanulaceae	Herb	0	1	0	0	0	0	1
712	<i>Lobelia seguinii</i> var. <i>doniana</i>	Campanulaceae	Herb	0	1	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
713	<i>Lonicera acuminata</i>	Caprifoliaceae	Liana	0	1	0	0	0	0	1
714	<i>Lonicera glabrata</i>	Caprifoliaceae	Herb	0	0	0	0	0	0	1
715	<i>Lonicera hispida</i>	Caprifoliaceae	Herb	0	0	0	0	0	0	1
716	<i>Luculia gratissima</i>	Rubiaceae	Shrub	0	1	0	0	0	0	0
717	<i>Ludwigia hyssopifolia</i>	Onagraceae	Herb	1	0	0	0	0	1	0
718	<i>Ludwigia octovalvis</i>	Onagraceae	Herb	0	0	0	0	0	1	0
719	<i>Ludwigia perennis</i>	Onagraceae	Herb	0	0	0	0	1	1	0
720	<i>Lumnitzera racemosa</i>	Combretaceae	Tree	1	0	0	0	0	0	0
721	<i>Lycopodium clavatum</i>	Lycopodiaceae	Herb	0	1	0	0	0	0	1
722	<i>Lygodium japonicum</i>	Schizaeaceae	Herb	0	0	1	0	0	0	0
723	<i>Lygodium microphyllum</i>	Schizaeaceae	Herb	0	0	0	1	1	1	0
724	<i>Lyonia ovalifolia</i>	Ericaceae	Tree	0	1	0	0	0	0	1
725	<i>Lyonia villosa</i>	Ericaceae	Tree	0	0	0	0	0	0	1
726	<i>Macaranga denticulata</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
727	<i>Macaranga peltata</i>	Euphorbiaceae	Tree	0	0	0	0	1	1	0
728	<i>Machilus edulis</i>	Lauraceae	Tree	0	1	0	0	0	0	0
729	<i>Machilus glaucescens</i>	Lauraceae	Tree	0	0	0	1	1	1	0
730	<i>Machilus kurzii</i>	Lauraceae	Tree	0	1	0	0	0	0	0
731	<i>Madhuca longifolia</i> var. <i>latifolia</i>	Sapotaceae	Tree	0	0	1	0	0	0	0
732	<i>Maesa indica</i>	Myrsinaceae	Shrub	0	0	0	1	0	1	1
733	<i>Magnolia campbellii</i>	Magnoliaceae	Tree	0	1	0	0	0	0	1
734	<i>Magnolia champaca</i>	Magnoliaceae	Tree	0	0	0	1	1	1	0
735	<i>Magnolia doltsopa</i>	Magnoliaceae	Tree	0	1	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
736	<i>Magnolia globosa</i>	Magnoliaceae	Tree	0	0	0	0	0	0	1
737	<i>Magnolia hodgsonii</i>	Magnoliaceae	Tree	0	0	0	0	1	1	0
738	<i>Magnolia pterocarpa</i>	Magnoliaceae	Tree	0	1	0	1	0	0	0
739	<i>Magnolia sp.</i>	Magnoliaceae	Tree	0	0	0	0	0	1	0
740	<i>Mahonia acanthifolia</i>	Berberidaceae	Shrub	0	1	0	0	0	0	0
741	<i>Mahonia japonica</i>	Berberidaceae	Shrub	0	1	0	0	0	0	0
742	<i>Mahonia nepalensis</i>	Berberidaceae	Shrub	0	1	0	0	0	0	0
743	<i>Maianthemum fuscum</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
744	<i>Malachra capitata</i>	Malvaceae	Herb	1	0	0	0	0	0	0
745	<i>Mallotus philippensis</i>	Euphorbiaceae	Tree	0	0	0	0	1	1	0
746	<i>Mallotus repandus</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
747	<i>Malus sikkimensis</i>	Rosaceae	Shrub	0	0	0	0	0	0	1
748	<i>Mangifera indica</i>	Anacardiaceae	Tree	0	0	0	0	1	1	0
749	<i>Mangifera sylvatica</i>	Anacardiaceae	Tree	0	0	0	0	1	0	0
750	<i>Marattia fraxinea</i>	Marattiaceae	Shrub	0	0	0	0	1	1	0
751	<i>Mariscus compactus</i>	Cyperaceae	Herb	0	0	0	0	0	1	0
752	<i>Mariscus panicus</i>	Cyperaceae	Herb	0	0	0	0	0	1	0
753	<i>Martynia annua</i>	Martyniaceae	Herb	0	0	1	0	0	0	0
754	<i>Mecardonia procumbens</i>	Plantaginaceae	Herb	1	0	0	0	0	0	0
755	<i>Melanoseris decipiens var. multifida</i>	Asteraceae	Herb	0	1	0	0	0	0	0
756	<i>Melanoseris graciliflora</i>	Asteraceae	Herb	0	1	0	0	0	0	0
757	<i>Melastoma malabathricum</i>	Melastomataceae	Shrub	0	0	0	0	1	1	0
758	<i>Melia composite</i>	Meliaceae	Tree	0	0	0	0	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
759	<i>Meliosma simplicifolia</i>	Sabiaceae	Tree	0	0	0	0	1	0	0
760	<i>Melochia corchorifolia</i>	Malvaceae	Herb	0	0	1	0	0	0	0
761	<i>Memecylon cerasiforme</i>	Melastomataceae	Shrub	0	0	0	1	0	0	0
762	<i>Merremia emarginata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
763	<i>Merremia hederacea</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
764	<i>Mesua ferrea</i>	Caryophyllaceae	Tree	0	0	0	1	1	1	0
765	<i>Meyna spinosa</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
766	<i>Mezoneuron cucullatum</i>	Fabaceae	Liana	0	0	0	1	1	1	0
767	<i>Micromelum integerrimum</i>	Rutaceae	Tree	0	0	0	1	1	1	0
768	<i>Micromelum minutum</i>	Rutaceae	Shrub	0	0	0	1	1	1	0
769	<i>Micropera obtusa</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
770	<i>Mikania cordata</i>	Asteraceae	Climber	1	0	0	1	1	1	0
771	<i>Miliusa velutina</i>	Annonaceae	Tree	0	0	1	0	0	0	0
772	<i>Millettia pachycarpa</i>	Fabaceae	Liana	0	0	0	1	1	0	0
773	<i>Millettia</i> sp.	Fabaceae	Climber	0	0	0	0	1	0	0
774	<i>Mimosa pudica</i>	Fabaceae	Herb	0	0	1	1	1	1	0
775	<i>Mimosa rubicaulis</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
776	<i>Miscanthus nepalensis</i>	Poaceae	Herb	0	1	0	0	0	0	0
777	<i>Mitragyna parvifolia</i>	Rubiaceae	Tree	0	0	1	1	1	1	0
778	<i>Momordica charantia</i> subsp. <i>abbreviata</i>	Cucurbitaceae	Climber	0	0	0	1	0	1	0
779	<i>Momordica charantia</i> var. <i>charantia</i>	Cucurbitaceae	Climber	0	0	0	0	0	1	0
780	<i>Morinda angustifolia</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
781	<i>Morinda citrifolia</i>	Rubiaceae	Tree	0	0	1	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
782	<i>Morus macroura</i>	Moraceae	Tree	0	0	0	0	0	1	0
783	<i>Mucuna atropurpurea</i>	Fabaceae	Climber	0	0	1	0	0	0	0
784	<i>Mucuna pruriens</i>	Fabaceae	Climber	0	0	1	0	0	0	0
785	<i>Mucuna sempervirens</i>	Fabaceae	Climber	0	0	0	1	0	0	0
786	<i>Murdannia nudiflora</i>	Commelinaceae	Herb	1	0	1	0	0	0	0
787	<i>Murraya koenigii</i>	Rutaceae	Tree	0	0	0	1	1	1	0
788	<i>Murraya paniculata</i>	Rutaceae	Tree	0	0	0	1	1	1	0
789	<i>Mussaenda</i> sp.	Rubiaceae	Shrub	0	0	0	1	1	1	0
790	<i>Myriactis nepalensis</i>	Asteraceae	Herb	0	1	0	0	0	0	1
791	<i>Myrsine semiserrata</i>	Myrsinaceae	Shrub	0	1	0	0	0	0	1
792	<i>Naravelia zeylanica</i>	Ranunculaceae	Climber	0	1	0	1	1	1	0
793	<i>Neanotis calycina</i>	Rubiaceae	Herb	0	1	0	0	0	0	0
794	<i>Neillia thyrsiflora</i>	Rosaceae	Shrub	0	1	0	0	0	0	1
795	<i>Nelsonia canescens</i>	Acanthaceae	Herb	0	0	0	1	0	0	0
796	<i>Neohymenopogon parasiticus</i>	Rubiaceae	Herb	0	0	0	0	0	0	1
797	<i>Neolitsea cuipala</i>	Lauraceae	Tree	0	0	0	0	0	0	1
798	<i>Nicotiana plumbaginifolia</i>	Solanaceae	Herb	0	0	1	0	0	0	0
799	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Tree	0	0	1	0	0	0	0
800	<i>Nypa fruticans</i>	Arecaceae	Tree	1	0	0	0	0	0	0
801	<i>Oberonia recurva</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
802	<i>Ochlandra</i> sp.	Poaceae	Shrub	0	0	1	0	1	0	0
803	<i>Ochna pumila</i>	Ochnaceae	Shrub	0	1	1	0	0	0	0
804	<i>Ocimum tenuiflorum</i>	Lamiaceae	Herb	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
805	<i>Ocotea lancifolia</i>	Lauraceae	Tree	0	0	0	0	1	1	0
806	<i>Odontosoria chinensis</i>	Lindsaeaceae	Herb	0	1	0	0	0	0	0
807	<i>Oenothera rosea</i>	Onagraceae	Herb	0	0	0	0	0	0	1
808	<i>Olax nana</i>	Olacaceae	Shrub	0	0	1	0	0	0	0
809	<i>Olax scandens</i>	Olacaceae	Shrub	0	0	1	0	0	0	0
810	<i>Oldenlandia attenuata</i>	Rubiaceae	Herb	1	0	0	0	0	0	0
811	<i>Oldenlandia corymbosa</i>	Rubiaceae	Herb	0	0	1	0	0	0	0
812	<i>Oldenlandia corymbosa</i> var. <i>linearis</i>	Rubiaceae	Herb	1	0	0	0	0	0	0
813	<i>Oldenlandia umbellata</i>	Rubiaceae	Herb	1	0	0	0	0	0	0
814	<i>Oleandra pistillaris</i>	Polypodiaceae	Herb	0	1	0	0	0	0	0
815	<i>Onychium japonicum</i>	Pteridaceae	Herb	0	0	0	0	0	0	1
816	<i>Ophioglossum reticulatum</i>	Ophioglossaceae	Herb	0	0	1	0	0	0	0
817	<i>Ophiopogon intermedius</i>	Asparagaceae	Herb	0	1	0	0	0	0	1
818	<i>Oplismenus burmanni</i>	Poaceae	Herb	0	1	0	1	1	1	0
819	<i>Oplismenus compositus</i>	Poaceae	Herb	0	1	1	1	1	1	0
820	<i>Oreoseris gossypina</i>	Asteraceae	Herb	0	0	0	0	0	0	1
821	<i>Oroxylum indicum</i>	Bignoniaceae	Tree	0	0	1	0	1	1	0
822	<i>Orthoraphium roylei</i>	Poaceae	Herb	0	0	0	0	0	0	1
823	<i>Oryza coarctata</i>	Poaceae	Herb	1	0	0	0	0	0	0
824	<i>Osbeckia stellata</i> var. <i>crinita</i>	Melastomataceae	Shrub	0	1	0	0	0	0	1
825	<i>Osmanthus suavis</i>	Oleaceae	Tree	0	1	0	0	0	0	1
826	<i>Osmunda claytoniana</i>	Osmundaceae	Herb	0	1	0	0	0	0	0
827	<i>Otochilus fuscus</i>	Orchidaceae	Herb	0	0	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
828	<i>Ougeinia oojeinensis</i>	Fabaceae	Tree	0	0	1	0	0	0	0
829	<i>Oxalis acetosella</i>	Oxalidaceae	Herb	0	0	0	0	0	0	1
830	<i>Oxalis corniculata</i>	Oxalidaceae	Herb	0	1	0	0	0	0	0
831	<i>Oxyspora paniculata</i>	Melastomataceae	Shrub	0	0	0	0	0	0	1
832	<i>Paederia foetida</i>	Rubiaceae	Climber	0	0	0	1	0	0	0
833	<i>Panax pseudoginseng</i>	Araliaceae	Herb	0	1	0	0	0	0	0
834	<i>Panax pseudoginseng</i> subsp. <i>himalaicus</i>	Araliaceae	Herb	0	0	0	0	0	0	1
835	<i>Pandanus unguifer</i>	Pandanaceae	Herb	0	0	0	0	0	1	0
836	<i>Panicum nodatum</i>	Poaceae	Herb	0	0	0	1	1	1	0
837	<i>Panicum psilopodium</i>	Poaceae	Herb	0	0	0	1	1	1	0
838	<i>Panicum repens</i>	Poaceae	Herb	0	0	1	0	0	0	0
839	<i>Papaver napaulense</i>	Papaveraceae	Herb	0	0	0	0	0	0	1
840	<i>Papilionanthe teres</i>	Orchidaceae	Herb	0	0	0	1	1	1	0
841	<i>Paramignya monophylla</i>	Rutaceae	Liana	0	0	0	0	1	0	0
842	<i>Paris polyphylla</i>	Melanthiaceae	Herb	0	1	0	0	0	0	1
843	<i>Parnassia nubicola</i>	Celastraceae	Herb	0	0	0	0	0	0	1
844	<i>Parochetus communis</i>	Fabaceae	Herb	0	1	0	0	0	0	1
845	<i>Parthenium hysterophorus</i>	Asteraceae	Herb	0	0	1	0	0	0	0
846	<i>Paspalum scrobiculatum</i>	Poaceae	Herb	0	0	1	0	0	0	0
847	<i>Paspalum thunbergii</i>	Poaceae	Herb	0	0	0	0	0	0	1
848	<i>Passiflora foetida</i>	Passifloraceae	Climber	0	0	1	0	0	0	0
849	<i>Passiflora suberosa</i>	Passifloraceae	Climber	0	0	0	1	0	0	0
850	<i>Pavetta indica</i>	Rubiaceae	Shrub	0	0	1	0	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
851	<i>Pedicularis pantlingii</i>	Orobanchaceae	Herb	0	0	0	0	0	0	1
852	<i>Pegia nitida</i>	Anacardiaceae	Liana	0	0	0	0	0	1	0
853	<i>Pelatantheria insectifer</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
854	<i>Peliosanthes violacea</i> var. <i>minor</i>	Asparagaceae	Herb	0	0	0	0	1	0	0
855	<i>Pentatropis capensis</i>	Apocynaceae	Herb	1	0	0	0	0	0	0
856	<i>Peperomia tetraphylla</i>	Piperaceae	Herb	0	1	0	0	0	0	0
857	<i>Peracarpa carnosia</i>	Campanulaceae	Herb	0	0	0	0	0	0	1
858	<i>Pergularia daemia</i>	Apocynaceae	Climber	1	0	0	0	0	0	0
859	<i>Pericampylus glaucus</i>	Menispermaceae	Climber	0	0	0	0	1	1	0
860	<i>Pericampylus incanus</i>	Menispermaceae	Climber	0	0	0	0	1	1	0
861	<i>Peristylus biermannianus</i>	Orchidaceae	Herb	0	0	0	0	0	0	1
862	<i>Perotis indica</i>	Poaceae	Herb	0	0	1	0	0	0	0
863	<i>Persicaria capitata</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
864	<i>Persicaria chinensis</i>	Polygonaceae	Herb	0	1	0	0	0	0	1
865	<i>Persicaria hydropiper</i>	Polygonaceae	Herb	0	1	0	0	0	0	0
866	<i>Persicaria hydropiperoides</i>	Polygonaceae	Climber	0	0	0	0	1	1	0
867	<i>Persicaria lapathifolia</i>	Polygonaceae	Herb	0	1	0	0	0	0	0
868	<i>Persicaria runcinata</i>	Polygonaceae	Herb	0	1	0	0	0	0	1
869	<i>Persicaria wallichii</i>	Polygonaceae	Herb	0	1	0	0	0	0	0
870	<i>Phaius mishmensis</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
871	<i>Phaius tankervilleae</i> var. <i>pulchra</i>	Orchidaceae	Herb	0	0	0	0	0	1	0
872	<i>Phanera vahlii</i>	Fabaceae	Liana	0	0	1	0	0	0	0
873	<i>Phaulopsis imbricata</i>	Acanthaceae	Herb	0	0	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
874	<i>Phlogacanthus thyrsoiflorus</i>	Acanthaceae	Shrub	0	0	0	1	1	1	0
875	<i>Phlomis lanata</i>	Lamiaceae	Herb	0	0	0	0	0	0	1
876	<i>Phlomis hamosa</i>	Lamiaceae	Herb	0	1	0	0	0	0	1
877	<i>Phoenix paludosa</i>	Arecaceae	Shrub	1	0	0	0	0	0	0
878	<i>Phoenix sylvestris</i>	Arecaceae	Tree	0	0	1	0	0	0	0
879	<i>Phyla nodiflora</i>	Verbenaceae	Herb	1	0	0	0	0	0	0
880	<i>Phyllanthus amarus</i>	Phyllanthaceae	Herb	1	0	1	0	0	0	0
881	<i>Phyllanthus emblica</i>	Phyllanthaceae	Tree	0	0	1	1	1	1	0
882	<i>Phyllanthus niruri</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0
883	<i>Phyllanthus praetervisus</i>	Phyllanthaceae	Herb	0	0	0	1	0	1	0
884	<i>Phyllanthus reticulatus</i>	Phyllanthaceae	Shrub	0	0	0	1	1	1	0
885	<i>Phyllanthus rheedei</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0
886	<i>Phyllanthus sikkimensis</i>	Phyllanthaceae	Shrub	0	0	0	1	1	1	0
887	<i>Phyllanthus urinaria</i>	Phyllanthaceae	Herb	0	0	0	1	1	1	0
888	<i>Phyllanthus virgatus</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0
889	<i>Phyllodium pulchellum</i>	Fabaceae	Herb	0	0	1	0	0	0	0
890	<i>Physalis angulata</i>	Solanaceae	Herb	1	0	0	0	0	0	0
891	<i>Picrorhiza kurroa</i>	Plantaginaceae	Herb	0	0	0	0	0	0	1
892	<i>Pieris formosa</i>	Ericaceae	Tree	0	1	0	0	0	0	1
893	<i>Pilea bracteosa</i>	Urticaceae	Herb	0	1	0	0	0	0	0
894	<i>Pilea ternifolia</i>	Urticaceae	Herb	0	1	0	0	0	0	1
895	<i>Pilea umbrosa</i>	Urticaceae	Herb	0	1	0	0	0	0	0
896	<i>Pimpinella diversifolia</i>	Apiaceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
897	<i>Pinus patula</i>	Pinaceae	Tree	0	1	0	0	0	0	0
898	<i>Pinus wallichiana</i>	Pinaceae	Tree	0	1	0	0	0	0	0
899	<i>Piper attenuatum</i>	Piperaceae	Climber	0	1	0	1	1	1	0
900	<i>Piper betleoides</i>	Piperaceae	Climber	0	0	0	0	1	1	0
901	<i>Piper locnchites</i>	Piperaceae	Climber	0	0	0	0	1	1	0
902	<i>Piper longum</i>	Piperaceae	Climber	0	0	0	1	1	1	0
903	<i>Piper retrofractum</i>	Piperaceae	Climber	0	0	0	1	1	0	0
904	<i>Piper suipigua</i>	Piperaceae	Climber	0	1	0	0	0	0	0
905	<i>Piper sylvaticum</i>	Piperaceae	Climber	0	0	0	1	1	1	0
906	<i>Piptanthus nepalensis</i>	Fabaceae	Tree	0	1	0	0	0	0	1
907	<i>Pistia stratiotes</i>	Araceae	Herb	0	0	1	0	0	0	0
908	<i>Pitardella sikkimensis</i>	Rubiaceae	Shrub	0	0	0	1	1	1	0
909	<i>Plagiogyria pycnophylla</i>	Cyatheaceae	Herb	0	1	0	0	0	0	0
910	<i>Plantago asiatica</i> subsp. <i>erosa</i>	Plantaginaceae	Herb	0	0	0	0	0	0	1
911	<i>Plantago erosa</i>	Plantaginaceae	Herb	0	1	0	0	0	0	0
912	<i>Plantago erosa</i> var. <i>fengdouensis</i>	Plantaginaceae	Herb	0	0	0	0	0	0	1
913	<i>Platanthera urceolata</i>	Orchidaceae	Herb	0	0	0	0	0	0	1
914	<i>Pleione hookeriana</i>	Orchidaceae	Herb	0	0	0	0	0	0	1
915	<i>Pleione praecox</i>	Orchidaceae	Herb	0	1	0	0	0	0	1
916	<i>Pleurolobus gangeticus</i>	Fabaceae	Herb	0	0	1	0	0	0	0
917	<i>Plumbago zeylanica</i>	Plumbaginaceae	Herb	0	0	1	0	0	0	0
918	<i>Poa ludens</i>	Poaceae	Herb	0	1	0	0	0	0	0
919	<i>Poa mairei</i>	Poaceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
920	<i>Poa rajbhandarii</i>	Poaceae	Herb	0	1	0	0	0	0	1
921	<i>Podophyllum hexandrum</i>	Berberidaceae	Herb	0	0	0	0	0	0	1
922	<i>Pogostemon benghalensis</i>	Lamiaceae	Herb	0	0	0	1	1	1	0
923	<i>Pogostemon purpurescens</i>	Lamiaceae	Herb	0	0	0	1	1	1	0
924	<i>Polhillides velutina</i>	Fabaceae	Herb	0	0	1	0	0	0	0
925	<i>Polyalthia simiarum</i>	Annonaceae	Tree	0	0	0	1	0	1	0
926	<i>Polyalthia cerasoides</i>	Annonaceae	Tree	0	0	0	1	0	0	0
927	<i>Polygala crotalarioides</i>	Polygalaceae	Herb	0	0	1	0	0	0	0
928	<i>Polygonatum brevistylum</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
929	<i>Polygonatum oppositifolium</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
930	<i>Polygonatum verticillatum</i>	Asparagaceae	Herb	0	0	0	0	0	0	1
931	<i>Polygonum capitatum</i>	Lamiaceae	Herb	0	0	0	0	1	1	0
932	<i>Polygonum chinense</i>	Polygonaceae	Herb	0	0	0	0	1	1	0
933	<i>Polygonum hydropiper</i>	Polygonaceae	Herb	0	0	0	0	1	1	0
934	<i>Polygonum molle</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
935	<i>Polygonum plebeium</i>	Polygonaceae	Herb	0	0	0	0	1	1	0
936	<i>Polygonum runcinatum</i>	Polygonaceae	Herb	0	1	0	0	0	0	1
937	<i>Polygonum verticillatum</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
938	<i>Polystichum lentum</i>	Polypodiaceae	Herb	0	0	0	0	0	0	1
939	<i>Pontederia crassipes</i>	Pontederiaceae	Herb	0	0	1	0	0	0	0
940	<i>Porana paniculata</i>	Convolvulaceae	Climber	0	0	0	0	1	0	0
941	<i>Portulaca suffruticosa</i>	Portulacaceae	Herb	0	0	1	0	0	0	0
942	<i>Portulaca tuberosa</i>	Portulacaceae	Herb	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
943	<i>Potentilla fruticosa</i>	Rosaceae	Herb	0	1	0	0	0	0	0
944	<i>Potentilla indica</i>	Rosaceae	Herb	0	0	0	1	1	1	1
945	<i>Pothas scandens</i>	Arecaceae	Climber	0	0	1	1	1	1	0
946	<i>Pouzolzia zeylanica</i>	Urticaceae	Herb	0	1	0	1	0	1	0
947	<i>Pratia montana</i>	Campanulaceae	Herb	0	1	0	0	0	0	0
948	<i>Pratia nummularia</i>	Campanulaceae	Herb	0	0	0	0	0	0	1
949	<i>Premna mollissima</i>	Lamiaceae	Shrub	0	0	0	1	1	1	0
950	<i>Premna bengalensis</i>	Lamiaceae	Shrub	0	0	0	0	0	1	0
951	<i>Primula capitata</i>	Primulaceae	Herb	0	0	0	0	0	0	1
952	<i>Primula denticulata</i>	Primulaceae	Herb	0	0	0	0	0	0	1
953	<i>Primula irregularis</i>	Primulaceae	Herb	0	0	0	0	0	0	1
954	<i>Primula petiolaris</i>	Primulaceae	Herb	0	0	0	0	0	0	1
955	<i>Primula rotundifolia</i>	Primulaceae	Herb	0	0	0	0	0	0	1
956	<i>Primula scapigera</i>	Primulaceae	Herb	0	0	0	0	0	0	1
957	<i>Primula vulgaris</i>	Primulaceae	Herb	0	0	0	0	0	0	1
958	<i>Prunella vulgaris</i>	Lamiaceae	Herb	0	1	0	0	0	0	1
959	<i>Prunus cerasoides</i>	Rosaceae	Tree	0	1	0	0	0	0	0
960	<i>Prunus napaulensis</i>	Rosaceae	Tree	0	1	0	0	0	0	0
961	<i>Prunus rufa</i>	Rosaceae	Tree	0	0	0	0	0	0	1
962	<i>Pseudarthria viscida</i>	Fabaceae	Herb	0	0	1	0	0	0	0
963	<i>Pseuderanthemum latifolium</i>	Acanthaceae	Herb	0	0	0	0	1	0	0
964	<i>Pseuderanthemum malabaricum</i>	Acanthaceae	Herb	0	0	0	0	1	1	0
965	<i>Pseudognaphalium affine</i>	Asteraceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
966	<i>Psychotria erratica</i> var. <i>pedunculata</i>	Rubiaceae	Herb	0	0	0	0	1	0	0
967	<i>Psydrax dicoccos</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
968	<i>Pteridium revolutum</i>	Dennstaedtiaceae	Herb	0	1	0	0	0	0	0
969	<i>Pteris aspericaulis</i>	Pteridaceae	Herb	0	1	0	0	0	0	1
970	<i>Pteris cretica</i>	Pteridaceae	Herb	0	1	0	0	0	0	0
971	<i>Pteris excelsa</i>	Pteridaceae	Herb	0	1	0	0	0	0	0
972	<i>Pteris quadriaurita</i>	Pteridaceae	Herb	0	1	0	0	0	0	1
973	<i>Pteris semipinnata</i>	Pteridaceae	Herb	0	0	0	1	1	1	0
974	<i>Pteris venusta</i>	Pteridaceae	Herb	0	0	1	0	0	0	0
975	<i>Pterocarpus marsupium</i>	Fabaceae	Tree	0	0	1	1	0	1	0
976	<i>Pterospermum acerifolium</i>	Malvaceae	Tree	0	0	0	1	1	1	0
977	<i>Pterygota alata</i>	Malvaceae	Tree	0	0	0	1	1	1	0
978	<i>Pueraria sikkimensis</i>	Fabaceae	Climber	0	0	0	1	1	1	0
979	<i>Pupalia lappacea</i>	Amaranthaceae	Herb	0	0	0	1	1	1	0
980	<i>Pyrus pashia</i>	Rosaceae	Tree	0	0	0	0	0	0	1
981	<i>Quercus lamellosa</i>	Fagaceae	Tree	0	1	0	0	0	0	0
982	<i>Quercus lineata</i>	Fagaceae	Tree	0	1	0	0	0	0	0
983	<i>Quercus pachyphylla</i>	Fagaceae	Tree	0	1	0	0	0	0	0
984	<i>Quercus thomsoniana</i>	Fagaceae	Tree	0	1	0	0	0	0	0
985	<i>Ranunculus diffusus</i>	Ranunculaceae	Herb	0	1	0	0	0	0	1
986	<i>Ranunculus microphyllus</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
987	<i>Rauwolfia serpentina</i>	Apocynaceae	Herb	0	0	0	1	0	0	0
988	<i>Rauwolfia tetraphylla</i>	Apocynaceae	Shrub	0	0	1	1	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
989	<i>Rhaphidophora calophylla</i>	Araceae	Climber	0	1	0	0	0	0	0
990	<i>Rhaphidophora decursiva</i>	Araceae	Climber	0	0	0	0	1	1	0
991	<i>Rhaphidophora glauca</i>	Araceae	Climber	0	1	0	0	0	0	0
992	<i>Rhaphidophora</i> sp.	Araceae	Climber	0	0	0	1	0	0	0
993	<i>Rhizophora apiculata</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
994	<i>Rhizophora mucronata</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
995	<i>Rhodiola himalensis</i>	Crassulaceae	Herb	0	0	0	0	0	0	1
996	<i>Rhododendron arboreum</i>	Ericaceae	Tree	0	1	0	0	0	0	1
997	<i>Rhododendron barbatum</i>	Ericaceae	Tree	0	1	0	0	0	0	1
998	<i>Rhododendron falconeri</i>	Ericaceae	Tree	0	1	0	0	0	0	1
999	<i>Rhododendron grande</i>	Ericaceae	Tree	0	1	0	0	0	0	1
1000	<i>Rhododendron griffithianum</i>	Ericaceae	Tree	0	1	0	0	0	0	1
1001	<i>Rhododendron hodgsonii</i>	Ericaceae	Tree	0	0	0	0	0	0	1
1002	<i>Rhododendron triflorum</i>	Ericaceae	Shrub	0	0	0	0	0	0	1
1003	<i>Rhynchospermum verticillatum</i>	Asteraceae	Herb	0	1	0	0	0	0	0
1004	<i>Rhynchospora colorata</i>	Cyperaceae	Herb	0	0	1	0	0	0	0
1005	<i>Rhynchostylis retusa</i>	Orchidaceae	Herb	0	0	0	1	1	0	0
1006	<i>Rhynchocheum ellipticum</i>	Gesneriaceae	Shrub	0	0	0	0	0	1	0
1007	<i>Ribes takare</i>	Grossulariaceae	Shrub	0	0	0	0	0	0	1
1008	<i>Richardia scabra</i>	Rubiaceae	Herb	0	0	0	1	0	1	0
1009	<i>Ricinus communis</i>	Euphorbiaceae	Shrub	0	0	1	0	0	0	0
1010	<i>Rivea hypocrateriformis</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
1011	<i>Rohdea nepalensis</i>	Asparagaceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1012	<i>Rosa sericea</i>	Rosaceae	Shrub	0	0	0	0	0	0	1
1013	<i>Rotala rosea</i>	Lythraceae	Herb	0	0	1	0	0	0	0
1014	<i>Rothia indica</i>	Fabaceae	Herb	1	0	0	0	0	0	0
1015	<i>Rubia cordifolia</i>	Rubiaceae	Climber	0	1	0	0	0	0	1
1016	<i>Rubia manjith</i>	Rubiaceae	Climber	0	1	0	0	0	0	1
1017	<i>Rubia sikkimensis</i>	Rubiaceae	Climber	0	1	0	0	0	0	0
1018	<i>Rubia wallichiana</i>	Rubiaceae	Climber	0	0	0	0	0	0	1
1019	<i>Rubus acuminatus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
1020	<i>Rubus calycinooides</i>	Rosaceae	Herb	0	0	0	0	0	0	1
1021	<i>Rubus calycinus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
1022	<i>Rubus ellipticus</i>	Rosaceae	Shrub	0	1	0	0	0	0	1
1023	<i>Rubus hypargyrus</i>	Rosaceae	Shrub	0	1	0	0	0	0	0
1024	<i>Rubus lineatus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
1025	<i>Rubus paniculatus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
1026	<i>Rubus rosifolius</i>	Rosaceae	Shrub	0	1	0	0	0	0	0
1027	<i>Rubus rugosus</i>	Rosaceae	Herb	0	1	0	0	0	0	1
1028	<i>Rubus splendidissimus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
1029	<i>Rubus wardii</i>	Rosaceae	Shrub	0	1	0	0	0	0	0
1030	<i>Ruellia prostrata</i>	Asteraceae	Herb	0	0	1	0	0	0	0
1031	<i>Rumex nepalensis</i>	Polygonaceae	Herb	0	1	0	0	0	0	1
1032	<i>Rungia pectinata</i>	Acanthaceae	Herb	0	0	1	1	0	1	1
1033	<i>Saccharum spontaneum</i>	Poaceae	Herb	0	0	0	0	0	1	0
1034	<i>Saccolabiopsis pussila</i>	Orchidaceae	Herb	0	0	0	1	1	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1035	<i>Saccolabium</i> sp.	Orchidaceae	Herb	0	0	0	0	1	0	0
1036	<i>Sagina japonica</i>	Caryophyllaceae	Herb	0	0	0	0	0	0	1
1037	<i>Salacia chinensis</i>	Celastraceae	Shrub	0	0	0	1	0	0	0
1038	<i>Salix obscura</i>	Salicaceae	Tree	0	0	0	0	0	0	1
1039	<i>Salix thomsoniana</i>	Salicaceae	Tree	0	0	0	0	0	0	1
1040	<i>Salomonina ciliata</i>	Polygalaceae	Herb	0	0	0	0	0	1	0
1041	<i>Sambucus adnata</i>	Viburnaceae	Shrub	0	0	0	0	0	0	1
1042	<i>Sanicula elata</i>	Apiaceae	Herb	0	0	0	0	0	0	1
1043	<i>Santalum album</i>	Santalaceae	Tree	0	0	1	0	0	0	0
1044	<i>Sarcococca wallichii</i>	Euphorbiaceae	Herb	0	1	0	0	0	0	1
1045	<i>Sarcolobus globosus</i>	Apocynaceae	Climber	1	0	0	0	0	0	0
1046	<i>Sarocalamus racemosus</i>	Poaceae	Shrub	0	0	0	0	0	0	1
1047	<i>Satyrium nepalense</i>	Orchidaceae	Herb	0	0	0	0	0	0	1
1048	<i>Saurauia roxburghii</i>	Actinidiaceae	Tree	0	0	0	0	0	1	0
1049	<i>Sauropus androgynus</i>	Phyllanthaceae	Shrub	0	0	0	1	0	0	0
1050	<i>Sauropus compressus</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0
1051	<i>Sauropus compressus</i> var. <i>puberulus</i>	Phyllanthaceae	Herb	0	0	0	1	1	1	0
1052	<i>Saxifraga strigosa</i>	Saxifragaceae	Herb	0	1	0	0	0	0	0
1053	<i>Schefflera rhododendrifolia</i>	Araliaceae	Tree	0	1	0	0	0	0	1
1054	<i>Schima wallichii</i>	Theaceae	Tree	0	0	0	1	1	1	0
1055	<i>Schisandra grandiflora</i>	Schisandraceae	Liana	0	1	0	0	0	0	1
1056	<i>Schisandra neglecta</i>	Schisandraceae	Liana	0	0	0	0	0	0	1
1057	<i>Schleichera oleosa</i>	Sapindaceae	Tree	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1058	<i>Scoparia dulcis</i>	Plantaginaceae	Herb	1	0	1	0	0	0	0
1059	<i>Scutellaria discolor</i>	Lamiaceae	Herb	0	1	0	0	0	0	0
1060	<i>Selaginella monospora</i>	Selaginellaceae	Herb	0	0	0	0	0	0	1
1061	<i>Selinum carvifolium</i>	Apiaceae	Herb	0	0	0	0	0	0	1
1062	<i>Selliguea erythrocarpa</i>	Polypodiaceae	Herb	0	1	0	0	0	0	1
1063	<i>Semecarpus anacardium</i>	Anacardiaceae	Tree	0	0	1	0	0	0	0
1064	<i>Senecio graciliflorus</i>	Asteraceae	Herb	0	0	0	0	0	0	1
1065	<i>Senecio scandens</i>	Asteraceae	Climber	0	1	0	0	0	0	0
1066	<i>Senecio wightianus</i>	Asteraceae	Herb	0	1	0	0	0	0	0
1067	<i>Senegalia chundra</i>	Fabaceae	Tree	0	0	1	0	0	0	0
1068	<i>Senegalia pennata</i>	Fabaceae	Liana	0	0	0	1	1	1	0
1069	<i>Senna obtusifolia</i>	Fabaceae	Herb	0	0	1	0	0	0	0
1070	<i>Senna occidentalis</i>	Fabaceae	Herb	0	0	1	0	1	1	0
1071	<i>Senna sophera</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
1072	<i>Senna tora</i>	Fabaceae	Herb	0	0	1	1	1	1	0
1073	<i>Sesuvium portulacastrum</i>	Aizoaceae	Herb	1	0	0	0	0	0	0
1074	<i>Setaria flavida</i>	Poaceae	Herb	0	0	1	0	0	0	0
1075	<i>Setaria glauca</i>	Poaceae	Herb	0	0	1	0	0	0	0
1076	<i>Shorea robusta</i>	Dipterocarpaceae	Tree	0	0	1	1	1	1	0
1077	<i>Sida acuta</i>	Malvaceae	Herb	0	0	1	0	0	0	0
1078	<i>Sida alnifolia</i>	Malvaceae	Herb	0	0	0	1	0	1	0
1079	<i>Sida cordata</i>	Malvaceae	Herb	0	0	1	1	1	1	0
1080	<i>Sida cordifolia</i>	Malvaceae	Herb	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1081	<i>Sida rhombifolia</i> subsp. <i>alnifolia</i>	Malvaceae	Herb	0	0	1	1	0	0	0
1082	<i>Sida rhomboidea</i>	Malvaceae	Herb	0	0	1	0	0	0	0
1083	<i>Skimmia laureola</i>	Rutaceae	Shrub	0	0	0	0	0	0	1
1084	<i>Sloanea sterculiacea</i>	Elaeocarpaceae	Tree	0	0	0	1	1	1	0
1085	<i>Smilax elegans</i>	Smilacaceae	Climber	0	1	0	0	0	0	1
1086	<i>Smilax griffithii</i>	Smilacaceae	Climber	0	0	0	0	1	1	0
1087	<i>Smilax lanceifolia</i>	Smilacaceae	Climber	0	0	0	0	0	1	0
1088	<i>Smilax munita</i>	Smilacaceae	Shrub	0	1	0	0	0	0	1
1089	<i>Smilax myrtillus</i>	Smilacaceae	Climber	0	1	0	0	0	0	0
1090	<i>Smilax ovalifolia</i>	Smilacaceae	Climber	0	0	1	1	1	1	0
1091	<i>Smilax</i> sp.	Smilacaceae	Climber	0	0	0	0	1	0	0
1092	<i>Smilax zeylanica</i>	Smilacaceae	Climber	0	0	1	1	1	1	0
1093	<i>Smitinandia micrantha</i>	Orchidaceae	Herb	0	0	0	0	1	1	0
1094	<i>Solanum khasianum</i> var. <i>chatterjeeanum</i>	Solanaceae	Herb	0	0	0	1	0	1	0
1095	<i>Solanum melongena</i>	Solanaceae	Herb	0	0	1	0	0	0	0
1096	<i>Solanum nigrum</i>	Solanaceae	Herb	0	0	1	0	0	0	0
1097	<i>Solanum sisymbriifolium</i>	Solanaceae	Herb	0	0	1	0	0	0	0
1098	<i>Solanum torvum</i>	Solanaceae	Shrub	0	0	1	1	0	1	0
1099	<i>Solena heterophylla</i>	Cucurbitaceae	Climber	0	0	0	1	1	1	0
1100	<i>Sonneratia alba</i>	Lythraceae	Tree	1	0	0	0	0	0	0
1101	<i>Sonneratia apetala</i>	Lythraceae	Tree	1	0	0	0	0	0	0
1102	<i>Sonneratia caseolaris</i>	Lythraceae	Tree	1	0	0	0	0	0	0
1103	<i>Sonneratia griffithii</i>	Lythraceae	Tree	1	0	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1104	<i>Sorbus foliolosa</i>	Rosaceae	Tree	0	0	0	0	0	0	1
1105	<i>Soymida febrifuga</i>	Meliaceae	Tree	0	0	1	0	0	0	0
1106	<i>Spatholobus parviflorus</i>	Fabaceae	Liana	0	0	1	1	1	1	0
1107	<i>Spermacoce alata</i>	Rubiaceae	Herb	0	0	0	1	1	1	0
1108	<i>Spermacoce articularis</i>	Rubiaceae	Herb	0	0	1	0	0	0	0
1109	<i>Spermacoce hispida</i>	Rubiaceae	Herb	0	0	1	0	0	0	0
1110	<i>Spermacoce latifolia</i>	Rubiaceae	Herb	0	0	0	1	1	1	0
1111	<i>Spermacoce prostrata</i>	Rubiaceae	Liana	0	0	0	0	1	1	0
1112	<i>Spermacoce pusilla</i>	Rubiaceae	Herb	0	0	0	0	1	1	0
1113	<i>Spiraea bella</i>	Rosaceae	Herb	0	0	0	0	0	0	1
1114	<i>Spiraea micrantha</i>	Rosaceae	Herb	0	0	0	0	0	0	1
1115	<i>Spondias pinnata</i>	Anacardiaceae	Tree	0	0	0	0	0	1	0
1116	<i>Sporobolus diandrus</i>	Poaceae	Herb	0	0	1	0	0	0	0
1117	<i>Sporobolus virginicus</i>	Poaceae	Herb	1	0	0	0	0	0	0
1118	<i>Stauntonia latifolia</i>	Lardizabalaceae	Liana	0	0	0	0	0	0	1
1119	<i>Stellaria decumbens</i>	Caryophyllaceae	Herb	0	0	0	0	0	0	1
1120	<i>Stellaria lanata</i>	Caryophyllaceae	Herb	0	0	0	0	0	0	1
1121	<i>Stellaria media</i>	Caryophyllaceae	Herb	0	1	0	0	0	0	0
1122	<i>Stellaria sikkimensis</i>	Caryophyllaceae	Herb	0	1	0	0	0	0	1
1123	<i>Stenosseris graciliflora</i>	Asteraceae	Herb	0	1	0	0	0	0	0
1124	<i>Stephania japonica</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
1125	<i>Stephania japonica var. discolor</i>	Menispermaceae	Climber	0	0	0	1	1	1	0
1126	<i>Sterculia guttata</i>	Malvaceae	Tree	0	0	0	1	0	1	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1127	<i>Sterculia villosa</i>	Malvaceae	Tree	0	0	1	1	1	1	0
1128	<i>Stereospermum colais</i>	Bignoniaceae	Tree	0	0	0	1	1	1	0
1129	<i>Stereospermum suaveolens</i>	Bignoniaceae	Tree	0	0	1	0	0	0	0
1130	<i>Streblus asper</i>	Moraceae	Tree	0	0	1	0	1	1	0
1131	<i>Streptolirion volubile</i>	Commelinaceae	Climber	0	1	0	0	0	0	0
1132	<i>Strobilanthes divaricata</i>	Acanthaceae	Herb	0	1	0	0	0	0	1
1133	<i>Strobilanthes pentastemonoides</i>	Acanthaceae	Herb	0	1	0	0	0	0	1
1134	<i>Strobilanthes pentastemonoides</i> var. <i>dalhousieana</i>	Acanthaceae	Herb	0	1	0	0	0	0	1
1135	<i>Strobilanthes</i> sp.	Acanthaceae	Herb	0	0	0	0	1	1	0
1136	<i>Suaeda maritima</i>	Chenopodiaceae	Herb	1	0	0	0	0	0	0
1137	<i>Suaeda nudiflora</i>	Amaranthaceae	Herb	1	0	0	0	0	0	0
1138	<i>Suregada multiflora</i>	Euphorbiaceae	Tree	0	0	1	0	1	1	0
1139	<i>Swertia bimaculata</i>	Gentianaceae	Herb	0	1	0	0	0	0	1
1140	<i>Swertia chirayita</i>	Gentianaceae	Herb	0	1	0	0	0	0	1
1141	<i>Swertia ciliata</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
1142	<i>Swertia hookeri</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
1143	<i>Swertia paniculata</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
1144	<i>Swertia purpurascens</i>	Gentianaceae	Herb	0	1	0	0	0	0	0
1145	<i>Symplocos dryophila</i>	Symplocaceae	Tree	0	1	0	0	0	0	1
1146	<i>Symplocos glomerata</i>	Symplocaceae	Tree	0	1	0	0	0	1	1
1147	<i>Symplocos lucida</i>	Symplocaceae	Tree	0	1	0	0	0	0	1
1148	<i>Symplocos racemosa</i>	Symplocaceae	Tree	0	1	1	0	0	0	0
1149	<i>Symplocos ramosissima</i>	Symplocaceae	Tree	0	1	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1150	<i>Symplocos</i> sp.	Symplocaceae	Tree	0	0	0	0	0	1	0
1151	<i>Symplocos theifolia</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
1152	<i>Symplocos cochinchinensis</i> var. <i>laurina</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
1153	<i>Synotis acuminata</i>	Asteraceae	Herb	0	0	0	0	0	0	1
1154	<i>Synotis alata</i>	Asteraceae	Herb	0	0	0	0	0	0	1
1155	<i>Synotis cappa</i>	Asteraceae	Herb	0	1	0	0	0	0	1
1156	<i>Synotis tetrantha</i>	Asteraceae	Herb	0	1	0	0	0	0	1
1157	<i>Syzygium cumini</i>	Myrtaceae	Tree	0	0	1	0	0	0	0
1158	<i>Syzygium formosum</i>	Myrtaceae	Tree	0	0	0	1	1	1	0
1159	<i>Syzygium jambos</i>	Myrtaceae	Tree	0	0	1	0	0	0	0
1160	<i>Syzygium nervosum</i>	Myrtaceae	Tree	0	0	1	0	0	0	0
1161	<i>Syzygium praecox</i>	Myrtaceae	Tree	0	0	0	1	1	1	0
1162	<i>Syzygium tetragonum</i>	Myrtaceae	Tree	0	0	0	0	1	0	0
1163	<i>Tabernaemontana alternifolia</i>	Apocynaceae	Shrub	0	0	0	1	1	1	0
1164	<i>Tabernaemontana divaricata</i>	Apocynaceae	Shrub	0	0	0	0	1	1	0
1165	<i>Tamarix troupii</i>	Tamaricaceae	Shrub	1	0	0	0	0	0	0
1166	<i>Taxus wallichiana</i>	Taxaceae	Tree	0	1	0	0	0	0	1
1167	<i>Tectona grandis</i>	Lamiaceae	Tree	0	0	0	0	1	1	0
1168	<i>Tephrosia candida</i>	Fabaceae	Shrub	0	0	0	1	1	1	0
1169	<i>Tephrosia purpurea</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
1170	<i>Teramnus labialis</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
1171	<i>Terminalia alata</i>	Combretaceae	Tree	0	0	1	1	0	0	0
1172	<i>Terminalia anogeissiana</i>	Combretaceae	Tree	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1173	<i>Terminalia bellirica</i>	Combretaceae	Tree	0	0	0	1	0	1	0
1174	<i>Terminalia chebula</i>	Combretaceae	Tree	0	0	1	1	1	1	0
1175	<i>Terminalia crenulata</i>	Combretaceae	Tree	0	0	0	1	1	0	0
1176	<i>Terminalia elliptica</i>	Combretaceae	Tree	0	0	1	0	0	0	0
1177	<i>Terminalia myriocarpa</i>	Combretaceae	Tree	0	0	0	1	1	1	0
1178	<i>Terminalia tomentosa</i>	Combretaceae	Tree	0	0	0	0	0	1	0
1179	<i>Tetradium fraxinifolium</i>	Rutaceae	Tree	0	1	0	0	0	0	0
1180	<i>Tetrameles nudiflora</i>	Tetramelaceae	Tree	0	0	0	1	1	1	0
1181	<i>Tetragium campylocarpum</i>	Vitaceae	Climber	0	0	0	1	1	1	0
1182	<i>Tetragium serrulatum</i>	Vitaceae	Climber	0	1	0	0	1	1	1
1183	<i>Thalictrum chelidonii</i>	Ranunculaceae	Herb	0	1	0	0	0	0	1
1184	<i>Thalictrum cultratum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
1185	<i>Thalictrum foliolosum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
1186	<i>Thalictrum rostellatum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
1187	<i>Thalictrum virgatum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
1188	<i>Thelypteris arida</i>	Aspleniaceae	Herb	0	1	0	0	0	0	1
1189	<i>Thespesia populnea</i>	Malvaceae	Herb	1	0	0	0	0	0	0
1190	<i>Thladiantha cordifolia</i>	Cucurbitaceae	Climber	0	0	0	1	1	1	0
1191	<i>Thunbergia alata</i>	Acanthaceae	Climber	0	0	1	0	0	0	0
1192	<i>Thunbergia coccinea</i>	Acanthaceae	Climber	0	0	0	0	1	1	0
1193	<i>Thunbergia fragrans</i>	Acanthaceae	Climber	0	0	0	0	1	1	0
1194	<i>Thunbergia lutea</i>	Acanthaceae	Climber	0	1	0	0	0	0	0
1195	<i>Tiarella polyphylla</i>	Saxifragaceae	Climber	0	0	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1196	<i>Tinospora cordifolia</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
1197	<i>Tinospora crispa</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
1198	<i>Tinospora sinensis</i>	Menispermaceae	Herb	0	0	1	0	0	0	0
1199	<i>Toddalia asiatica</i>	Rutaceae	Shrub	0	0	0	1	1	1	0
1200	<i>Toona ciliata</i>	Meliaceae	Tree	0	0	0	1	0	0	0
1201	<i>Torenia crustacea</i>	Linderniaceae	Shrub	1	0	1	0	0	0	0
1202	<i>Torenia diffusa</i>	Linderniaceae	Herb	0	0	0	1	1	1	0
1203	<i>Trema orientale</i>	Cannabaceae	Tree	0	0	1	0	0	0	0
1204	<i>Trewia nudiflora</i>	Euphorbiaceae	Tree	0	0	0	1	1	1	0
1205	<i>Trichosanthes bracteata</i>	Cucurbitaceae	Climber	0	0	0	1	0	0	0
1206	<i>Trichosanthes lepiniana</i>	Cucurbitaceae	Climber	0	0	0	1	1	1	0
1207	<i>Trichuriella monsoniae</i>	Amaranthaceae	Climber	0	0	1	0	0	0	0
1208	<i>Tridax procumbens</i>	Asteraceae	Herb	0	0	1	0	0	0	0
1209	<i>Trifolium dubium</i>	Fabaceae	Herb	0	0	0	0	0	0	1
1210	<i>Trifolium pratense</i>	Fagaceae	Herb	0	1	0	0	0	0	0
1211	<i>Trifolium repens</i>	Fagaceae	Herb	0	0	0	0	0	0	1
1212	<i>Trigastrotheca pentaphylla</i>	Molluginaceae	Herb	0	0	1	0	0	0	0
1213	<i>Tripterospermum volubile</i>	Gentianaceae	Climber	0	1	0	0	0	0	1
1214	<i>Triumfetta annua</i>	Malvaceae	Herb	0	0	1	0	0	0	0
1215	<i>Triumfetta pentandra</i>	Malvaceae	Herb	0	0	1	0	1	1	0
1216	<i>Triumfetta rhomboidea</i>	Malvaceae	Herb	0	0	1	0	0	0	0
1217	<i>Tropidia angulosa</i>	Orchidaceae	Herb	0	0	0	1	1	1	0
1218	<i>Tsuga dumosa</i>	Pinaceae	Tree	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1219	<i>Turpinia nepalensis</i>	Staphyleaceae	Tree	0	0	0	0	0	1	0
1220	<i>Uncaria sessilifructus</i>	Rubiaceae	Liana	0	0	0	1	1	1	0
1221	<i>Uraria lagopodoides</i>	Fabaceae	Herb	0	0	0	1	1	1	0
1222	<i>Uraria lagopus</i> var. <i>neglecta</i>	Fabaceae	Herb	0	1	0	0	0	0	0
1223	<i>Uraria rufescens</i>	Fabaceae	Herb	0	0	0	1	1	1	0
1224	<i>Urena lobata</i>	Malvaceae	Herb	1	0	1	1	0	0	0
1225	<i>Urtica dioica</i>	Urticaceae	Herb	0	1	0	0	0	0	0
1226	<i>Uvaria hamiltonii</i>	Annonaceae	Tree	0	0	0	1	1	1	0
1227	<i>Vaccinium nummularia</i>	Ericaceae	Shrub	0	0	0	0	0	0	1
1228	<i>Vaccinium retusum</i>	Ericaceae	Shrub	0	0	0	0	0	0	1
1229	<i>Valeriana hardwickei</i>	Rubiaceae	Herb	0	1	0	0	0	0	0
1230	<i>Vallisneria spiralis</i>	Apocynaceae	Liana	0	0	0	1	1	0	0
1231	<i>Vangueria spinosa</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
1232	<i>Vatica lanceifolia</i>	Dipterocarpaceae	Tree	0	0	0	1	1	1	0
1233	<i>Ventilago madraspatana</i>	Rhamnaceae	Liana	0	0	1	0	0	0	0
1234	<i>Vernonia albicans</i>	Asteraceae	Herb	0	0	1	1	1	1	0
1235	<i>Vernonia clivorum</i>	Asteraceae	Herb	0	0	0	1	1	0	0
1236	<i>Viburnum erubescens</i>	Viburnaceae	Tree	0	1	0	0	0	0	1
1237	<i>Viburnum mullaha</i>	Viburnaceae	Shrub	0	0	0	0	0	0	1
1238	<i>Vigna</i> sp.	Fabaceae	Climber	0	0	0	1	0	0	0
1239	<i>Viola hookeri</i>	Violaceae	Herb	0	0	0	0	0	0	1
1240	<i>Viola pilosa</i>	Violaceae	Herb	0	1	0	0	0	0	1
1241	<i>Viola sikkimensis</i>	Violaceae	Herb	0	1	0	0	0	0	1

Checklist of medicinal plants in seven MPCAs

Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1242	<i>Viscum orientale</i>	Santalaceae	Herb	1	0	1	0	0	0	0
1243	<i>Vitex altissima</i>	Lamiaceae	Tree	0	0	1	0	0	0	0
1244	<i>Vitex negundo</i>	Lamiaceae	Tree	0	0	1	0	0	0	0
1245	<i>Wattakaka volubilis</i>	Apocynaceae	Climber	0	0	0	1	1	1	0
1246	<i>Wissadula periplocifolia</i>	Malvaceae	Herb	0	0	1	0	0	0	0
1247	<i>Woodfordia fruticosa</i>	Lythraceae	Shrub	0	0	1	0	0	0	0
1248	<i>Wrightia arborea</i>	Apocynaceae	Tree	0	0	0	1	0	1	0
1249	<i>Xanthium indicum</i>	Asteraceae	Herb	0	0	1	0	0	0	0
1250	<i>Xenostegia tridentata</i>	Convolvulaceae	Herb	0	0	1	0	0	0	0
1251	<i>Xylia xylocarpa</i>	Fabaceae	Tree	0	0	0	1	0	0	0
1252	<i>Xylocarpus granatum</i>	Meliaceae	Tree	1	0	0	0	0	0	0
1253	<i>Xylocarpus moluccensis</i>	Meliaceae	Tree	1	0	0	0	0	0	0
1254	<i>Yushania maling</i>	Poaceae	Shrub	0	1	0	0	0	0	1
1255	<i>Zanonia indica</i>	Cucurbitaceae	Climber	0	0	0	1	1	1	0
1256	<i>Zanthoxylum armatum</i>	Rutaceae	Tree	0	1	0	0	0	0	0
1257	<i>Zanthoxylum nitidum</i>	Rutaceae	Liana	0	0	0	1	0	0	0
1258	<i>Zanthoxylum oxyphyllum</i>	Rutaceae	Shrub	0	1	0	0	0	0	0
1259	<i>Zanthoxylum rhetsa</i>	Rutaceae	Climber	0	0	0	1	0	0	0
1260	<i>Zehneria japonica</i>	Cucurbitaceae	Climber	0	0	0	1	0	0	0
1261	<i>Zehneria umbellata</i>	Cucurbitaceae	Climber	0	0	0	1	0	1	0
1262	<i>Zeuxine goodyeroides</i>	Orchidaceae	Herb	0	1	0	0	0	0	1
1263	<i>Zingiber rubens</i>	Zingiberaceae	Herb	0	0	0	1	1	1	0
1264	<i>Ziziphus horrida</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0

Checklist of medicinal plants in seven MPCAs

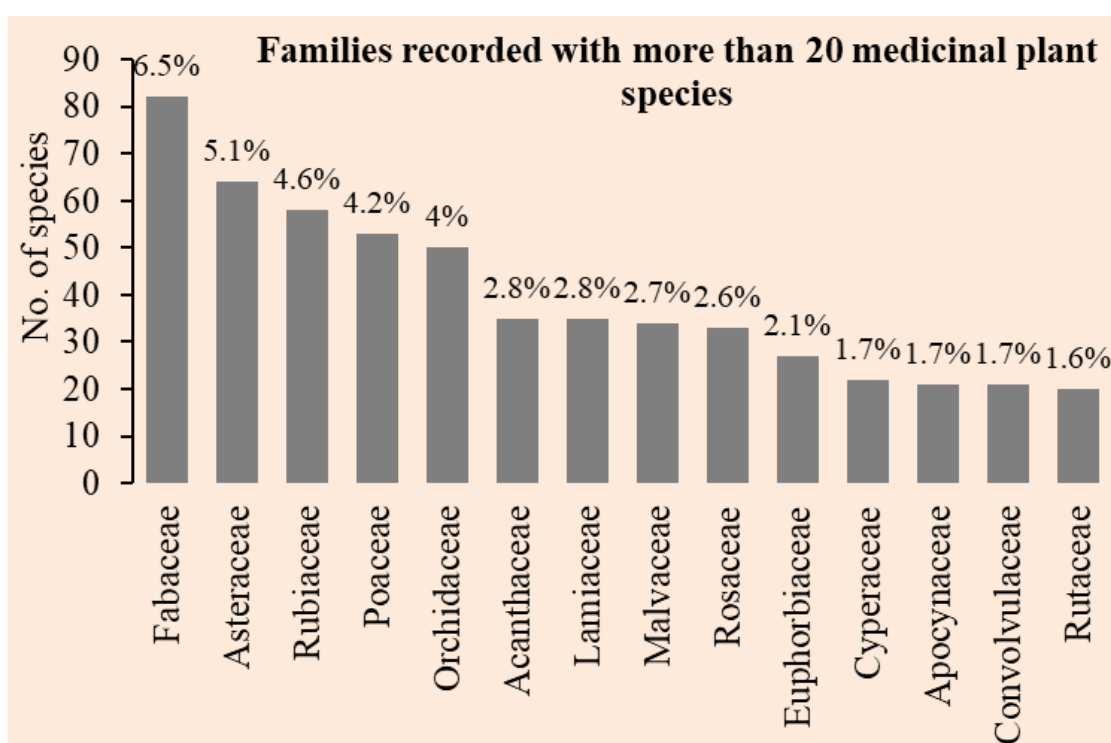
Sl.No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
1265	<i>Ziziphus jujuba</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0
1266	<i>Ziziphus mauritiana</i>	Rhamnaceae	Shrub	0	0	0	1	0	0	0
1267	<i>Ziziphus nummularia</i>	Rhmanaceae	Shrub	0	0	0	1	0	1	0
1268	<i>Ziziphus oenopolia</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0
1269	<i>Ziziphus rugosa</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0
1270	<i>Zornia diphylla</i>	Fabaceae	Herb	0	0	1	0	0	0	0
				96	313	329	340	343	387	304

3.4 Comparative analysis of medicinal plants diversity

3.4.1 Family and genus diversity

Medicinal plant species recorded in seven MPCAs belonged to 167 families (Appendix 1). There are 82 species (6.5%) belonging to Fabaceae family. The other species-rich families are Asteraceae (64 species), Rubiaceae (58 species), Poaceae (53 species), Orchidaceae (50 species), Acanthaceae (35 species), Lamiaceae (35 species), Malvaceae (35 species), Rosaceae (33 species), Euphorbiaceae (27 species), Cyperaceae (22 species), Apocynaceae (21 species), Convolvulaceae (21 species) and Rutaceae (20 species) (Figure 11). Out of 167 families, there are 130 families (78%) represented by less than 10 medicinal plant species. The list of families and their species richness is provided in Annexure 10.

Figure 11. Families recorded with more than 20 medicinal plant species in all seven MPCAs in West Bengal

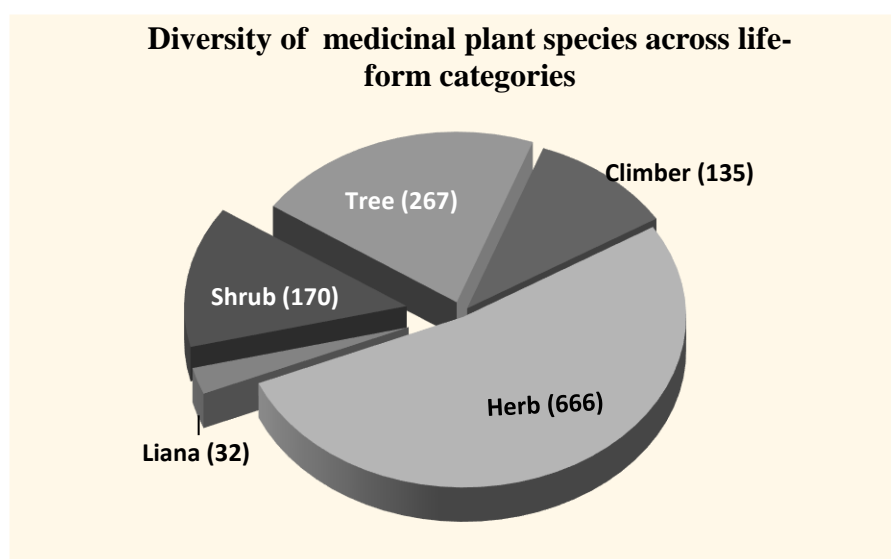


3.4.2 Life-form diversity

The analysis of plant life-forms revealed that herbs are represented by 53% of species diversity, followed by trees (21%), shrubs (13%) and climbers (11%) (Figure 12). Species rich families have more herbaceous medicinal species namely (Fabaceae – 40%; Asteraceae -

97%; Rubiaceae - 45%; Poaceae - 94% and Orchidaceae – 98%) in all seven MPCAs. Herbs are largely dominated by species from Asteraceae (62 species) Poaceae (50 species), Orchidaceae (50 species), Fabaceae (33 species), Rubiaceae (24 species) and Acanthaceae (25 species). Trees are largely belonged to Lauraceae (19 species), Fabaceae (15 species), Euphorbiaceae (13 species), Meliaceae (16 species) and Moraceae (11 species). Shrubs belonged to Rubiaceae (17 species), Fabaceae (10 species), Verbenaceae (8 species), Rutaceae (8 species) and Rosaceae (7 species). Climbers are from Convolvulaceae (18 species), Cucurbitaceae (17 species), Fabaceae (11 species), Apocynaceae (10 species), Vitaceae (10 species) and Menispermaceae (7 species). In all seven MPCAs, herbs are dominant (38 to 68 percent) followed by trees (14 to 26 percent) and shrubs (7 to 18 percent) (Figure 13). In three MPCAs (Bonnie camp, Tonglu and Dhotrey), the contribution of climbers and lianas are less than 10 percent. The distribution of medicinal plant species across families and life-form categories are provided in Annexure 11.

Figure 12. An account of number of medicinal plant species across life-form categories (N = 1270)



3.4.3 Species distribution across MPCAs

There are 744 plant species (59%) present only in any one MPCA (Figure 14). The number of species that are recorded in any two and three MPCAs are 267 (21%) and 192 (15%) respectively. There are three and one plant species are present in any five and six MPCAs respectively, while no medicinal plant species are present in all seven MPCAs. The number

of unique species, i.e., species present only in that site, is high in Garpanchkot MPCA (230 species) followed by Tonglu MPCA (167 species), Dhotrey MPCA (162 species), Bonnie camp (68 species) and Sursuti MPCA (48 species) (Figure 15). MPCA sites, North Rajabharatkawa and North Sevoke have 37 and 37 unique plant species respectively.

Figure 13. An account of MPCA-wise number of medicinal plant species across life-form categories (N = 1270)

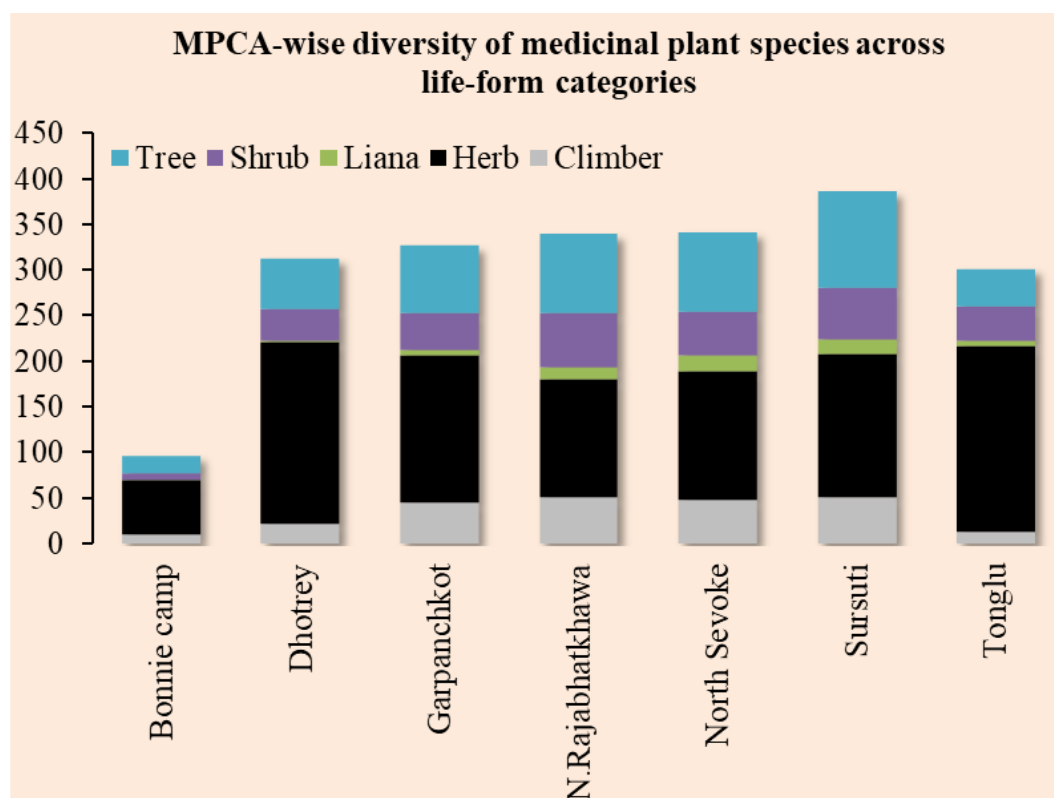


Figure 14. Distribution of medicinal plant species across seven MPCAs

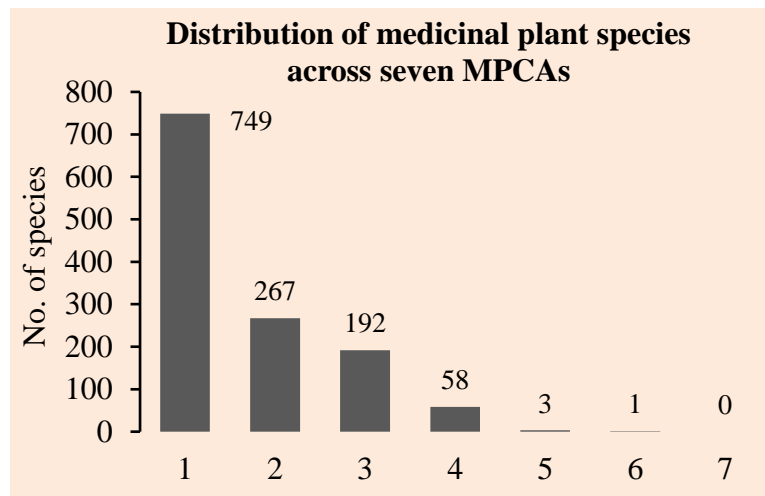
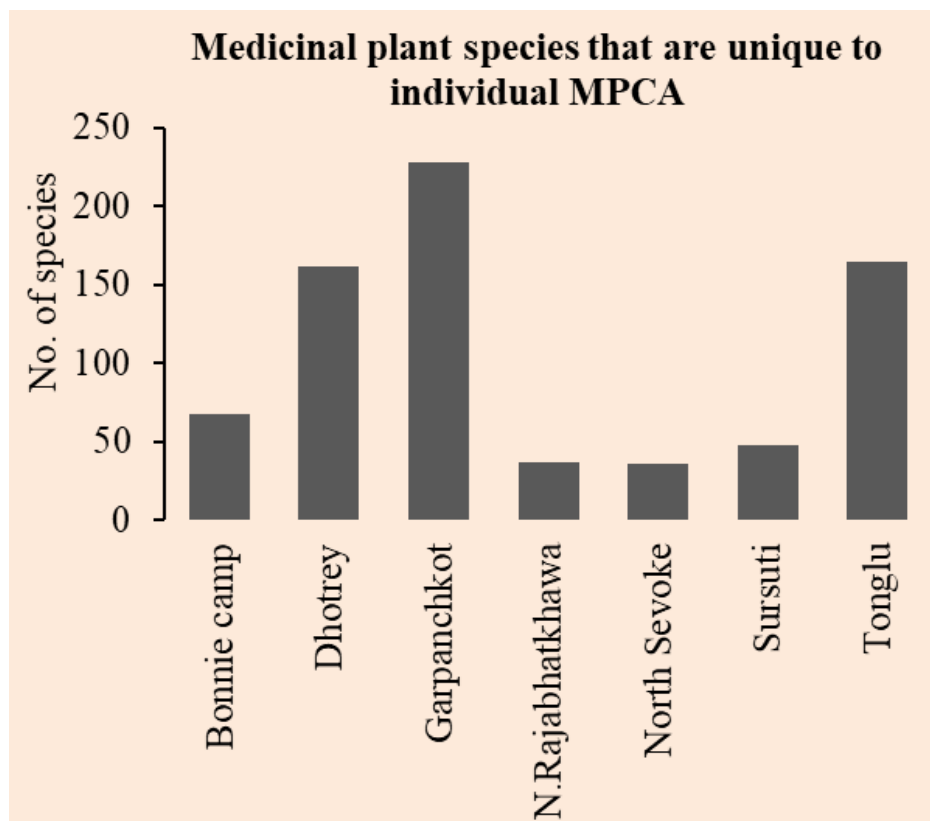


Figure 15. Number of medicinal plant species that are unique to each MPCA



3.4.4 Species similarity across MPCAs

Though MPCA sites had unique species ranging from 11 to 71 percent of total medicinal plant diversity, they also shared medicinal plants with each other (Figure 16). North Sevoke

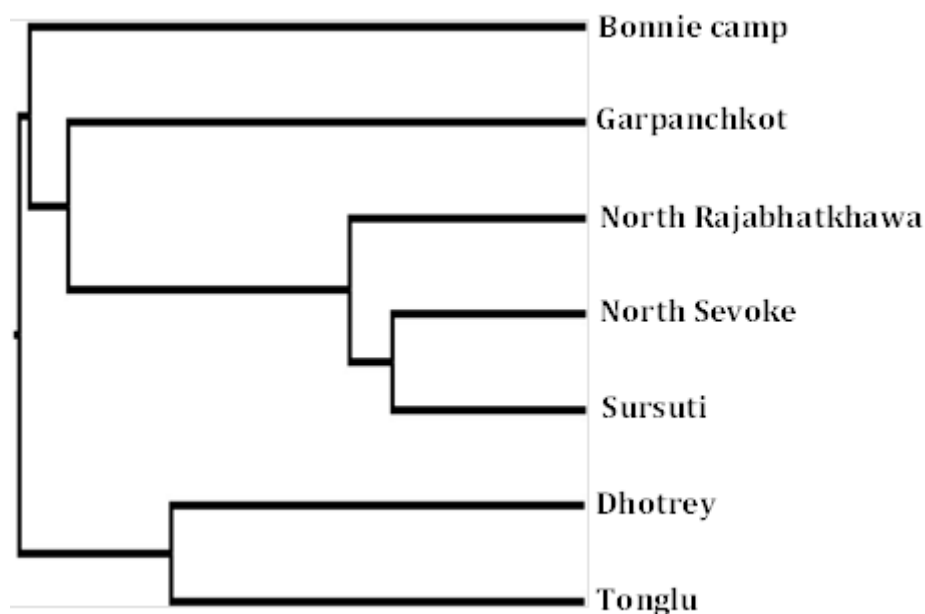
and North Rajabhatkhawa MPCAs shared around 84 percent and 80 percent of their medicinal plant diversity with Sursuti MPCA. Both North Sevoke and North Rajabhatkhawa MPCAs shared 72 percent of their plant species. Tonglu MPCA shared its medicinal plants with Dhotrey MPCA (42 percent) and not with other MPCAs. Bonnie camp MPCA has 71 percent of medicinal plants that are unique to that site, and shared around 23 percent of the species with Garpanchkot MPCA. The cluster dendrogram was drawn using presence or absence data with similarity matrix computed based on Jaccard coefficient with 100 bootstraps (Figure 17). Tonglu and Dhotrey MPCAs formed a separate cluster from other MPCA sites. North Sevoke and Sursuti are the closest MPCAs in terms of species sharing. The next closest MPCA is North Rajabhatkhawa, followed by Garpanchkot MPCA and Bonnie camp MPCA.

Figure 16. An account of number of species shared between seven MPCAs

Species similarity	Bonnie camp	Dhotrey	Garpanchkot	N.Rajabhatkha wa	North Sevoke	Sursuti	Tonglu
Bonnie camp	95	1	23	9	6	10	0
Dhotrey	1	313	5	15	14	17	133
Garpanchkot	24	2	329	65	53	66	2
N.Rajabhatkhawa	9	5	20	340	245	273	4
North Sevoke	6	4	16	72	343	287	2
Sursuti	10	5	20	80	84	387	6
Tonglu	0	42	1	1	1	2	304

Number of species shared

Percentage of species shared

Figure 17. Cluster dendrogram to reveal species similarity across seven MPCA sites

3.5 Threatened medicinal plant species across MPCAs

Out of 43 threatened medicinal plant species assessed for threatened status in West Bengal through CAMP workshops conducted, 40 medicinal plant species are recorded in seven MPCAs (Table 8). The number of medicinal plant species across different threatened status categories are: 14 Vulnerable; 19 Endangered; 1 Near Threatened; 6 Critically Endangered (Figure 18). Among trees, there are 24 species in Vulnerable, 7 in Endangered and 3 in Near Threatened category (Figure 19). There are 6 trees and 4 climbers in Vulnerable category. Out of 15 herbs assessed, 8 species are in Endangered category. Out of 40 threatened medicinal plants recorded in MPCAs, 25 are under trade (Figure 20), while 16 are in high trade with volumes exceeding 100MT per annum (Figure 21).

Figure 18. Number of medicinal plant species belonging to different threatened status categories recorded in seven MPCAs in West Bengal (N = 40)

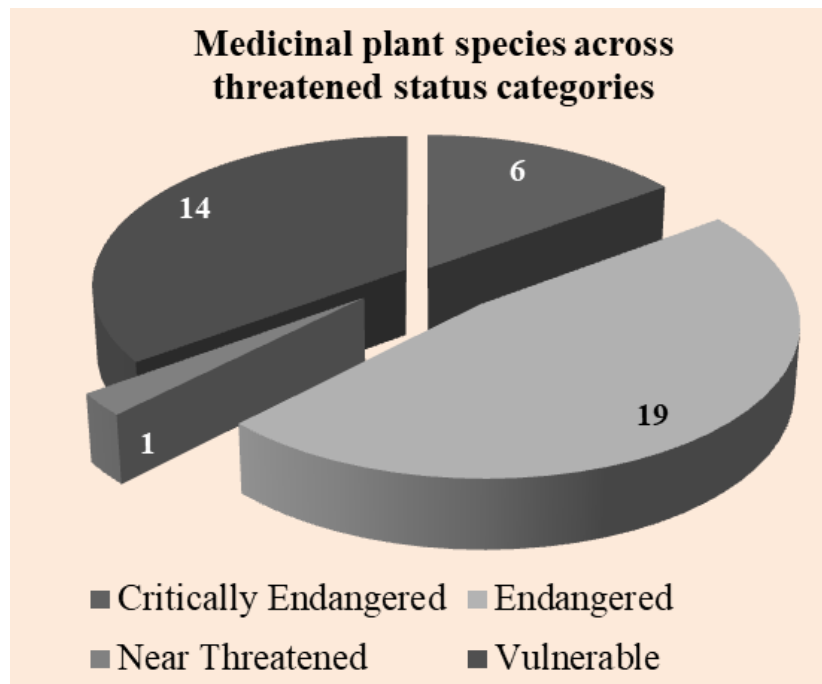


Figure 19. Number of threatened medicinal plant species across different life-form categories recorded in seven MPCAs in West Bengal (N = 40)

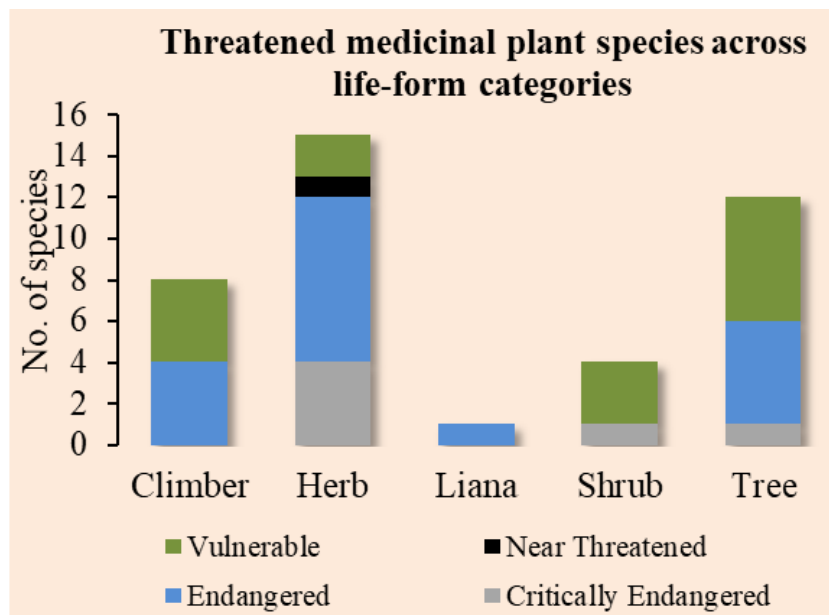


Figure 20. Number of traded medicinal plant species across different threatened status categories recorded in seven MPCAs in West Bengal (N = 25)

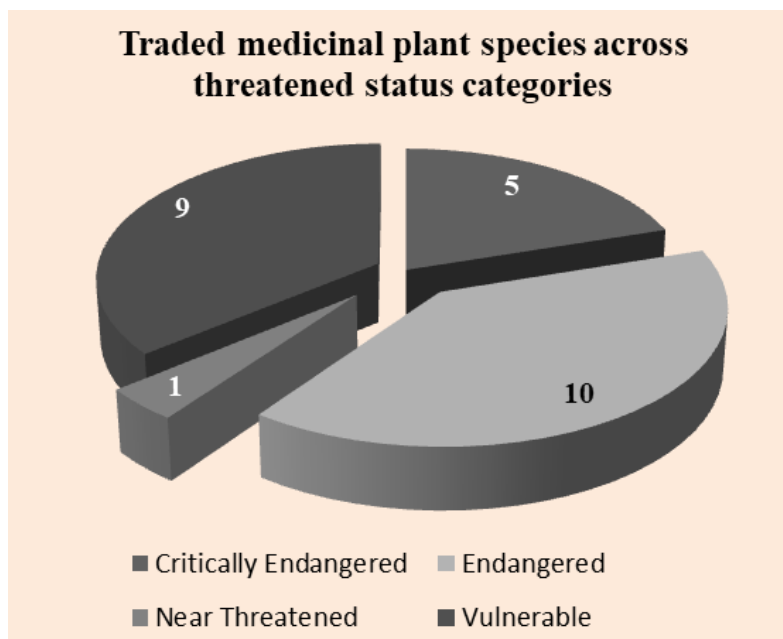


Figure 21. Number of traded medicinal plant species across different threatened status categories recorded in seven MPCAs in West Bengal (N = 16)

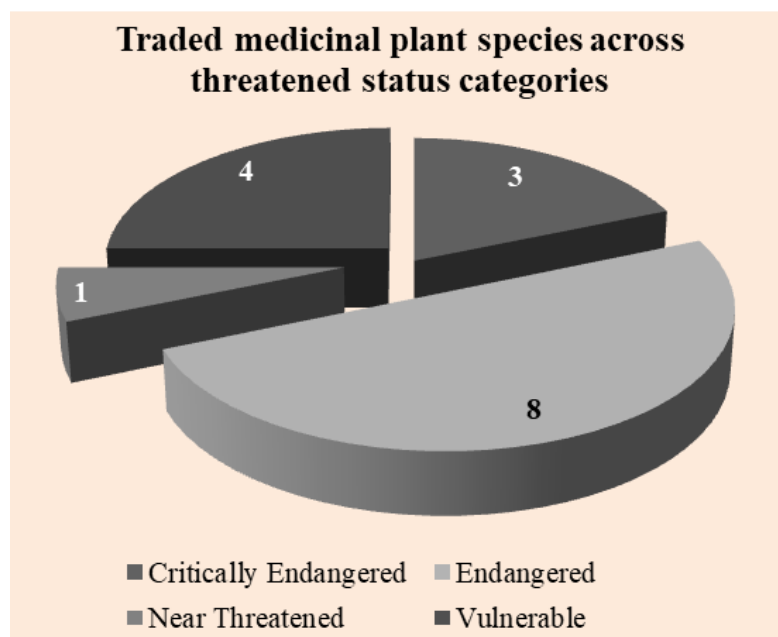


Table 8. Presence of threatened medicinal plant species across seven MPCAs in West Bengal (* T – Traded; H – High traded (>100 MT/year))

Botanical name	Threatened status	Traded/High traded*	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
<i>Abelmoschus moschatus</i>	Near Threatened	T/H	0	0	0	0	1	0	0
<i>Aconitum ferox</i>	Endangered	T/H	0	0	0	0	0	0	1
<i>Aconitum palmatum</i>	Endangered	T	0	0	0	0	0	0	1
<i>Aconitum spicatum</i>	Endangered	T	0	0	0	0	0	0	1
<i>Alpinia calcarata</i>	Endangered	T/H	0	0	0	1	1	1	0
<i>Ampelocissus barbata</i>	Endangered		0	0	0	1	1	1	0
<i>Aristolochia indica</i>	Vulnerable	T	0	0	1	1	1	1	0
<i>Asparagus racemosus</i>	Endangered	T/H	0	0	1	1	0	0	0
<i>Berberis aristata</i>	Vulnerable	T/H	0	1	0	0	0	0	1
<i>Celastrus paniculatus</i>	Endangered	T/H	0	0	0	1	1	1	0
<i>Cinnamomum bejolghota</i>	Vulnerable		0	1	0	1	1	1	0
<i>Cinnamomum cecidodaphne</i>	Endangered		0	0	0	0	1	0	0
<i>Desmodium motorium</i>	Vulnerable		0	0	1	0	0	0	0
<i>Dioscorea prazeri</i>	Endangered		0	0	0	1	1	1	0
<i>Drosera burmanni</i>	Endangered		0	0	0	1	1	1	0
<i>Gloriosa superba</i>	Vulnerable	T/H	0	0	1	0	0	0	0
<i>Gymnema sylvestre</i>	Vulnerable	T/H	0	0	1	0	0	0	0
<i>Gynocardia odorata</i>	Endangered		0	0	0	1	1	1	0
<i>Helminthostachys zeylanica</i>	Endangered		0	0	0	1	1	1	0
<i>Lumnitzera racemosa</i>	Vulnerable		1	0	0	0	0	0	0

Checklist of medicinal plants in seven MPCAs

<i>Machilus glaucescens</i>	Critically Endangered		0	0	0	1	1	1	0
<i>Mesua ferrea</i>	Endangered	T/H	0	0	0	1	1	1	0
<i>Morinda citrifolia</i>	Vulnerable	T	0	0	1	1	1	1	0
<i>Mucuna pruriens</i>	Endangered	T/H	0	0	1	0	0	0	0
<i>Nypa fruticans</i>	Vulnerable		1	0	0	0	0	0	0
<i>Olax nano</i>	Vulnerable		0	0	1	0	0	0	0
<i>Ophioglossum reticulatum</i>	Endangered		0	0	1	0	0	0	0
<i>Panax pseudoginseng</i>	Critically Endangered	T	0	1	0	0	0	0	0
<i>Pericampylus glaucus</i>	Vulnerable	T	0	0	0	0	1	1	0
<i>Picrorhiza kurroa</i>	Critically Endangered	T/H	0	0	0	0	0	0	1
<i>Podophyllum hexandrum</i>	Critically Endangered	T	0	0	0	0	0	0	1
<i>Pterocarpus marsupium</i>	Endangered	T/H	0	0	1	1	0	1	0
<i>Rauvolfia serpentina</i>	Endangered	T/H	0	0	0	1	0	0	0
<i>Sonneratia caseolaris</i>	Endangered		1	0	0	0	0	0	0
<i>Stereospermum colais</i>	Vulnerable	T/H	0	0	0	1	1	1	0
<i>Swertia chirayita</i>	Critically Endangered	T/H	0	1	0	0	0	0	1
<i>Taxus wallichiana</i>	Critically Endangered	T/H	0	1	0	0	0	0	1
<i>Thalictrum foliolosum</i>	Vulnerable	T	0	0	0	0	0	0	1
<i>Toona ciliata</i>	Vulnerable	T	0	0	0	1	0	0	0
<i>Xylocarpus granatum</i>	Vulnerable		1	0	0	0	0	0	0

3.6 Non-native (exotic) plants recorded in MPCAs

Out of 1270 medicinal plant species recorded across seven MPCAs, there are 80 (6%) non-native (exotic) plants. The list of non-native medicinal plant species with details is provided in Annexure 13. Bonnie camp MPCA has highest proportion of non-native plants (35%, 34 species) (Figure 22). The 12 percent of medicinal plants (40 species) recorded in Garpanchkot MPCA is non-native plants. The number of non-native exotic plants is 35, 29 and 28 in Susruti (9%), North Sevoke (8 %) and North Rajabhathkawa (8%) respectively. The percentage of non-native plants in Dhotrey and Tonglu MPCA sites is less than 5% (Figure 22).

The places of origin for 80 non-native medicinal plant species are analysed. There are around 42 places of origin from 21 continental regions (Figure 23). Out of 80 non-native species, 44 species have tropical and sub-tropical American origin covering almost all Latin American countries, America, and pacific islands, etc. The remaining species are largely from the tropical and sub-tropical old-world countries covering largely Asia, Africa and Australia.

Figure 22. Number of non-native (exotic) medicinal plant species recorded in seven MPCAs in West Bengal (N = 80)

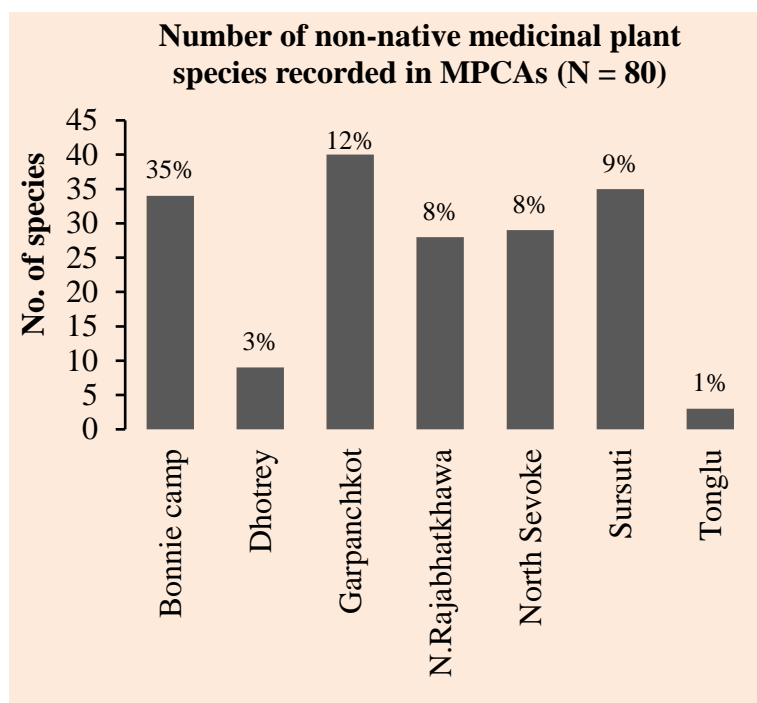
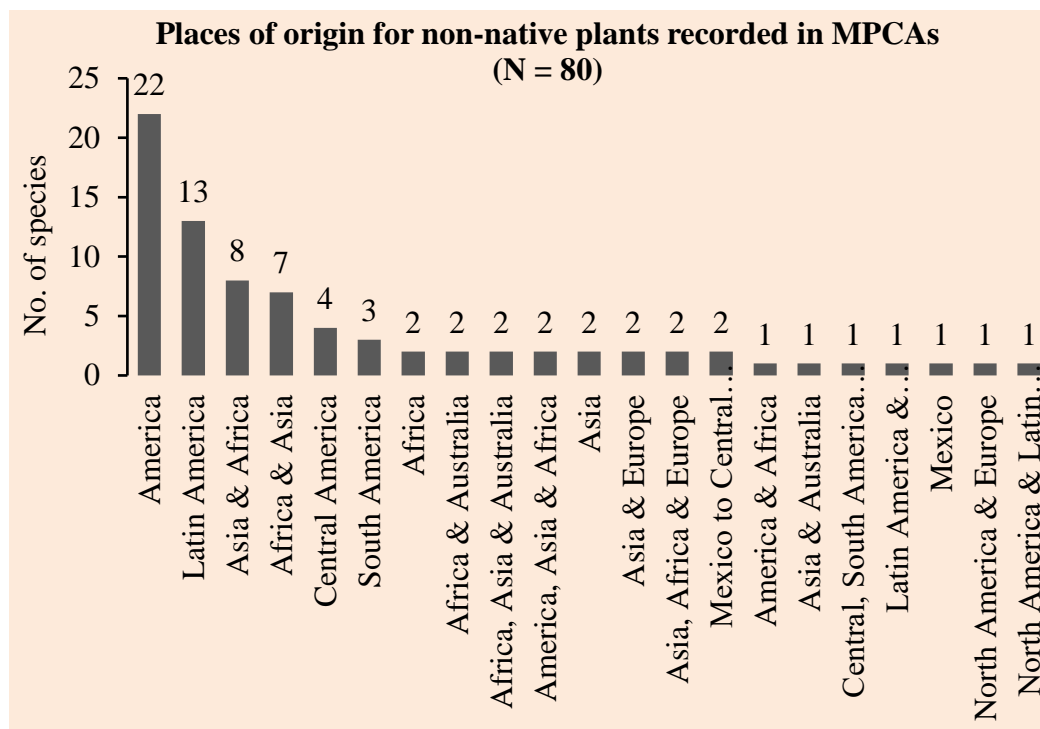


Figure 23. Details of places of origin for non-native medicinal plant species recorded in seven MPCAs in West Bengal (N = 80)



3.7 Voucher specimens for digital herbarium

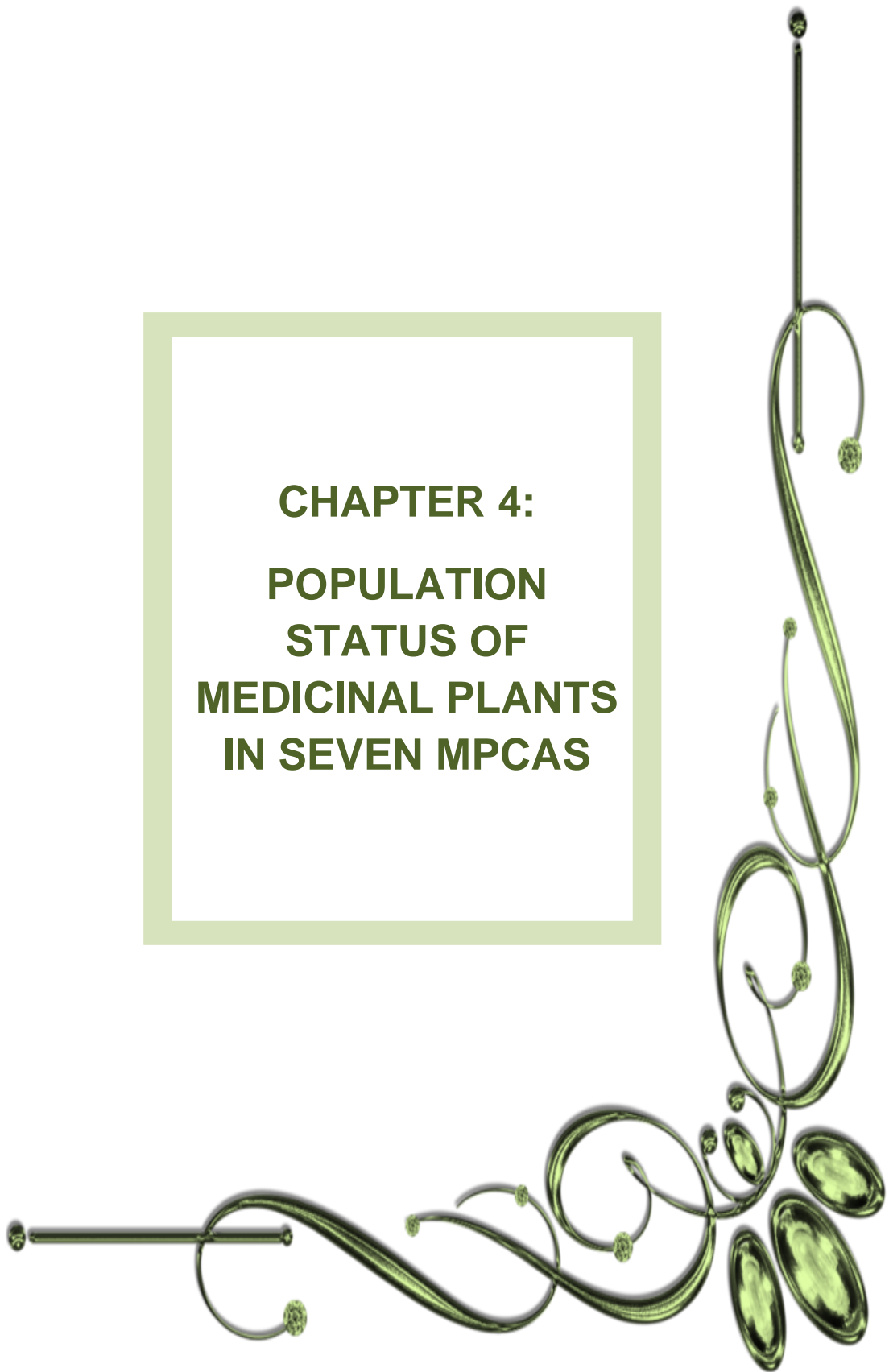
During the field surveys, plant specimens were collected for plants that belong to threatened categories, and need further identification. After returning from the field, they were processed following standard procedures and maintained in a good condition to avoid any fungal infections spreading on the specimen. Each specimen was given collection number and tag. The pressed specimens were brought back to FRLHT campus for later identification, herbarium preparation and digital imaging. In total, field team collected 725 specimens from all seven MPCAs. Out of that only 160 voucher specimens were preserved in herbarium sheets. Later, these herbarium sheets underwent digital imaging process for preparing digital herbarium. The details of medicinal plant voucher specimens that are prepared for digital herbarium is provided in Annexure 13. More than half of the voucher specimens prepared are herbs followed by shrubs and trees.

3.8 Conclusion

One of the most critical issues on the global, local and national agenda is the need to preserve biodiversity for future generations and concurrently strive to understand the indigenous knowledge of resource management practices. Floristic inventory and diversity studies help us to understand the species composition and diversity status of forests which also offer vital information for forest conservation. Prior to forest management operations, biodiversity inventories are used to determine the nature and distribution of biodiversity resources of the region being managed. The current study provides a checklist of plant species and highlights the presence of the RET species in seven Medicinal Plants Conservation Areas (MPCAs) for better conservation management plans.

Considering the number of medicinal plant species recorded in seven MPCAs and the kind of protection given to them for the conservation of gene pool, the MPCA program established in West Bengal for medicinal plants conservation caused a significant change especially in the area of in-situ conservation principles in the entire forestry sector in the country. Hence the management of MPCAs, mainstreamed through incorporating them in the Work Plan prescriptions, has to be the joint responsibility of the state forest department and the local communities through their local institution called Joint Forest management committees (JFMCs). The establishment of MPCA to conserve the medicinal plants in any natural habitats may be a new initiative for various stakeholders, who gets involved in the management process. In that case, building the capacity of various stakeholders to be involved in the process of establishment of conservation areas and the sustainable management of resources within is also important.

**CHAPTER 4:
POPULATION
STATUS OF
MEDICINAL PLANTS
IN SEVEN MPCAS**





Nypa fruticans

4.1 Introduction

The term biological diversity with its short form biodiversity and its definition was introduced around half a century ago years ago in a number of research papers (Lovejoy, 1980a; b; Wilson and Peters, 1988; Reid and Miller, 1989; McNeely et al., 1990; Chauvet and Oliver, 1993), however, the basic understanding of biodiversity goes far back in time. Ideas regarding the linkages and relationships between organisms and their environment, both biotic and abiotic, were developed from the eighteenth century onwards, as naturalists such as Darwin, Humboldt and Wallace observed the patterns of distribution of species and vegetation types in their natural environments. Nevertheless, it was not until the early part of the 20th century that formal tools and methods for the measurement and modeling of these relationships and their diversity were developed and field-tested. Biodiversity emerged to be the most straight forward concept encompassing the components of biodiversity like genetic diversity, species diversity, community diversity.

Species diversity of plant communities is often strongly related to the productivity of forest ecosystem. Pausas and Austin (2001) stated that the main factors determining species richness patterns at the local level are resource availability and responses to environmental variables that have a direct physiological impact on plant growth or on resource availability. When the abundance of plant species in a given area is measured, there can be some common species, and some rare species and many species of varying degree of rareness. The high species diversity leads to a low density of most tree species and the large expected distances between the conspecific individuals. It is generally recognized the species richness is positively associated with species abundance (Condit et al., 1998), besides, area and environmental heterogeneity have strong effects on species diversity (Whitmore, 1998). The species-richness-abundance relationship suggests that large populations are less prone to extinction than small ones. Based on the relationship between abundance and diversity, habitats supporting large numbers of individuals can support more populations and more species than habitats supporting small numbers of individuals (Huang et al., 2003). The species-area relationships arise partly from an increase in habitat diversity with increasing area sampled. These relationships are important in ecological study because they provide insight into community structure (Leps and Stursa, 1989), and the mathematical expressions of the models are used for predicting species richness at larger scales, and extinction rates caused by habitat destruction (Pimm et al., 1995). The species-area relationship is a

fundamental component of conservation biology, and is often used to assess the long-term effects of habitat fragmentation on biodiversity (Palmer, 1990).

Floristic inventories and population assessment studies generally rely on sampling plots. The effects of plot size and the influence of plot shape on the estimates of plant diversity have been assessed in order to develop standard methods for biodiversity studies of different life-form categories that work across different data requirements. Plot-less methods have also been employed for tree diversity inventory. Most biodiversity studies have followed the plot method, including square plots (e.g., 100 m x 100 m) to rectangular plots (e.g., 80 m x 125 m), to long belt transects (e.g., 10 m x 1000 m). Plot-based research occurs within a range of plot sizes from 0.1 ha plots, to 1 ha plots, 50 ha plot and up to 52 ha plot. One-hectare plots have been widely used in tropical forests. In the recent years the methodological emphasis in the study of tropical forests has shifted to large-scale permanent forest plots. The rationale is to provide sufficiently precise estimates of diversity, density, dispersion pattern, mortality, recruitment, growth and net rates of change in structure and populations.

SPATIAL PATTERNS IN BIODIVERSITY

Plant populations generally exhibit three patterns of spatial distribution: (1) regular or uniform, (2) clumped or aggregated, and (3) random. The individuals of a species is said to be random if the position of each individual plant is independent of all the others; aggregated populations, are those where there is a tendency for individuals of the species to occur in clumps, and in regular populations the plants are more evenly spaced than they were distributed according to chance (Pielou, 1960). Clumped distribution is very common in nature as the seeds of plants may fall at random over an area, and also plant's ability to reproduce vegetatively or by seeds with a small radius of dispersal. Uniform distribution is extremely rare, and expected if the members of a population were so abundant that they compete with each other for available space.

Spatial patterns may be determined by habitat, alternative population recruitment strategies and differential competitive ability of seedlings (Janzen, 1970). The high degree of clumping can be found in forest gaps as a response to the sudden availability of space, light, no competition and nutrients. The difference in random versus clumped spatial patterns seems to be related to different histories of disturbance in the forests compared. Besides, the absence of major disturbance, soil and water conditions also play major roles in controlling species distribution. As the forest matures, clumping becomes common pattern in association with

gap dynamics, which is nothing but natural augmentation in the forest gaps formed due to frequent disturbances and tree falls resulting in increased light mound upheaval and nutrient release.

SPECIES AREA RELATIONSHIPS

Species-area and species-individual curves have been central to community ecology for decades. The observation that the species number tends to increase, continuously and monotonically with area was first published in the work of Watson (1835) and latter it was reiterated. The species-area curve was later considered as one of the few 'laws' of community ecology. In the twentieth century the emphasis shifted from observing the relationships to expressing them from mathematical perspective. The increase in species number with forest area been attributed to ecological processes and also to sampling effects, whereby larger forest fragments contain more plots that sample more of the community. Loss of diversity can only be predicted using species-area relationships at the appropriate scale and in the correct place, as trajectories of species accumulation differ according to forest type and disturbance history. Most models of community structure based on habitat partitioning suggest that there will be an asymptote in the species-accumulation curve, but the real question is about reaching the flat curve at what extent of sampling (for e.g. 50 ha or beyond that). Notwithstandingly, species-area curves are widely used to determine the capacity of forests of all sizes in terms of supporting species diversity.

According to Singh et al. (1984), species richness among woody plants is made possible in part by the species combination varying from one girth class to another. Thus, species are in constant flux in space and time and this is in turn is possible when suitable habitats of sufficient size are available to encompass all the stages of growth of all species. Thus, there occurs as a mosaic pattern or cyclic change in regeneration giving rise to variation in the combination of dominants. The distribution of woody plants in different size classes forms a reverse J-shaped curve for the undisturbed forests exhibiting a decrease in the number of plants from lower size class to higher size class. Diameter distributions are commonly used to assess the disturbance effect within forests, and to detect trends in regeneration patterns (Poorter et al., 1994, Denslow, 1995). It can be used to gauge forest vitality with respect to stocking of different age or size classes. Moreover, tree density distribution across different diameter classes indicates how well the growing forest is utilizing site resources. The data on plant distribution is ecologically more informative when accompanied with data on spatial

distribution of individuals. Recently, the remotely sensed data is widely used to study and understand the spatial information on biodiversity at the landscape scale, and becomes crucial in conservation science and forest management.

Tropical deforestation is a major concern on several fronts. It is significant to global climate warming and regional climate change; global losses in biotic diversity and net primary productivity; local-to-regional land deforestation; and threats to ecosystem services and other variable functions. The basic and applied ecological research have a vital and cost-effective role to play in forest conservation and management as it provides a better holistic understanding of how forests actually work ecologically and interact with humans (Hubbell and Foster, 1992). A trend of increase in the proportion of declining species with increase in disturbance intensity puts local anthropogenic pressure as responsible for the depletion. The increased impact of human activities on natural and managed ecosystems has potential ecological consequences in the way of causing losses and damages to biodiversity and ecosystem functioning. Hence, an assessment of plant population especially in protected forest areas is needed as the data collected would have potential usefulness and implication for conservation and management.

The State Forest Department of West Bengal has established seven Medicinal Plants Conservation Areas (MPCAs) across the state identifying natural habitats that are relatively undisturbed forest areas hosting rich diversity of medicinal plants, and maintained as in-situ conservation sites to conserve and protect the medicinal plant resources covering different forest types in the state. At the time of establishment of MPCAs, the checklist of medicinal plant species was prepared. Apart from this botanical exercise, there have not been any further research works planned or initiated to understand the distribution, growth and functioning of medicinal plants captured in the MPCA network across the state. Hence, this study was intended to quantify the population of medicinal plants through standardised sampling procedures and to assess the growth and structure of plant population in the seven MPCAs.

4.2 Materials and methods

The quantitative assessment of medicinal plants especially of conservation concern species was undertaken from October 2017 to October 2021 in seven MPCAs in West Bengal to examine the population status of medicinal flora present in MPCAs. The qualified and

experienced botanists from FRLHT, Bengaluru conducted the quantitative assessment studies in all seven MPCAs. The medicinal plants species in reproductive stages were collected for herbarium specimen with appropriate field number and notes. Specimens were processed in the field station every evening as per the standard method such as treatment with spirit, tagged with the specimen field no. and pressed with the help of herbarium press. They were brought to the FRLH Herbarium at the end of the survey tour and further processed. These voucher specimens were then mounted on the standard herbarium sheets, properly pasted and stitched wherever required (particularly having large fruits or capsules with seeds). They were then identified by the expert taxonomist consulting various related published flora viz., Flora of West Bengal, Flora of Bhutan, Flora of India and various herbaria and rawdrugs repository viz., Herbarium in University of North Bengal, Siliguri, Herbarium in Botany Department, Calcutta University and National Herbarium on Medicinal Plants, FRLHT, Bengaluru. They are then properly labelled with the standard labels having taxonomic and habitat information. These specimens are being scanned and digitized by entering the related data in the specified formats. This study was intended to study the population status of various prioritised medicinal plant species in all seven MPCAs.

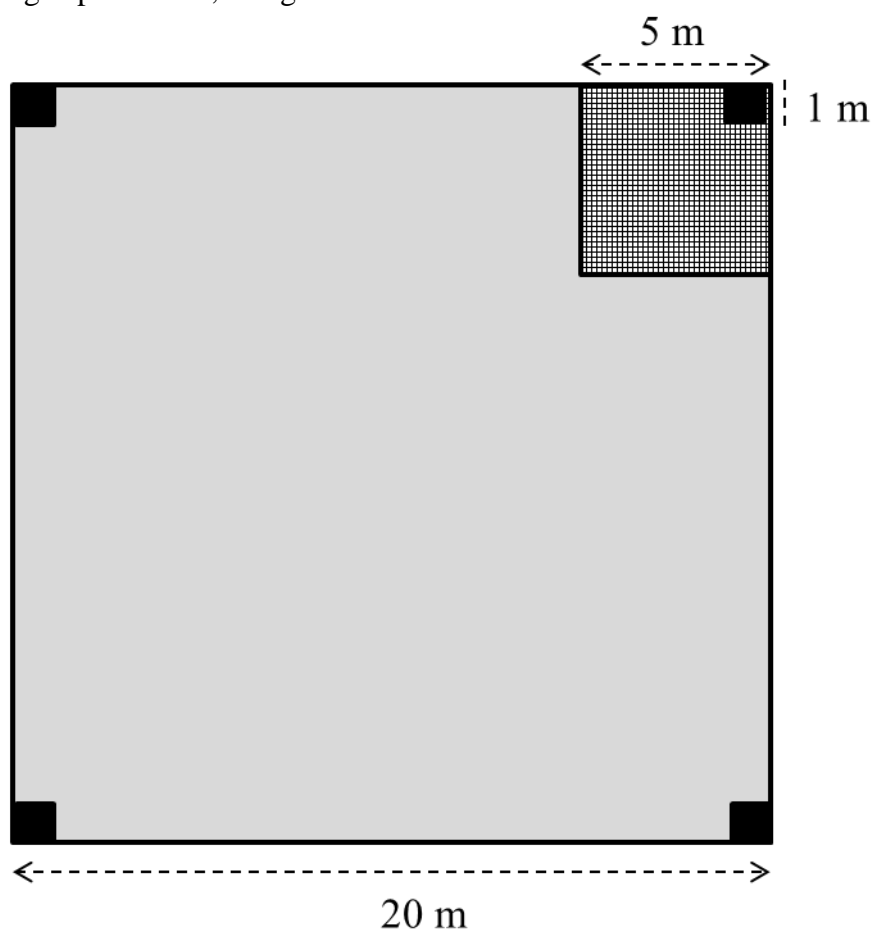
4.2.1 Sampling methods

Following are the sampling methods used for assessing the population of medicinal plant species in seven MPCA sites in West Bengal:

- ❖ Field works for ecological survey were carried out using quadrat method. Sample plots and sub-plots were laid using the restricted randomization design
- ❖ The choice of sample plots was based on typical sites with the combination of random and systematic selection keeping the subjective choice of sample locations in mind e.g., habitats of some important conservation concern species.
- ❖ The plots were laid using nested quadrat model. In a single 20m x 20m quadrat, which is used for the enumeration of woody plants of above 30cm gbh, one 5m x 5m sub-quadrats within (nested quadrats) for shrubs or saplings (≤ 30 cm gbh size) and four 1m x 1m plots within the 5m x 5m sub-quadrats were laid for herbs or seedlings
- ❖ Datasheets are prepared separately for each MPCA site and used during the field survey
- ❖ All woody plants (tree, liana and shrub/small tree) equal or greater than 30 cm girth at breast height (≥ 30 cm gbh; 1.3 m height from ground level) in the 20m x 20m quadrat

was measured using tailor tape. Each stem girth is taken separately and summed for basal area calculation in case of multi-stemmed trees

- ❖ GPS readings and elevation data was recorded in each quadrat locations in MPCAs
- ❖ The voucher specimens were preserved systematically and stored in the FRLH Herbarium for future references
- ❖ In addition, these preserved voucher specimens were scanned as part of digitisation of herbarium specimens
- ❖ New plant species that are recorded during the field survey are examined for endemism referring pertinent literatures and list of species endemic to West Bengal from the MPCA sites is also prepared. Besides, the list of species belonging to threatened category is also prepared following FRLHT's CAMP report
- ❖ To examine the species similarity among sites an agglomerative hierarchical clustering is performed, using Jaccard's index



- Woody plants (>30 cm gbh)
- ▣ Saplings (≤30 cm gbh) and shrubs
- Seedlings and herbs

DIVERSITY MEASURES

Forest ecosystem is one of the most species-rich vegetation formations on earth. Typically, hundreds of plant species coexist in a single hectare of forest. One of the key goals of ecology is to explain the distribution and abundance of species. Diversity of a community is assessed by the proportional species abundance data either by using statistical sampling theory (Fisher α) or by a variety of nonparametric measures (Simpson, Shannon, etc.). Ecosystem diversity on a spatial and areal scale is subdivided into alpha, beta, gamma and delta diversity (Whittaker, 1972). In forest ecosystems, alpha diversity operates within forest stands. Beta diversity refers to the variation between forests stands, i.e., how species composition varies from one area to another. Gamma and delta diversity operate on large scales. Most diversity studies, especially for large extents, considered only one or two components of diversity, species richness within local communities (α -diversity), species richness within a region (γ -diversity), or similarity between communities (β -diversity). Various indices have also been formulated for depicting species diversity. The most common of these are Simpson's heterogeneity index and the Shannon index.

Prior to the field survey, the information was given well in advance through emails and phone calls to concerned Divisional Forest Officers and Range Forest Officers to take permission, and also to make logistic arrangements. It has been made sure in every field trip to MPCAs to meet the concerned ACFs and RFOs to brief them about this project. In all the field surveys, frontline staffs have accompanied the botanisation team members to facilitate field activities.

Basal area (m ²)	$(GBH)^2/4\pi$
Important Value Index (IVI)	R. density + R. frequency + R. basal area
Relative Density	$\frac{\text{No. of individuals of species A X 100}}{\text{Total no. of individuals}}$
Relative frequency	$\frac{\text{No. of quadrats/plots having species A X 100}}{\text{Total no. of quadrats/plots sampled}}$
Relative basal area	$\frac{\text{Basal area (m}^2\text{) of species A X 100}}{\text{Total basal area of all species}}$

4.2.2 Data analysis

Species diversity indices such as the Shannon, Simpson and Fisher's α (as in Magurran, 1988) were calculated. To understand a species' share in the plant community, the species importance value index (sum of the relative density (Rd), relative frequency (Rf) and relative dominance (Rdm) as per Cottom and Curtis, 1956) and family importance value index (sum of the relative diversity (Rdi), relative density (Rd) and relative dominance (Rdm) based on Mori et al. 1983) were calculated. The program EstimateS v.5 (Colwell, 1997) was used for raising species-area curves plotted as species increment with every quadrat placed. Spatial patterns of species (whether individuals of tree species are random/uniform/clumped in distribution), represented by >50 individuals in each site, were determined by the quadrat count method using standardized Morisita index (Krebs, 1989). A ratio of zero indicates random dispersion pattern, above zero clumped pattern and less than zero uniform pattern. This quantitative spatial pattern is not strongly influenced by species richness and sample size, although it is sensitive to the abundance of the most abundant species. The frequency distribution of plant size (gbh) classes between the MPCA sites was compared using Kolmogorov-Smirnov one-sample test (Zar, 1999).

Coefficient of variation (CV- standard deviation/mean for a species) was computed to identify whether there is an oligarchy in plant species across MPCA sites. This would provide information on site differentiation with respect to species composition, whether species with a low CV regardless of absolute density are equitably distributed, or those with a high CV show a large degree of variability in their distribution. To examine the species similarity among the ten sites an agglomerative hierarchical clustering analysis was performed, using Sorensen's index (Magurran, 1988) and unweighted paired group arithmetic average (UPGMA) using Biodiversity Pro (1997).

SPECIES DIVERSITY INDICES

Shannon-Wiener Index (H') is the most commonly used index of diversity in ecological studies as it is fairly sensitive to actual site differences. The values range from 0 to 5, usually ranging from 1.5 to 3.5. It is easily calculated using the following equations:

$$H' = - \sum \left[\left(\frac{n_i}{N} \right) \times \ln \left(\frac{n_i}{N} \right) \right]$$

n_i = number of individuals or amount (e.g., biomass or density) of each species (the i^{th} species); N = total number of individuals (or amount) for the site, and \ln = the natural log of the number.

Simpson's Index (λ) is a measure of dominance. Therefore, $(1-\lambda)$ estimates species diversity. It gives the probability that any two individuals drawn at random from an infinitely large community belong to different species. It is less sensitive to species richness and heavily weighted towards the most abundant species. It is calculated using the following equation

$$\lambda = \sum \frac{n_i(n_i-1)}{N(N-1)}$$

n_i = number of individuals or amount of each species (i.e., the number of individuals of the i^{th} species); N = total number of individuals for the site

ASSESSING SIMILARITY

In vegetation studies it is often desirable to compare two plant communities and determine how similar they are. This can be accomplished with a similarity index. The similarity index determines the interspecific association between the species of plant communities.

Sorensen's species similarity index (S_s) between the transects and the two sites. It gives greater "weight" to species that are common to the quadrats than to those found in only one quadrat. It uses presence/absence data and was calculated using the following formula

$$S_s = 2a/(2a + b + c), \text{ where}$$

a = number of species common to both quadrats; b = number of species unique to the first quadrat; c = number of species unique to the second quadrat

S_s usually is multiplied by 100% (i.e., $S_s = 67\%$), and may be represented in terms of dissimilarity (i.e., $DS = 1.0 - S_s$).

Jaccard similarity index (S_j) between the transects and the two sites was calculated following formula: uses presence/absence data (i.e., ignores info about abundance)

$$S_j = a/(a + b + c), \text{ where,}$$

S_j = Jaccard similarity coefficient; a = number of species common to (shared by) quadrats; b = number of species unique to the first quadrat, and c = number of species unique to the second

4.3. Results and Discussion

4.3.1. Population of woody plant species (>30 cm gbh size)

A total of 214 woody plant species (>30 cm gbh) belonging to 142 genera and 60 families were recorded in 169 quadrats of 20m x 20m size measuring 6.76 ha across seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal (Table 9). Woody plant species richness was as low as 11 species per 0.8 ha in Bonnie camp MPCA to as high as 64 species per 1.96 ha in Garpanchkot MPCA and 63 species per 0.8 ha in North Sevoke MPCA through intermediate figures of 28, 32, 52 and 54 species per 0.8 ha in the other MPCAs Tonglu, Dhotrey, North Rajabhatkhawa and Sursuti respectively. Species unique to individual MPCA site was 100, 75, 72, 69, 35, 30 and 28 percent in Bonnie camp, Tonglu, Dhotrey, Garpanchkot, North Rajabhatkhawa, North Sevoke and Sursuti respectively. In Garpanchkot MPCA, the maximum of 20 percent of checklisted medicinal plants were enumerated through quadrat sampling of 1.96 ha, while it was only 9 percent in Tonglu from 0.8 ha. Overall, 17 percent of species listed across seven MPCAs were recorded in the quadrat sampling of 6.79 ha area. No woody plant species were common to all seven sites, while 25 species were common in North Rajabhatkhawa and North Sevoke, which was the maximum species shared between MPCA sites. There were only 8 liana species (4 percent) with >30 cm gbh recorded in the quadrats, while the sampling quadrats in four MPCA sites (Bonnie camp, Dhotrey, North Rajabhatkhawa and Tonglu) had no liana species. Overall, 12 woody plant species belonging to threatened species category was recorded in 6.76 ha of sampled quadrats across seven MPCAs. The maximum of three threatened species recorded in 4 MPCAs (North Rajabhatkhawa, North Sevoke, Sursuti and Tonglu), while Bonnie camp and Dhotrey had 2 species and Garpanchkot with lone threatened species.

The contribution of 60 plant families towards woody plant diversity (genera and species) and stand density varied across the seven MPCA sites (Table 9). The Fabaceae (represented by 11 genera and 16 species) are taxonomically diverse and constituted the most-speciose family. The Lauraceae with six genera and 14 species formed the second most species-rich family in the forests studied. Woody plant species belonging to Fabaceae was present in Garpanchkot, North Rajabhatkhawa, North Sevoke and Sursuti while Lauraceae family members were not present in Bonnie camp and Garpanchkot MPCAs. The next three major species-rich families were Meliaceae (12 species in 9 genera) and Rubiaceae (10 species in 8 genera) and Euphorbiaceae (9 species in 8 genera). Not all species rich families were present in all

MPCAs. Out of 60 families, 23 had the representation of single woody plant species. More than half of families (32) were families having only genus. Overall, *Litsea* and *Terminalia* with seven species each were the largest genus among woody plant species (>30 cm gbh) in all seven MPCAs. The other species rich genera were *Magnolia* and *Syzygium* with 6 species each, *Rhododendron* and *Symplocos* with 5 species each. Overall, around half of genera had single species representation.

Based on the number of quadrats recorded and number of stems recorded, the common and dominant woody plant species were determined. They were different across seven MPCAs. In Bonnie camp MPCA, *Avicennia officinalis* was recorded in more than the half of 20m x 20m size quadrats placed (Table 9). Other two common species were *A. alba* and *Exoecaria agallocha*, found in 8 quadrats out of 20 quadrats placed in Bonnie camp MPCA. The same three species: *Avicennia officinalis* (22 stems), *Exoecaria agallocha* (20 stems) and *A. alba* (19 stems) were dominant in terms of number of individuals in each species. In Dhotrey MPCA, *Quercus pachyphylla* (18 quadrats and 142 stems), *Magnolia campbelli* (11 quadrats and 27 stems) and *Eurya japonica* (10 quadrats and 26 stems) were the common and dominant woody plant species with >30 cm gbh size. Woody plant species namely, *Terminalia anogeissiana* with 215 stems, *Lagerstroemia parviflora* with 98 stems and *T. alata* with 65 stems were found to be common as recorded in 46, 40 and 31 quadrats respectively in Garpanchkot MPCA. *Shorea robusta* and *Careya arborea* were the other two dominant woody tree species with 115 and 82 stems respectively. In North Rajabhatkhawa, the commonly found dominant woody plant species were *Polyalthia simiarum* (18 quadrats with 80 stems), *Dysoxylum reticulatum* (12 quadrats with 35 stems) and *Aphanamisis polystachya* (10 quadrats with 13 stems). Woody species, *Aphanamisis polystachya* was common and dominant in North Sevoke (14 quadrats with 70 stems) and Sursuti MPCA (14 quadrats with 22 stems). In Tonlgu, *Viburnum erubescens* (14 quadrats with 47 stems), *Neolitsea cuipala* (13 quadrats with 23 stems), *Rhododendron griffithianum* (12 quadrats with 65 stems) were recorded to be common. The other dominant woody species having >30 cm gbh size in Tonglu MPCA were *Rhododendron arboretum* (44 stems in 10 quadrats), *Lithocarpus pachyphyllus* (42 stems in 10 quadrats) and *Symplocos lucida* (33 stems in 10 quadrats). Among seven MPCAs, species enumeration exemplified monodominance nature only in Dhotrey with *Quercus pachyphylla* (occupying 40 percent of total density).

There were a maximum of 1014 individuals of woody plants with >30 cm gbh size in Garpanchkot MPCA enumerated in 1.96 ha sampling area followed by 387, 360, 307, 254,

249 and 87 stems in 0.8 ha quadrat areas in Tonglu, Dhotrey, North Rajabhatkhawa, Sursuti, North Sevoke and Bonnie camp respectively (Table 10). Mean plant gbh was as low as 44.38 cm in Bonnie camp MPCA to as high as 150.68 cm in Dhotrey MPCA. The maximum gbh was 670 cm (*Tetrameles nudiflora*), recorded in North Sevoke, while in other MPCAs, it was *Bruguiera cylindrica* (94 cm) in Bonnie camp, *Dysoxylum reticulatum* (405 cm) in North Rajabhatkhawa, *Shorea robusta* (185 cm) in Garpanchkot, *Quercus pachyphylla* (485 cm) in Dhotrey, *Sterculia villosa* (345 cm) in Sursuti and *Pieris Formosa* (456 cm) in Tonglu MPCA. The basal area of woody plant species with >30cm gbh size was in the range from 88.44 m²/0.8 ha in Dhotrey MPCA to 1.55 m²/0.8 ha in Bonnie camp with the intermediate values of 17.48 m², 24.03 m², 26.12 m², 32.04 m² and 34.82 m² in Tonglu, Sursuti, Garpanchkot (1.96 ha), North Rajabhatkhawa and North Sevoke respectively. Species diversity indices for woody plants >30cm gbh size varied greatly across seven MPCA sites (Table 10). MPCA sites, North Sevoke and Sursuti scored a high value of Shannon and Fisher's α indices, but Simpson value was low. Other sites scored intermediate values and Bonnie camp scored a low value of Fisher's α , when compared to the other sites.

Table 9. Summary of plant diversity inventory undertaken in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa
# of species recorded in qualitative assessment	96	313	327	340
Plant species (>30 cm gbh) recorded in 20 m x 20 m quadrats				
# of quadrats placed	20 (0.8 ha)	20 (0.8 ha)	49 (1.96 ha)	20 (0.8 ha)
# of species recorded	11	32	64	52
Percentage of species	11	10	20	15
# of families	5	16	29	27
# of genera	6	23	52	47
# of threatened species	2	2	1	3
# of trees	11	32	59	52
# of lianas	0	0	5	0
Common species (# of quadrats)	<i>Avicennia officinalis</i> (11), <i>Avicennia alba</i> (8), <i>Excoecaria agallocha</i> (8)	<i>Quercus pachyphylla</i> (18), <i>Eurya japonica</i> (10), <i>Magnolia campbellii</i> (11)	<i>Terminalia anogeissiana</i> (46), <i>Lanea coromandelica</i> (40), <i>Terminalia alata</i> (31)	<i>Polyalthia simiarum</i> (18), <i>Dysoxylum reticulatum</i> (12), <i>Aphanamixis polystachya</i> (10)
Plant species (\leq 30 cm gbh) recorded in one 5 m x 5 m quadrat placed in each of twenty 20 m x 20 m quadrats				

Population status of medicinal plants in seven MPCAs

# of species recorded	14	34	62	38
Percentage of species	15	11	19	11
# of families	9	18	30	22
# of genera	11	23	52	37
# of threatened species	1	2	1	2
# of tree saplings	9	23	37	24
# of lianas	1	0	5	0
# of climbers	0	1	3	2
# of shrubs	4	10	17	12
Common species (# of quadrats)	<i>Avicennia marina</i> (14), <i>Aegiceras corniculatum</i> (9), <i>Avicennia alba</i> (8)	<i>Yushania maling</i> (13), <i>Eurya acuminata</i> (12), <i>Symplocos glomerata</i> (7)	<i>Shorea robusta</i> (23), <i>Holarrhena pubescens</i> (19), <i>Diospyros melanoxylon</i> (18)	<i>Polyalthia simiarum</i> (11), <i>Tabernaemontana alternifolia</i> (6), <i>Dysoxylum reticulatum</i> (5)
Plant species (herbs, seedlings) recorded in four 1m x 1 m quadrat in each of twenty 20 m x 20 m quadrats				
# of species recorded	21	91	97	108
Percentage of species	22	29	30	32
# of families	13	43	38	47
# of genera	16	68	83	96

Population status of medicinal plants in seven MPCAs

# of threatened species	1	1	4	7
# of tree seedlings	12	9	29	12
# of climber/liana seedlings	2	11	23	30
# of shrubs	3	5	18	21
# of herbs	4	66	27	45
Common species (# of quadrats)	<i>Aegialitis rotundifolia</i> (18), <i>Ceriops tagal</i> (16), <i>Aegiceras corniculatum</i> (15)	<i>Smilax elegans</i> (10), <i>Eurya acuminata</i> (9), <i>Sarcococca wallichii</i> (8)	<i>Helicteres isora</i> (37), <i>Andrographis paniculata</i> (30), <i>Soymida febrifuga</i> (23)	<i>Tetrastigma campylocarpum</i> (19), <i>Chloranthus elatior</i> (18), <i>Coffea benghalensis</i> (18)

Table 9. Summary of plant diversity inventory undertaken in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal (Contd..)

	North Sevoke	Sursuti	Tonglu	Overall
# of species recorded in qualitative assessment	342	387	302	1265
Plant species (>30 cm gbh) recorded in 20 m x 20 m quadrats				
# of quadrats placed	20 (0.8 ha)	20 (0.8 ha)	20 (0.8 ha)	6.76 ha
# of species recorded	63	54	28	214
Percentage of species	18	14	9	17
# of families	32	29	17	60
# of genera	53	45	21	142
# of threatened species	3	3	3	12
# of trees	60	52	28	206
# of lianas	3	2	0	8
Common species (# of quadrats)	<i>Aphanamixis polystachya</i> (14), <i>Pterygota alata</i> (9), <i>Tectona grandis</i> (8)	<i>Aphanamixis polystachya</i> (14), <i>Machilus glaucescens</i> (8), <i>Oroxylum indicum</i> (10)	<i>Viburnum erubescens</i> (14), <i>Neolitsea cuipala</i> (13), <i>Rhododendron griffithianum</i> (12)	
Plant species (≤30 cm gbh) recorded in one 5 m x 5 m quadrat placed in each of twenty 20 m x 20 m quadrats				
# of species recorded	40	29	24	189

Population status of medicinal plants in seven MPCAs

Percentage of species	12	7	8	15
# of families	24	18	15	65
# of genera	36	28	19	150
# of threatened species	3	3	2	11
# of tree saplings	25	20	11	111
# of lianas	4	4	1	12
# of climbers	3	0	0	8
# of shrubs	8	5	12	58
Common species (# of quadrats)	<i>Phlogacanthus thyrsoiflorus</i> (7), <i>Machilus glaucescens</i> (4), <i>Syzygium formosum</i> (3)	<i>Polyalthia simiarum</i> (7), <i>Baccaurea ramiflora</i> (4), <i>Machilus glaucescens</i> (3)	<i>Daphne papyracea</i> (17), <i>Viburnum erubescens</i> (16), <i>Rosa sericea</i> (10)	
Plant species (herbs, seedlings) recorded in four 1m x 1 m quadrat in each of twenty 20 m x 20 m quadrats				
# of species recorded	136	94	73	446
Percentage of species	40	24	24	35
# of families	55	44	38	107
# of genera	115	73	60	317
# of threatened species	5	3	4	17
# of tree seedlings	27	18	3	89

Population status of medicinal plants in seven MPCAs

# of climber/liana seedlings	31	20	8	74
# of shrubs	21	13	9	69
# of herbs	57	43	53	214
Common species (# of quadrats)	<i>Barleria strigosa</i> (17), <i>Coffea benghalensis</i> (13), <i>Piper attenuatum</i> (12)	<i>Piper attenuatum</i> (10), <i>Barleria strigosa</i> (9), <i>Oplismenus compositus</i> (9)	<i>Gaultheria fragrantissima</i> (20), <i>Senecio graciliflorus</i> (20), <i>Pilea ternifolia</i> (18)	

Table 10. Summary of plant species population density, basal area and diversity indices recorded in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

	Bonnie camp	Dhotrey	Garpanch kot*	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
Plant species (>30 cm gbh) recorded in 20 m x 20 m quadrats							
Density (stems/0.8ha)	87	360	1014	307	249	254	387
Basal area (m ² /0.8ha)	1.55	88.44	26.12	32.94	34.82	24.03	17.48
Average plant gbh (cm)	44.38	150.68	51.38	89.59	106.01	90.45	64.23
Maximum plant gbh (cm)	94	485	185	405	670	345	456
Diversity indices							
(i) Shannon	1.91	2.38	3.03	3.06	3.68	3.6	2.71
(ii) Simpson	0.184	0.184	0.088	0.098	0.035	0.036	0.088
(iii) Fisher's α	3.33	8.49	15.18	17.96	21.17	20.99	6.93
Plant species (\leq 30 cm gbh) recorded in one 5 m x 5 m quadrat placed in each of twenty 20 m x 20 m quadrats							
Density (stems/0.8ha)	146	122	331	87	96	79	186
Basal area (m ² /0.8ha)	0.425	0.319	0.860	0.192	0.181	0.186	0.674
Average plant gbh (cm)	17.74	17.07	16.34	15.74	14.51	16.06	18.77
Diversity indices							
(i) Shannon	2.27	3.04	3.52	3.2	3.22	3.03	2.41

Population status of medicinal plants in seven MPCAs

(ii) Simpson	0.136	0.069	0.049	0.069	0.068	0.064	0.138
(iii) Fisher's α	3.81	15.63	22.52	25.71	25.74	16.53	7.34
Plant species (herbs, seedlings) recorded in four 1 m x 1 m quadrat in each of twenty 20 m x 20 m quadrats							
Density (stems/0.8ha)	1805	1120	2375	1872	1555	806	4127
Diversity indices							
(i) Shannon	2.49	3.86	4.03	3.8	4.32	4.02	3.91
(ii) Simpson	0.109	0.033	0.025	0.038	0.023	0.028	0.025
(iii) Fisher's α	5.33	40.24	25.69	39.38	55.17	46.34	19.15

*Area sampled in Garpanchkot MPCA - 1.96 ha

4.3.2. Population of plant species with ≤ 30 cm gbh size

A total of 189 plant species (≤ 30 cm gbh) belonging to 150 genera and 65 families were recorded in 169 quadrats of 5m x 5m quadrat placed in 20m x 20m size across seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal (Table 9). Overall, 15 percent of medicinal plant species checklisted across seven MPCAs were recorded in the quadrat sampling of 6.79 ha area. Plant species richness was as low as 14 species per 0.8 ha in Bonnie camp MPCA to as high as 62 species per 1.96 ha in Garpanchkot MPCA and 40 species per 0.8 ha in North Sevoke MPCA through intermediate figures of 38, 34, 29 and 24 species per 0.8 ha in the other MPCAs North Rajabhatkhawa, Dhotrey, Sursuti and Tonglu respectively. Species unique to individual MPCA site was 14 (100%), 23 (68%), 49 (79%), 19 (50%), 17 (43%), 10 (34%) and 14 (58%) in Bonnie camp, Dhotrey, Garpanchkot, North Rajabhatkhawa, North Sevoke, Sursuti and Tonglu respectively. In Garpanchkot MPCA, the maximum of 19 percent of checklisted medicinal plants were enumerated through quadrat sampling of 1.96 ha, while it was only 7 percent in Sursuti from 0.8 ha. There were no plant species common to all seven MPCAs, while 11 species were common between North Rajabhatkhawa and North Sevoke. Out of 189 plant species with ≤ 30 cm gbh size recorded, there were 111 tree saplings (59%), 58 shrubs (31%), 12 lianas (6%) and 8 (4%) climbers. In all seven MPCAs, around 60-70% of plant species were tree saplings with an exception of 46 percent in Tonglu, where the proportion of shrubs were 50 percent. Otherwise, the proportion of shrubs were from 17 percent in Sursuti to 32 percent in North Rajabhatkhawa. Out of seven MPCAs, the good proportion of woody climbers (liana) and tendril climbers were present in North Sevoke (18%) and Garpanchkot (13%). In seven MPCAs, the number of plants with ≤ 30 cm gbh size belonging to threatened species category was 11 species in 6.76 ha of sampled quadrats. The number of threatened species recorded in each MPCA was three species in North Sevoke and Sursuti, two species in Dhotrey, North Rajabhatkhawa and Tonglu, and single species in Bonnie camp and Garpanchkot.

Out of 65 families comprising plant species with gph ≤ 30 cm present in the area sampled, none were present in all seven MPCAs. Twenty-eight families had single species representation. The species rich families were namely Rubiaceae (13 species belonging to 13 genera), Euphorbiaceae (10 species in 9 genera) and Fabaceae (10 species in 9 genera), Lauraceae (9 species and 5 genera) and Meliaceae (9 species and 7 genera). Among plant species with ≤ 30 cm gbh class, the largest genere were *Rhododendron* and *Terminalia* with 5

species each followed by *Symplocos* (4 species) and *Avicennia*, *Berberis*, *Bridelia* and *Diospyros* with 3 species each. Nearly two third of genera had single species representation.

The common and dominant plant species varied across seven MPCAs. In Bonnie camp MPCA, *Avicennia marina* (14 quadrats with 41 stems), *Aegiceros corniculatum* (9 quadrats with 13 stems) and *Avicennia alba* (8 quadrats with 17 stems) was common and dominant plant species (Table 9). *Aegialitis rotundifolia* contributed 11 percent of recorded stems in Bonnie camp MPCA, while it was present in 7 quadrats. In Dhotrey MPCA, *Yushania maling* (13 quadrats and 18 stems), *Eurya acuminata* (12 quadrats and 16 stems) and *Symplocos glomerata* (7 quadrats and 13 stems) were the common and dominant plant species with ≤ 30 cm gbh size. Plant species, *Shorea robusta* (23 quadrats with 49 stems), *Holarrhena pubescens* (19 quadrats with 24 stems) and *Diospyros melanoxylon* (18 quadrats with 19 stems) were found common and dominant in Garpanchkot MPCA. In North Rajabhatkhawa, the commonly recorded dominant plant species were *Polyalthia simiarum* (11 quadrats with 18 stems), *Tabernaemontana alternifolia* (6 quadrats with 6 stems) and *Dysoxylum reticulatum* (5 quadrats with 6 stems). *Polyalthia simiarum* was common and dominant in Sursuti (8 quadrats with 11 stems), while North Sevoke and Sursuti had *Machilus glaucescens* as common and dominant species. In Tonglu, *Daphne papyracea* (17 quadrats with 52 stems), *Viburnum erubescens* (16 quadrats with 33 stems) and *Rosa sericea* (10 quadrats with 14 stems) were recorded to be common and dominant plant species. In each MPCA site, there are species showing the dominance in terms of frequency, density and basal area. Species dominance and abundance would be established in a forest ecosystem by reducing the resources to the lowest rate of supply to exclude all other other species utilising that source (Tilman, 1988).

Garpanchkot MPCA had 331 individuals of plant species with ≤ 30 cm gbh size enumerated in sampling area followed by Tonglu (186 stems), Bonnie camp (146 stems), Dhotrey (122 stems), North Sevoke (96 stems), North Rajabhatkhawa (87 stems) and Sursuti (79 stems) (Table 10). Average plant gbh was as low as 14.51 cm in North Sevoke to as high as 18.77 cm in Tonglu. The basal area calculated for plant species with ≤ 30 cm gbh size was in the range from 0.860 m²/0.12ha in Garpanchkot to 0.181 m²/0.05ha in North Sevoke with the intermediate values of 0.674 m², 0.425 m², 0.319 m², 0.192 m² and 0.186 m² in Tonglu, Bonnie camp, Dhotrey, North Rajabhatkhawa and Sursuti respectively. Species diversity indices for plants ≤ 30 cm gbh size varied greatly across seven MPCA sites (Table 10). The Shannon and Fisher's α indices were low in Bonnie camp and Tonglu MPCA sites, whereas

Garpanchkot, North Rajabhatkhawa and North Sevoke had a high value of Shannon and Fisher's α indices. Simpson index value was nearly same in Dhotrey, North Rajabhatkhawa and North Sevoke.

4.3.3. Population of herbs, shrubs and plant seedlings

The sampling of 1m x 1m sub-quadrats in the four corners of 20m x 20m quadrats yielded a total of 446 plant species belonging to 317 genera and 107 families across seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal (Table 9). Overall, it was 35 percent of medicinal plant species checklisted across seven MPCAs. Species richness was 21, 91, 97, 108, 136, 94, 73 respectively for the MPCA sites Bonnie camp, Dhotrey, Garpanchkot, North Rajabhatkhawa, North Sevoke, Sursuti and Tonglu. Species unique to individual MPCA site was 14 (100%), 23 (68%), 49 (79%), 19 (50%), 17 (43%), 10 (34%) and 14 (58%) in Bonnie camp, Dhotrey, Garpanchkot, North Rajabhatkhawa, North Sevoke, Sursuti and Tonglu respectively. Species recorded in Bonnie camp MPCA was not found elsewhere. Similarly, the higher proportion of species unique to MPCA site was found in Garpanchkot (77%) and Tonglu (62%). There were 51 species present in both North Rajabhatkhawa and North Sevoke, while North Rajabhatkhawa and Sursuti had 39 common species. The above three MPCA sites had 31 species common to each other. Among lifeform categories, nearly half of the species were herbs (48%) followed by tree seedlings (20%), climber/liana seedlings (17%) and shrubs (15%). In Bonnie camp, tree seedlings contributed to more than half of species richness (57%), while the proportion of tree seedlings in Sursuti was only 4 percent. The number of species was nearly equal across lifeform categories in Garpanchkot MPCA. Out of 40 threatened medicinal plants recorded in seven MPCAs in the qualitative assessment, 17 species were recorded in the sampled sub-quadrats. North Rajabhatkhawa MPCA had the maximum of 7 threatened species followed by North Sevoke (5 species), Tonglu and Garpanchkot (4 species).

A total of 107 plant families comprising number of herbs, seedlings and shrubs were present in seven MPCA sites (Table 9). The species rich families were Fabaceae (26 species), Rubiaceae (25 species), Asteraceae (22 species), Acanthaceae (20 species) and Poaceae (17 species). Forty percent of families had single species representation. Familial diversity was higher in species rich MPCAs namely North Sevoke (55 families) and North Rajabhatkhawa (47 families). In North Sevoke MPCA, the top five families namely Acanthaceae (9 species), Apocynaceae (7 species), Fabaceae (7 species), Asteraceae (6 species) and Rubiaceae (6

species) had more than one fourth of the species richness (26%). In North Rajabhatkhawa MPCA, more than one third of species diversity belonged to top five families (Acanthaceae and Apocynaceae with 8 species each, Fabaceae and Rubiaceae with 7 species each and Asteraceae with 5 species). Overall, for herbs, shrubs and seedlings of trees and lianas, the largest genus was *Phyllanthus* with 8 species followed by *Piper* (7 species), and *Impatiens*, *Polygonum* and *Smilax* with 5 species each in all seven MPCAs. Three fourth of genera had single species representation. One third of genera was found in North Sevoke (115 genera) and North Rajabhatkhawa (96 genera).

The common and dominant plant species varied across seven MPCAs. In Bonnie camp MPCA, *Avicennia marina* (14 quadrats with 41 stems), *Aegiceros corniculatum* (9 quadrats with 13 stems) and *Avicennia alba* (8 quadrats with 17 stems) was common and dominant plant species (Table 9). *Aegialitis rotundifolia* contributed 11 percent of recorded stems in Bonnie camp MPCA, while it was present in 7 quadrats. In Dhotrey MPCA, *Yushania maling* (13 quadrats and 18 stems), *Eurya acuminata* (12 quadrats and 16 stems) and *Symplocos glomerata* (7 quadrats and 13 stems) were the common and dominant plant species with ≤ 30 cm gbh size. Plant species, *Shorea robusta* (23 quadrats with 49 stems), *Holarrhena pubescens* (19 quadrats with 24 stems) and *Diospyros melanoxylon* (18 quadrats with 19 stems) were found common and dominant in Garpanchkot MPCA. In North Rajabhatkhawa, the commonly recorded dominant plant species were *Polyalthia simiarum* (11 quadrats with 18 stems), *Tabernaemontana alternifolia* (6 quadrats with 6 stems) and *Dysoxylum reticulatum* (5 quadrats with 6 stems). *Polyalthia simiarum* was common and dominant in Sursuti (8 quadrats with 11 stems), while North Sevoke and Sursuti had *Machilus glaucescens* as common and dominant species. In Tonglu, *Daphne papyracea* (17 quadrats with 52 stems), *Viburnum erubescens* (16 quadrats with 33 stems) and *Rosa sericea* (10 quadrats with 14 stems) were recorded to be common and dominant plant species.

In all seven MPCAs, the maximum number of plants were enumerated in Tonglu MPCA (4127 individuals) (Table 10). The number of plants recorded in 1m x 1m sub-quadrats placed in the remaining MPCAs was 2375 (Garpanchkot), 1872 (North Rajabhatkhawa), 1805 (Bonnie camp), 1555 (North Sevoke), 1120 (Dhotrey) and 806 (Sursuti). Species diversity indices for plants ≤ 30 cm gbh size varied greatly across seven MPCA sites (Table 10). Among seven MPCA sites, Bonnie camp scored low value. Bonnie camp MPCA scored very low in Shannon, Fisher's α and Simpson indices. The Shannon index value was high in MPCA sites namely North Sevoke, Garpanchkot and Sursuti. Simpson index value was

nearly the same in Garpanchkot, North Sevoke and Sursuti. North Sevoke had the maximum Fisher's α index value followed by Sursuti and Dhotrey.

4.3.4. Species-area curve

Species-area curves for plant species enumerated in non-contiguous 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats were drawn for all seven MPCAs. In Bonnie camp MPCA, species curve reached an asymptote for woody plant species (>30 cm gbh size), saplings and shrubs (\leq 30 cm gbh size) and herbs, shrubs and seedlings, indicating adequate sampling effort (Figure 24). More than half of species observed was captured in initial five sampling attempts, while species addition was little or none after 15th sampling quadrat. Species area curves nearly levelled for woody plant species, saplings and shrubs and herbs and seedlings in Dhotrey MPCA (Figure 25). Around 50 percent of observed species was enumerated in the 6th quadrat itself, and then curve raised gradually with an additional 1 or 2 species for every sampling effort. The rate of climb of species area curve was same for plant species with >30cm gbh size and also with \leq 30 cm gbh size. Species area curves drawn for Garpanchkot MPCA revealed that 91 percent of herbs and seedlings species were observed in half of the sampling effort, while it was 80 percent for wood species (>30 cm gbh size) and 76 percent for plants with \leq 30 cm gbh size (Figure 26). The increased number of sampling efforts did not yield substantial increase in the number of plant species. In North Rajabhatkhawa MPCA, species accumulation curves did not reach an asymptote for sampling efforts taken in 20m x 20m size quadrats, 5m x 5m size quadrats and 1m x 1m sub-quadrats (Figure 27). More specifically, the enumeration of number of herbs, shrubs and seedlings increased with an addition of sampling efforts in the MPCA. Species area curves approaching an asymptote in North Sevoke MPCA indicated inadequate sampling efforts (Figure 28). Nevertheless, at the time of completion of half of sampling efforts, around 60 to 70 percent of species were observed in North Sevoke. Similar pattern was observed in species area curves drawn for sursuti MPCA indicating species curves not stabilise with the current sampling efforts (Figure 29). Additional sampling efforts are expected to increase the number of plant species in Sursuti. In Tonglu MPCA, species area curves were more or less flattened showing adequate sampling efforts (Figure 30).

The non-stabilizing species-area curves apparently indicate that the area sampled was not sufficient. In that case, the richness estimator values (ICE) were examined for projected species richness. If species area curves attained the asymptote, then the richness estimators

would indicate that increase in sampling efforts would not add substantial increase to number of species observed. For e.g., in Bonnie camp MPCA, according to richness estimator values (ICE and Jackknife 1), increasing sampling effort could add only 2 species at the maximum for woody plant species (>30 cm gbh class) and no additional species for plants with ≤ 30 cm gbh and 3 species maximum for herbs, shrubs and seedlings. Similarly, In Tonglu MPCA, additional sampling efforts would not increase the species richness greatly among woody plants >30 cm in gbh (6 species), plants with ≤ 30 cm gbh (10 species) and also among herbs, shrubs and seedlings (no extra species). In the contrast, species richness estimators have made a projection of greater increase in the number of species for following MPCAs namely North Rajabhatkhawa, North Sevoke and Sursuti. As these MPCA sites are larger in size and also rich in plant species diversity, the increase in sampling efforts is expected to add a greater number of species (sometimes more than 50 percent of species observed). For e.g., species richness estimator values (ICE and Jackknife1) indicated a 50, 55 and 60 percent increase respectively in woody plants (>10 cm gbh), plants with ≤ 30 cm gbh and herbs, shrubs and seedlings in North Rajabhatkhawa MPCA. A similar trend was observed in species diverse North Sevoke MPCA, which was projected to have more than 60, 55, 50 percent increase in the number of species in woody plants (>30 cm gbh), plants with ≤ 30 cm gbh and herbs, shrubs and seedlings respectively. In these sites, many new species are expected to add up during the additional sampling efforts.

Figure 24. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Bonnie camp MPCA

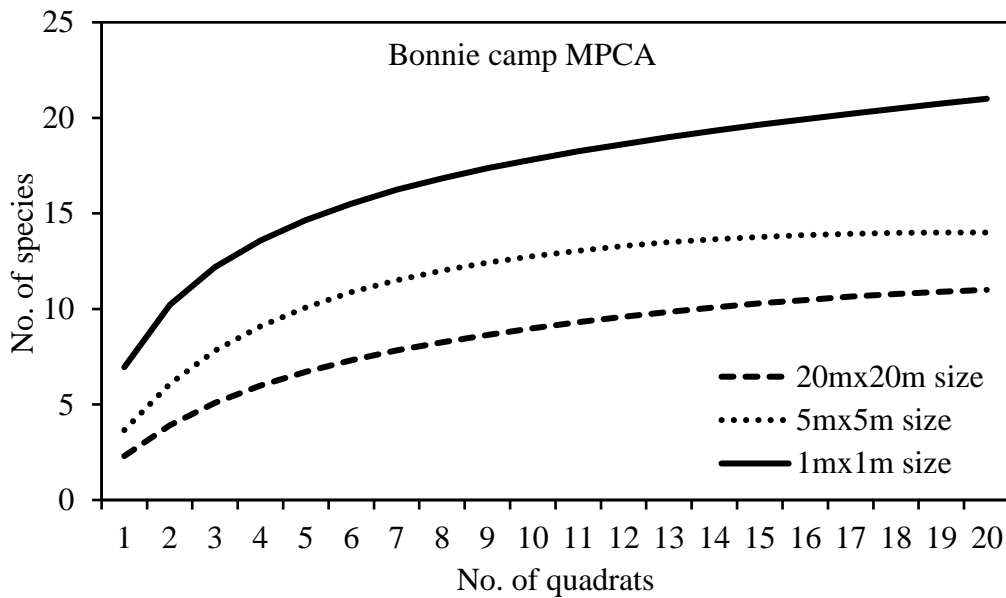


Figure 25. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Dhotrey MPCA

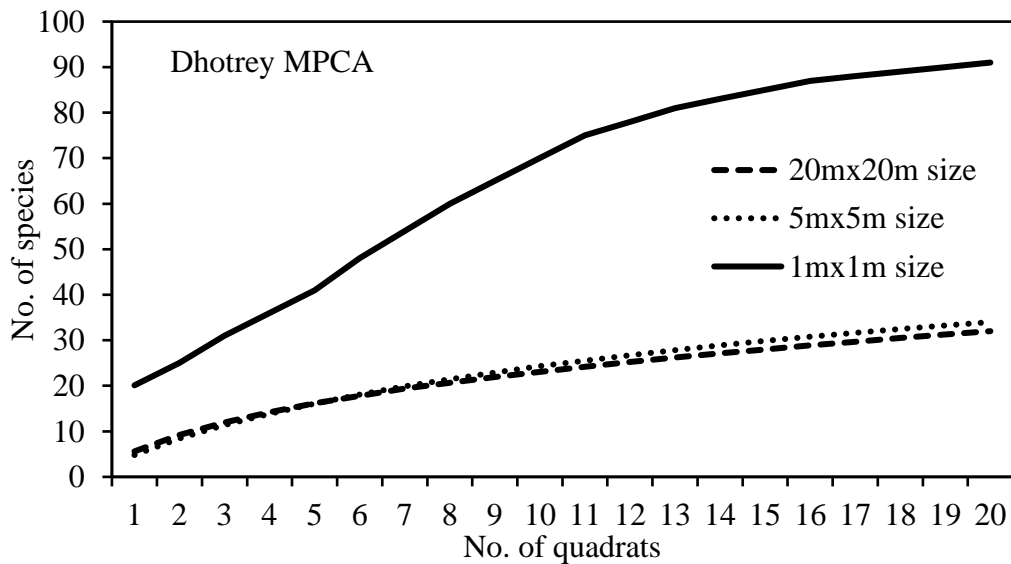


Figure 26. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Garpanchkot MPCA

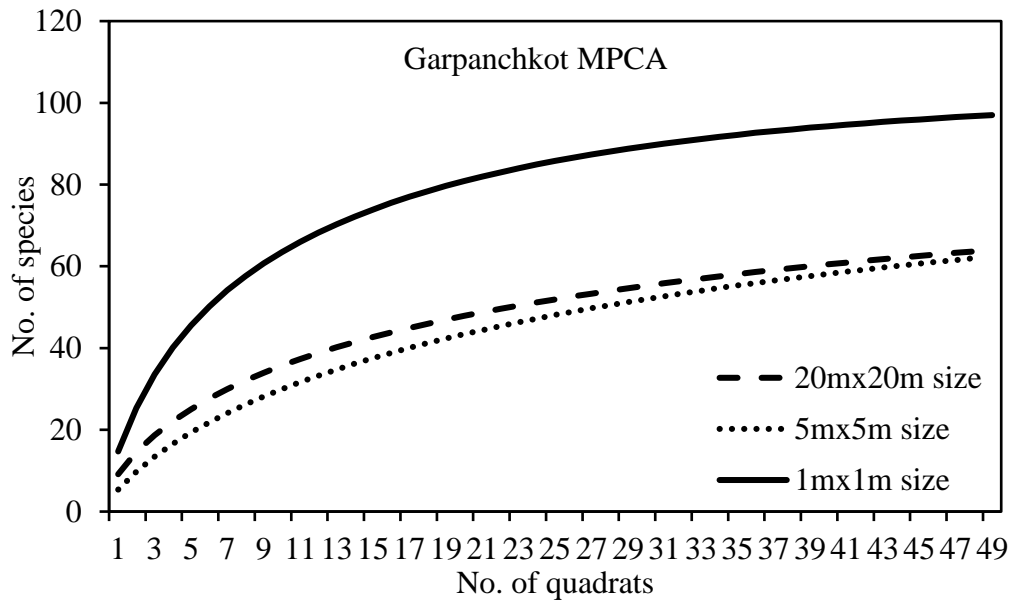


Figure 27. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in North Rajabhatkhawa MPCA

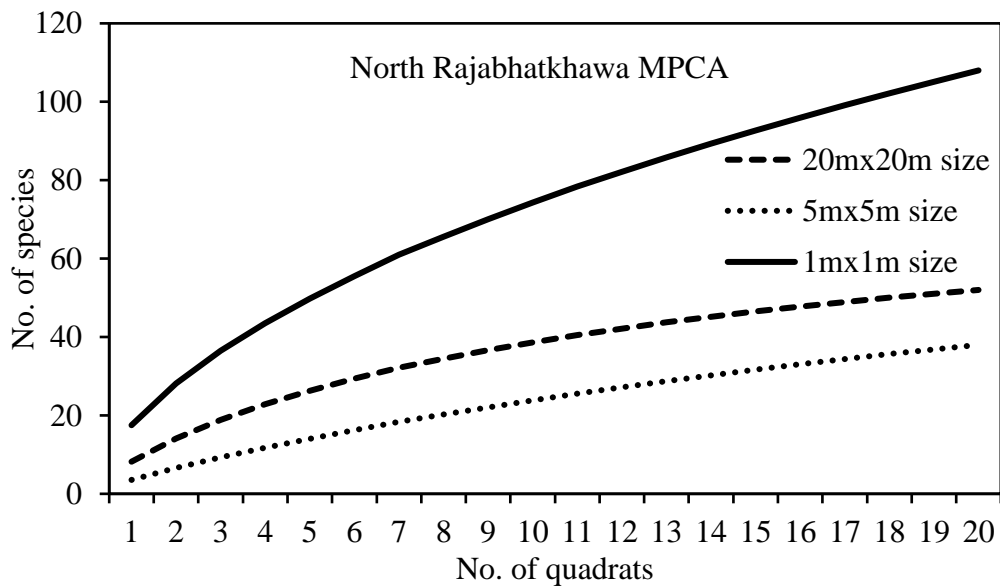


Figure 28. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in North Sevoke MPCA

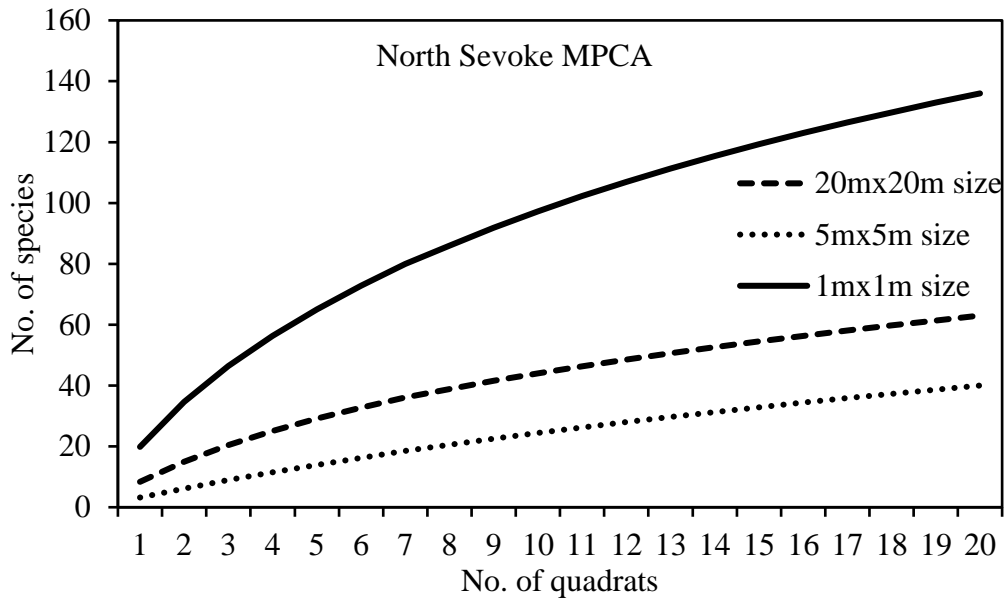


Figure 29. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Sursuti MPCA

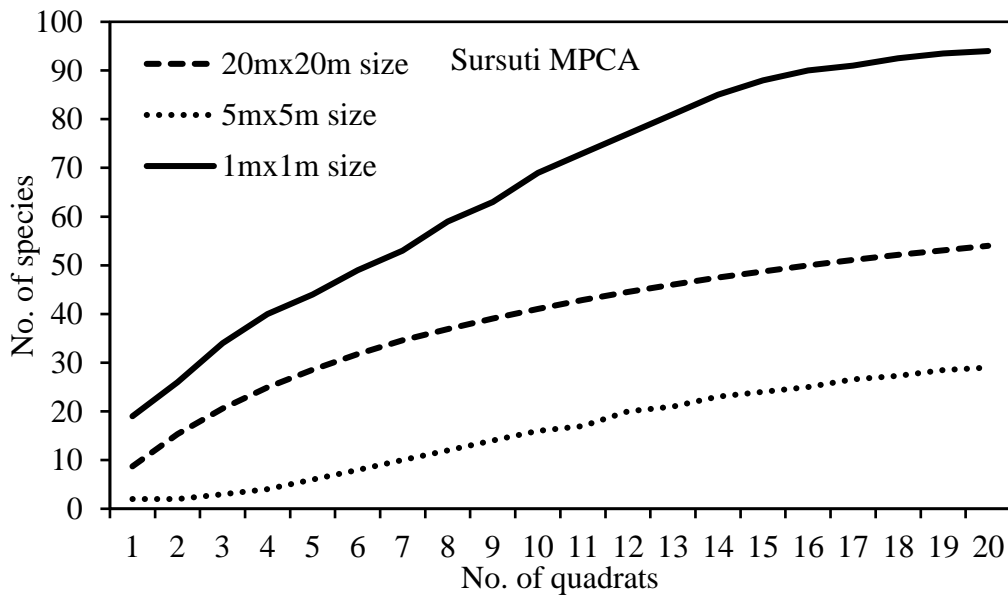
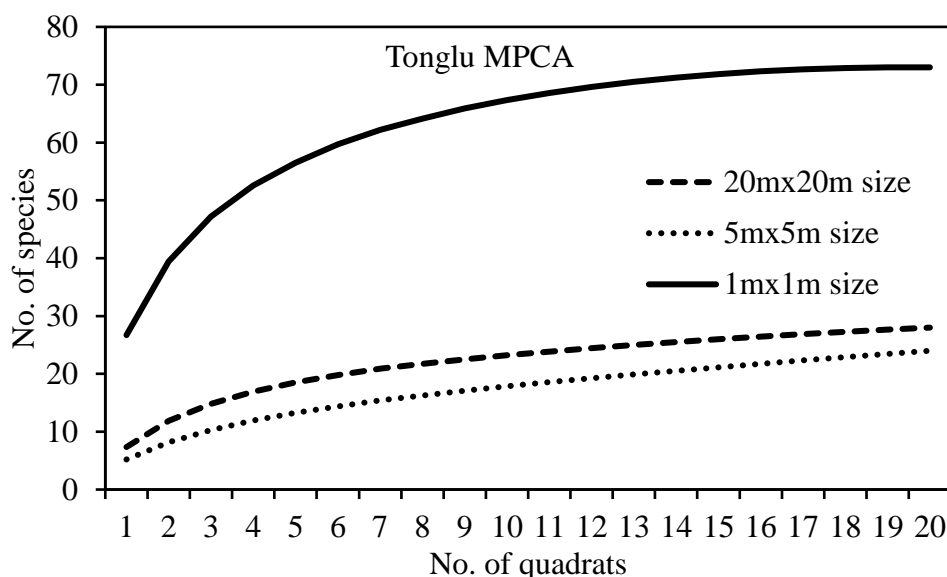


Figure 30. Species area curves drawn for plant species enumerated in 20m x 20m quadrats, 5m x 5m quadrats and 1m x 1m sub-quadrats placed in Tonglu MPCA



4.3.5. Importance value index (IVI)

The IVI of the top ten abundant plant species with $>30\text{cm}$ gbh size and $\leq 30\text{cm}$ gbh size is presented. In Bonnie camp, there was no clear dominance of single species among woody plants and plants with $\leq 30\text{cm}$ gbh size, but three species of *Avicennia* and *Excoecaria agallocha* were found to have high IVI scores (Figure 31). *Quercus pachyphylla* in Dhotrey MPCA had IVI score of 190 being a predominant woody plant species, while no plant species with $\leq 30\text{cm}$ gbh size showing any dominance (Figure 32). In Garpanchkot, *Terminalia anogeissiana* was the dominant woody species ($>30\text{cm}$ gbh) with an IVI of 137, while *Shorea robusta* was another species with high IVI among plant species with $>30\text{cm}$ gbh size (82) and $\leq 30\text{cm}$ gbh size (79) (Figure 33). *Polyalthia simiarum* with IVI values of 127 and 77 respectively in plant species with $>30\text{cm}$ gbh size and $\leq 30\text{cm}$ gbh size in North Rajabhatkhawa MPCA (Figure 34). In North Sevoke, no clear dominance was found among woody plant species, whereas *Phlogacanthus thyrsoiflorus* had a high IVI score of 72 among plant species with $\leq 30\text{cm}$ gbh size (Figure 35). *Aphanamixis polystachya* (with IVI score of 91) and *Polyalthia simiarum* (with IVI score of 111) were the dominant plant species with $>30\text{cm}$ gbh size and $\leq 30\text{cm}$ gbh size respectively in Sursuti MPCA (Figure 36). No clear

dominance was found among woody plant species in Tonglu, while *Daphne papyracea* and *Viburnum erubescens* dominated among plant species with ≤ 30 cm gbh size (Figure 37).

Figure 31. Importance value index (IVI) of top ten woody plant species with >30 cm gbh size and plants with ≤ 30 cm gbh size enumerated in Bonnie camp MPCA. Frequency and density are given above bar graph

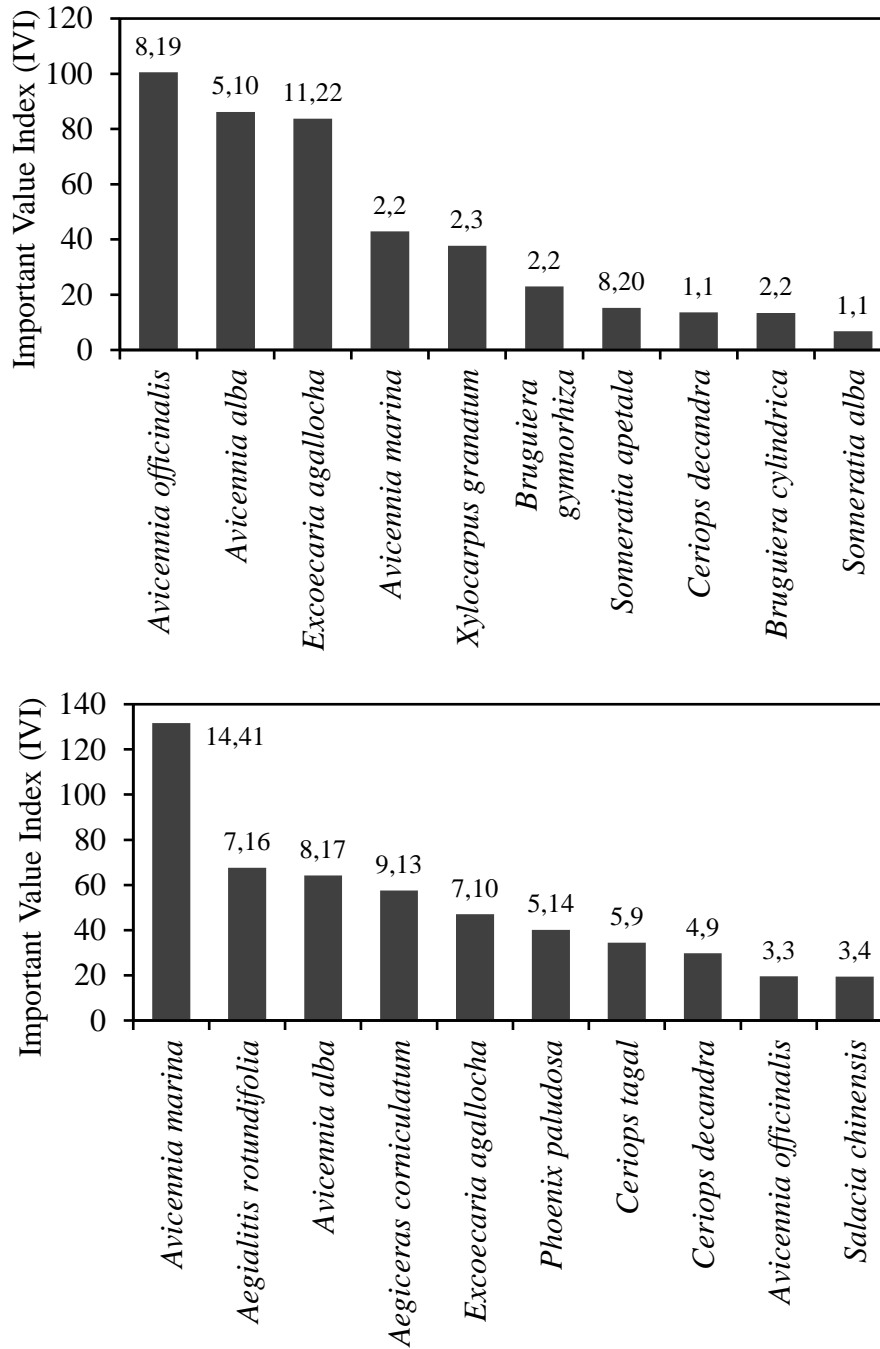


Figure 32. Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in Dhotrey MPCA. Frequency and density are given above bar graph

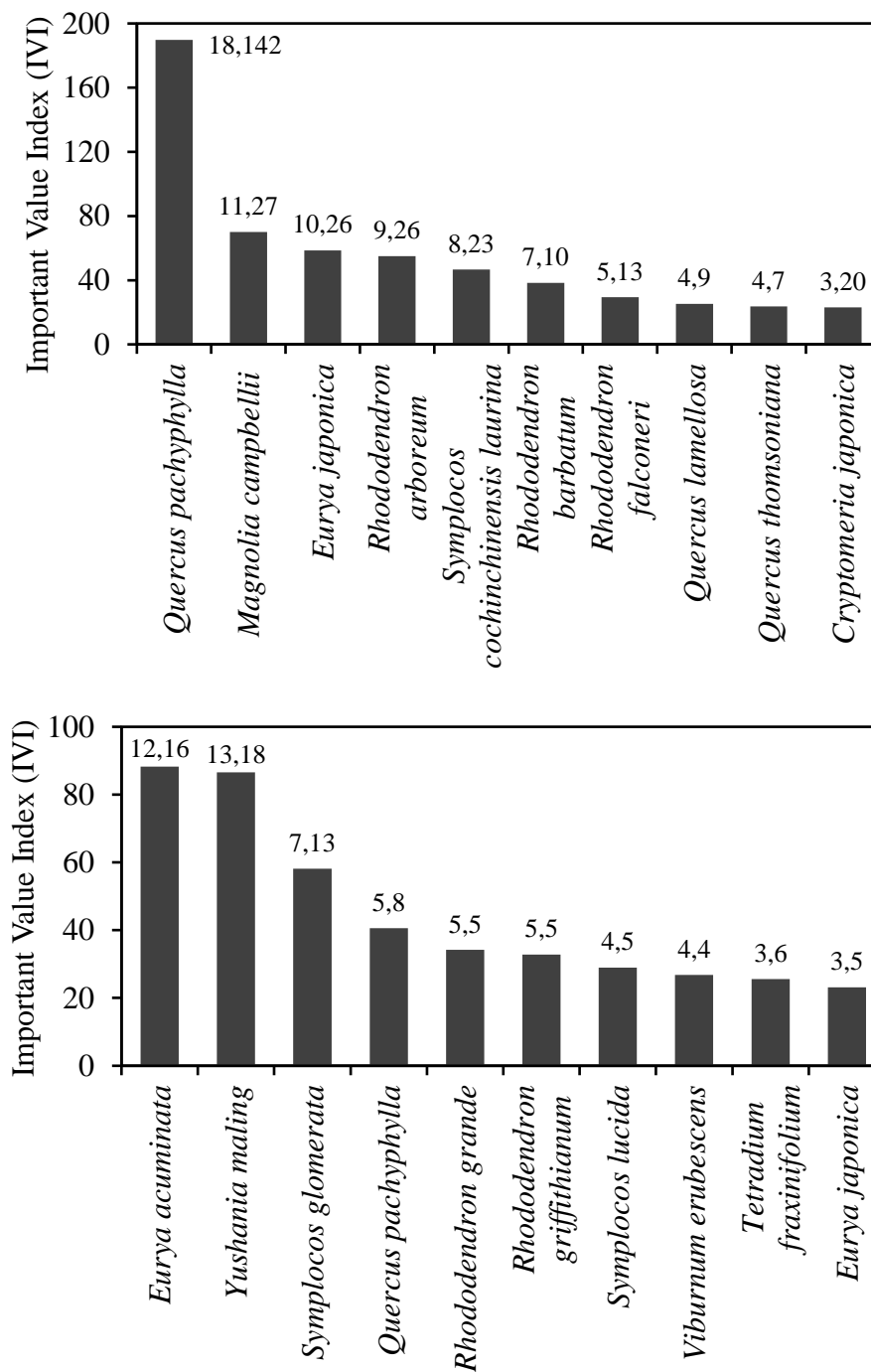


Figure 33. Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in Garpanchkot MPCA. Frequency and density are given above bar graph

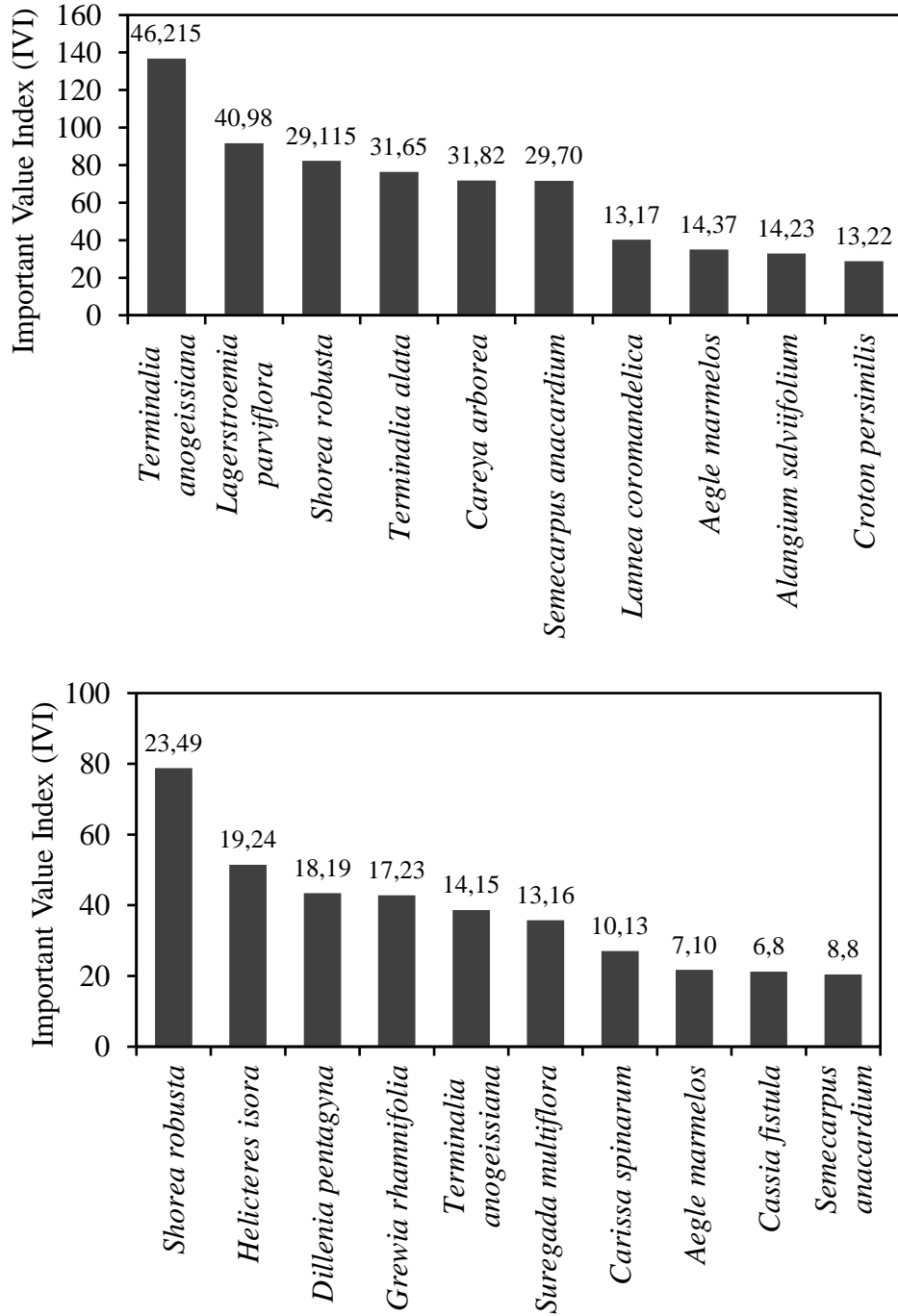


Figure 34. Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in North Rajabhatkhawa MPCA. Frequency and density given above bar graph

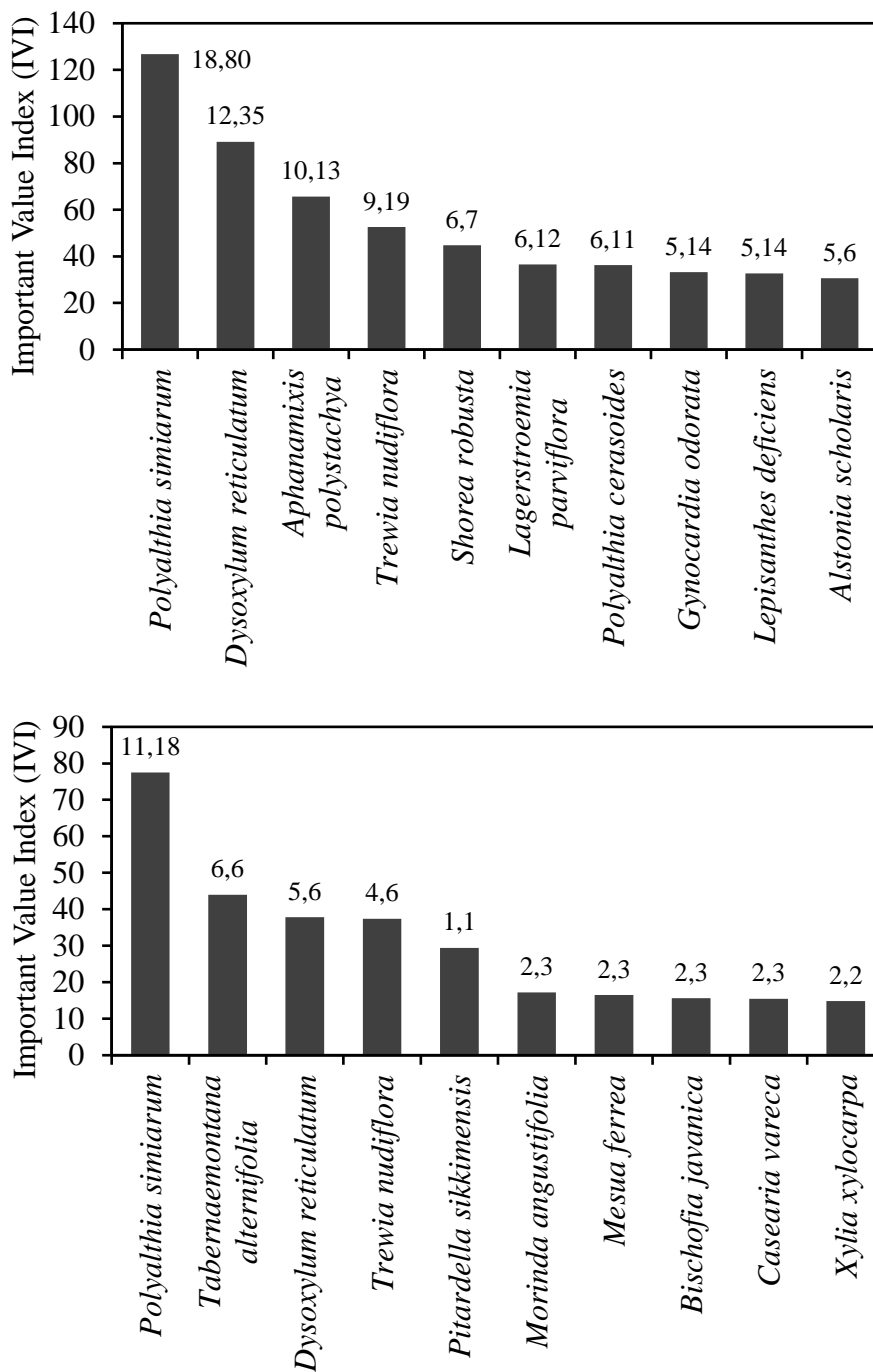


Figure 35. Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in North Sevoke MPCA. Frequency and density are given above bar graph

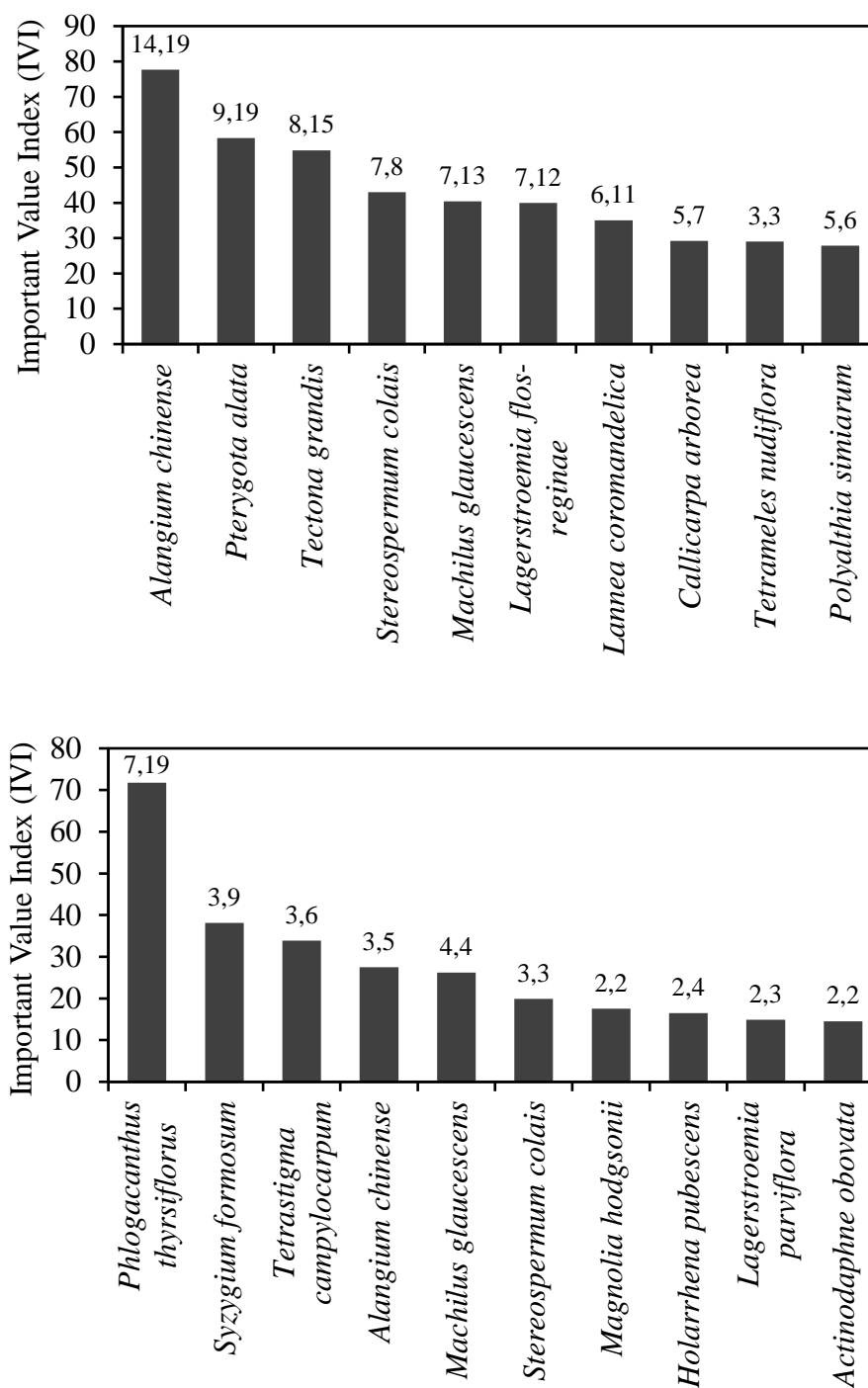


Figure 36. Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in Sursuti MPCA. Frequency and density are given above bar graph

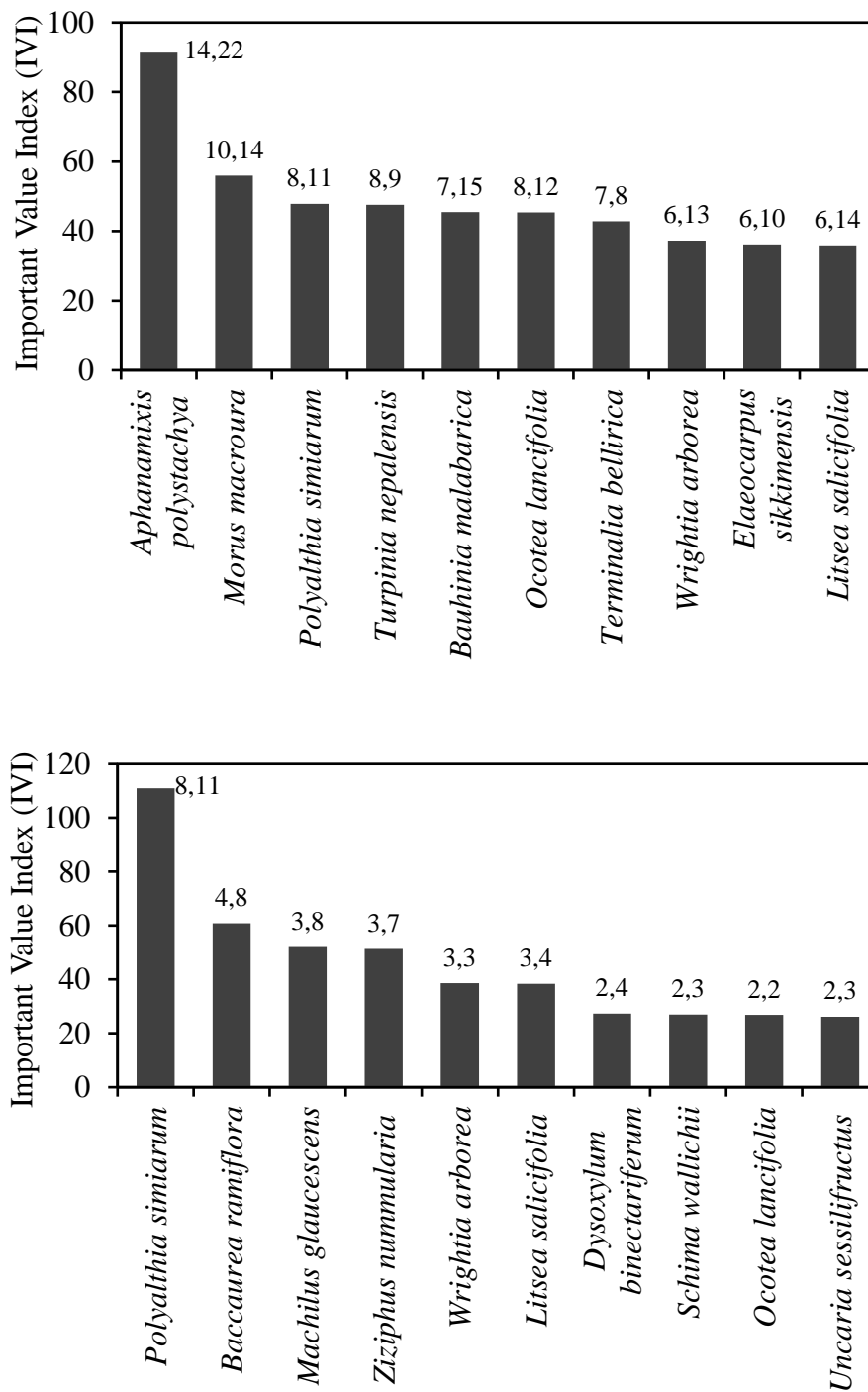
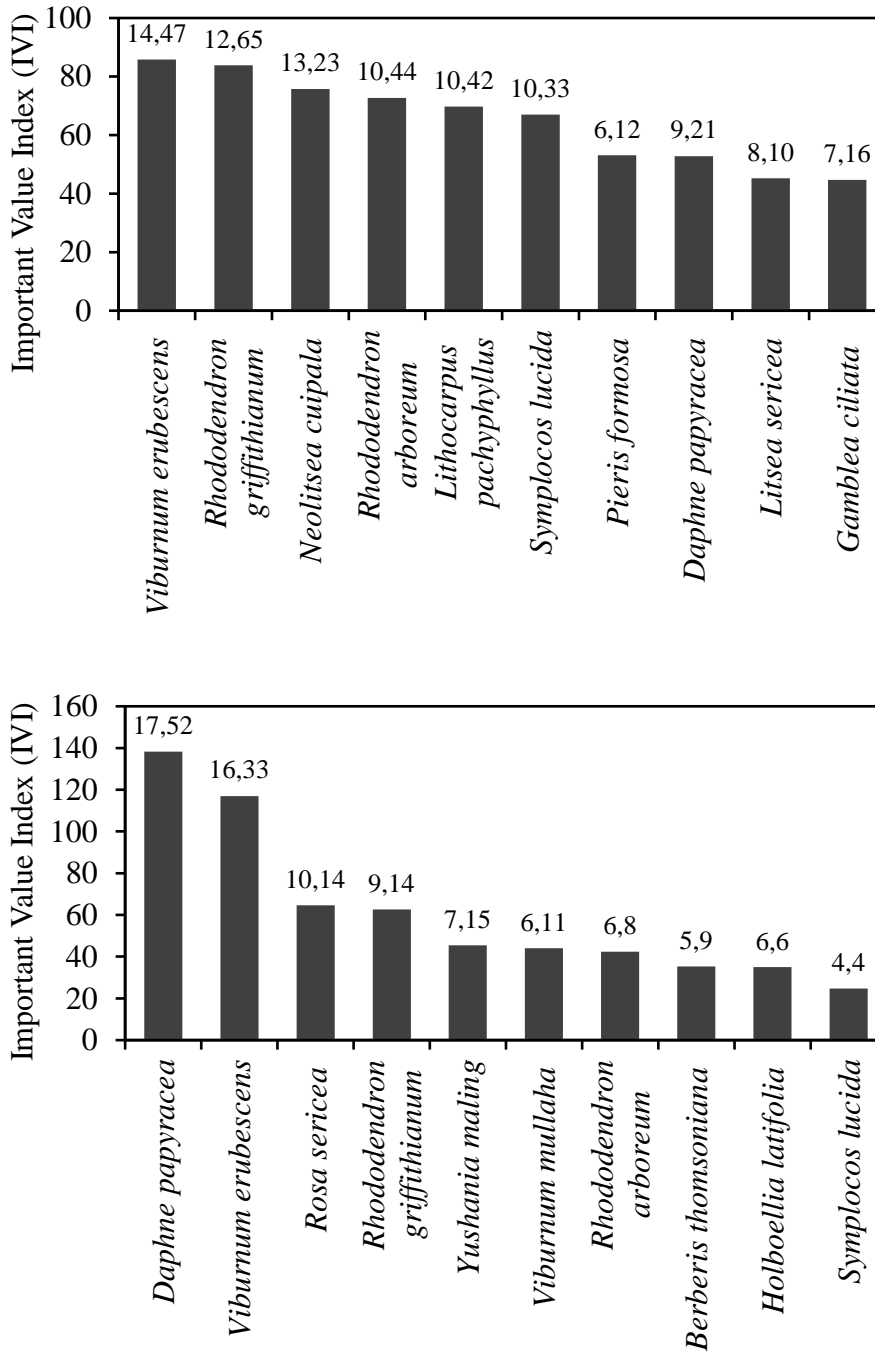


Figure 37. Importance value index (IVI) of top ten woody plant species with >30cm gbh size and plants with ≤30cm gbh size enumerated in Tonglu MPCA. Frequency and density are given above bar graph



4.3.6. Girth class species richness, density and basal area

Tree species richness and abundance decreased with increasing girth class except for the largest size class (>100 cm) in all seven MPCAs. The lower girth classes (31-40, 41-50 cm) contributed large proportion of woody plant species richness in the following MPCAs: Bonnie camp, Garpanchkot, North Rajabhatkhawa and Sursuti (Table 11). In the remaining MPCAs, species richness was nearly equal in all the girth class categories. With an exception of Bonnie camp and Garpanchkot, all other MPCAs had the maximum number of species in the higher girth class (>100 cm) (Table 11). A similar pattern was found in the forest stand density across seven MPCAs. Plant density in the lower girth classes (31-40 cm and 40-50 cm) was greater in Bonnie camp (74%), Garpanchkot (53%), North Rajabhatkhawa (41%) and Tonglu (40%) (Table 12). The number of stems in higher girth class (>100 cm) was greater in Dhotrey (67%), North Sevoke (39%) and Sursuti (33%). With an exception of girth class (>100 cm), species density in Dhotrey, North Sevoke and Tonglu MPCA was moderate in the middle girth class (Table 12). The contribution of basal area of woody plant species in higher girth class (>100 cm) to the total stand basal area was 95 percent in Dhotrey, 86 percent in North Sevoke, 80 percent in Sursuti, 84 percent in North Rajabhatkhawa and 44 percent in Tonglu (Table 13). In Garpanchkot MPCA, the basal area of middle girth size classes (51-60 cm, 61-70 cm, 71-80 cm) was 50 percent of total stand basal area, while the lower girth classes (31-40 cm and 41-50 cm) had greater proportion of basal area (48 percent) in Bonnie camp MPCA.

Table 11. Girth class species richness of woody plant species in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal

Girth class (cm)	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
31-40	8	8	40	29	23	25	13
41-50	6	8	42	21	15	27	17
51-60	4	8	36	17	17	18	12
61-70	3	10	28	12	18	8	17
71-80	2	7	23	9	16	12	12
80-90	3	8	14	5	10	13	12
90-100	2	7	7	6	10	7	14
>100	0	26	11	30	32	33	19

Table 12. Girth class population density of woody plant species in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal

Girth class (cm)	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
31-40	48	19	268	73	41	40	87
41-50	16	17	250	51	19	43	66
51-60	9	12	179	28	21	28	51
61-70	7	24	145	19	23	12	63
71-80	2	12	71	18	20	21	19
80-90	3	19	34	15	15	17	34
90-100	2	16	14	9	12	9	26
>100	0	241	21	91	95	83	40

Table 13. Girth class basal area recorded for woody plant species in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal

Girth class (cm)	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
31-40	0.45	0.18	2.74	0.72	0.43	0.41	0.83
41-50	0.29	0.29	4.39	0.85	0.31	0.71	1.02
51-60	0.21	0.29	4.59	0.70	0.54	0.68	1.28
61-70	0.22	0.86	5.13	0.64	0.80	0.40	2.01
71-80	0.09	0.56	3.36	0.82	0.95	0.96	0.89
80-90	0.20	1.11	2.09	0.89	0.89	1.02	2.00
90-100	0.09	1.10	1.06	0.66	0.89	0.65	1.81
>100	0.00	84.05	2.64	27.64	29.99	19.18	7.64

Table 14. The occurrence rates of plant species (species richness/stem density) in seven Medicinal Plant Conservation Areas (MPCAs) in West Bengal

Girth class (cm)	Bonnie camp	Dhotrey	Garpan chkot	North Rajabhat khawa	North Sevoke	Sursuti	Tonglu
31-40	0.17	0.42	0.15	0.40	0.56	0.63	0.15
41-50	0.38	0.47	0.17	0.41	0.79	0.63	0.26
51-60	0.44	0.67	0.20	0.61	0.81	0.64	0.24
61-70	0.43	0.42	0.19	0.63	0.78	0.67	0.27
71-80	1.00	0.58	0.32	0.50	0.80	0.57	0.63
80-90	1.00	0.42	0.41	0.33	0.67	0.76	0.35
90-100	1.00	0.44	0.50	0.67	0.83	0.78	0.54
>100	0.00	0.11	0.52	0.33	0.34	0.40	0.48

4.3.7. Structure of forest stand

The occurrence rate of woody plant species (species richness/stem density) increased with increasing plant gbh size class in Bonnie camp and Garpanchkot MPCA (Table 14). The variation in occurrence rate was not significantly different in MPCAs namely North Rajabhatkhawa, Sursuti, Dhotrey and Tonglu. Plant species occurrence rate was found to be higher in the middle gbh class (51-60cm, 61-70, 71-80 cm) in North Sevoke MPCA. The structure of forest stand based on the density displayed a clear reverse J-shaped curve only in Bonnie camp and Garpanchkot MPCAs (Figure 38). In other MPCAs, structure varied across gbh classes as plant individuals had moderate representation in all gbh classes especially in Tonglu MPCA. The basal area values of >100 cm gbh class was notably greater in Dhotrey, North Rajabhatkhawa, Sursuti and North Sevoke MPCAs (Figure 39). A clear J-shaped curve was displayed for basal area in Tonglu MPCA. Forest structure appeared to vary across gbh classes for basal area in Garpanchkot MPCA. Since there were many plant individuals belonging to higher gbh class (>100 cm) in MPCAs namely Dhotrey, North Rajabhatkhawa, North Sevoke and Sursuti, and no further categorisation of gbh classes were made beyond 100 cm, a trend of reverse J-shaped curves was not displayed for stem density in the above MPCAs, besides a basal area for higher gbh class which is many times greater than lower gbh classes was revealed.

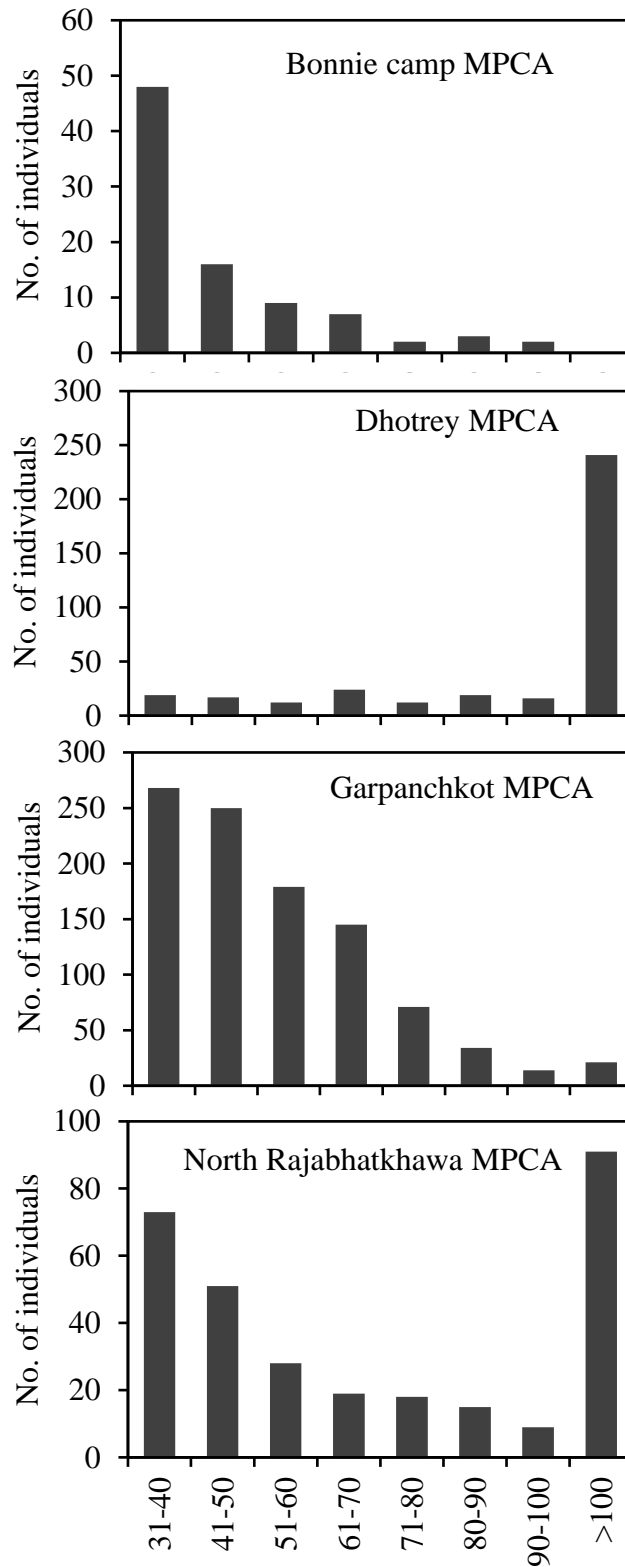
4.3.8. Woody plant species dispersion patterns

The spatial patterns of top ten woody plant species in each MPCA revealed that the individuals of a majority of plant species exhibited clumped dispersion at the area sampled in seven MPCAs. There was no single plant species that was uniformly dispersed in any of the seven MPCA sites. The clumped pattern of individuals of the dominant plant species may be due to inefficient mode of seed dispersal or opportunity or chance as when numerous saplings are able to grow up where a large tree has died or in a large gap due to windfall or vegetative reproduction by suckers. The predominance of clumped dispersion of woody plant species was common in the tropical and sub-tropical evergreen forest types. There were some plant species showing random patterns in dispersion as few influential factors are determining the performance or survival of species. In general, the local spatial effects in plant communities play a crucial role in the population structure (Greig-Smith, 1983).

4.3.9. Population structure of dominant woody plant species

In Bonnie camp MPCA, dominant woody plant species (*Avicennia officinalis*, *A. alba*. and *Excoecaria agallocha*) were well represented in the lower gph classes (31-40 cm and 41-50 cm). The dominant woody plant species of Dhotrey MPCA, *Quercus pachyphylla* and *Magnolia campbellii* had greater representation in higher girth classes (>100 cm), while the individuals of *Eurya japonica* were present in all gph classes. The dominant woody species of Garpanchkot MPCA had an expanding population structure with a greater number of individuals in the lower gph classes and stem density decreased with increasing girth class. In North Rajabhatkhawa MPCA, the dominant species, *Aphanamixis polystachya* was had a matured population with more individuals in the higher gph class, while other two dominant species (*Dysoxylum reticulatum* and *Polyalthia simiarum*) had representations in both lower and higher gph classes showing growing and matured population in the area sampled. *Aphanamixis polystachya*, the dominant species in North Sevoke and Sursuti MPCAs, displayed the same pattern as in North Rajabhatkhawa MPCA with more stem density in the higher gph class. Similarly, the woody stem density of *Tectona grandis* was larger in higher gph class having matured population in North Sevoke MPCA. The other dominant species in North Sevoke and Sursuti MPCAs had fair representation in all gph classes. In Tonglu MPCA, both dominant species, *Viburnum erubescens* and *Rhododendron girrithianum*, had younger population with more representation in the lower gph classes. The other dominant species in Tonglu, *Neolitsea cuipala* had individuals in all gph classes.

Figure 38. Forest stand structure based on woody plants density recorded in the seven MPCAs in West Bengal



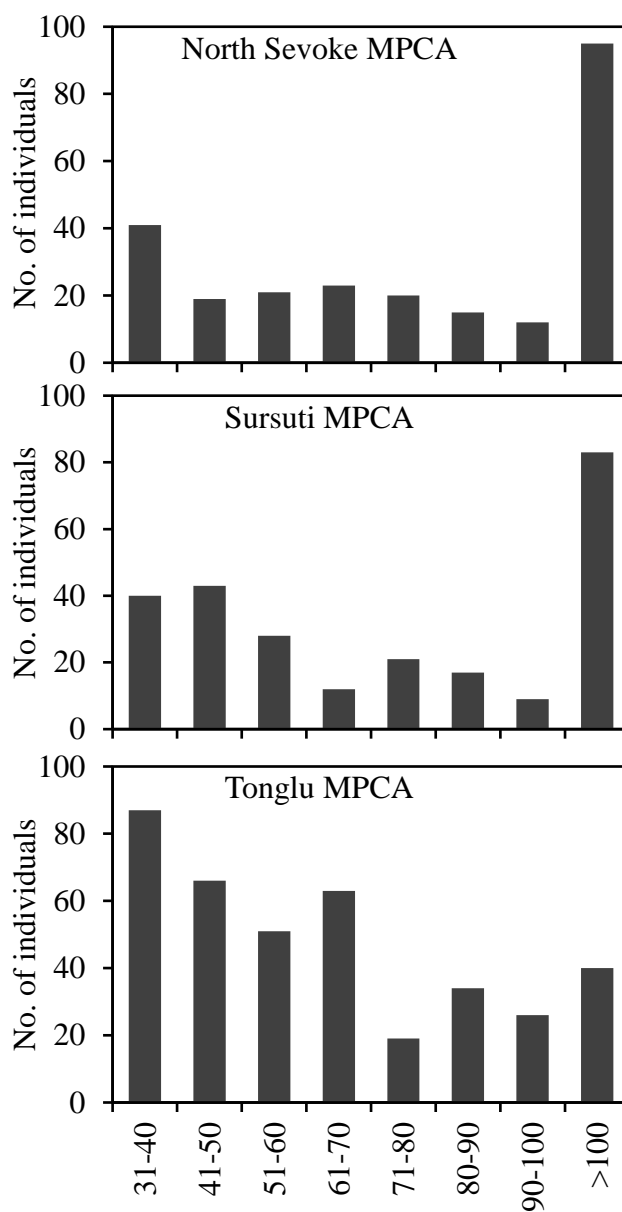
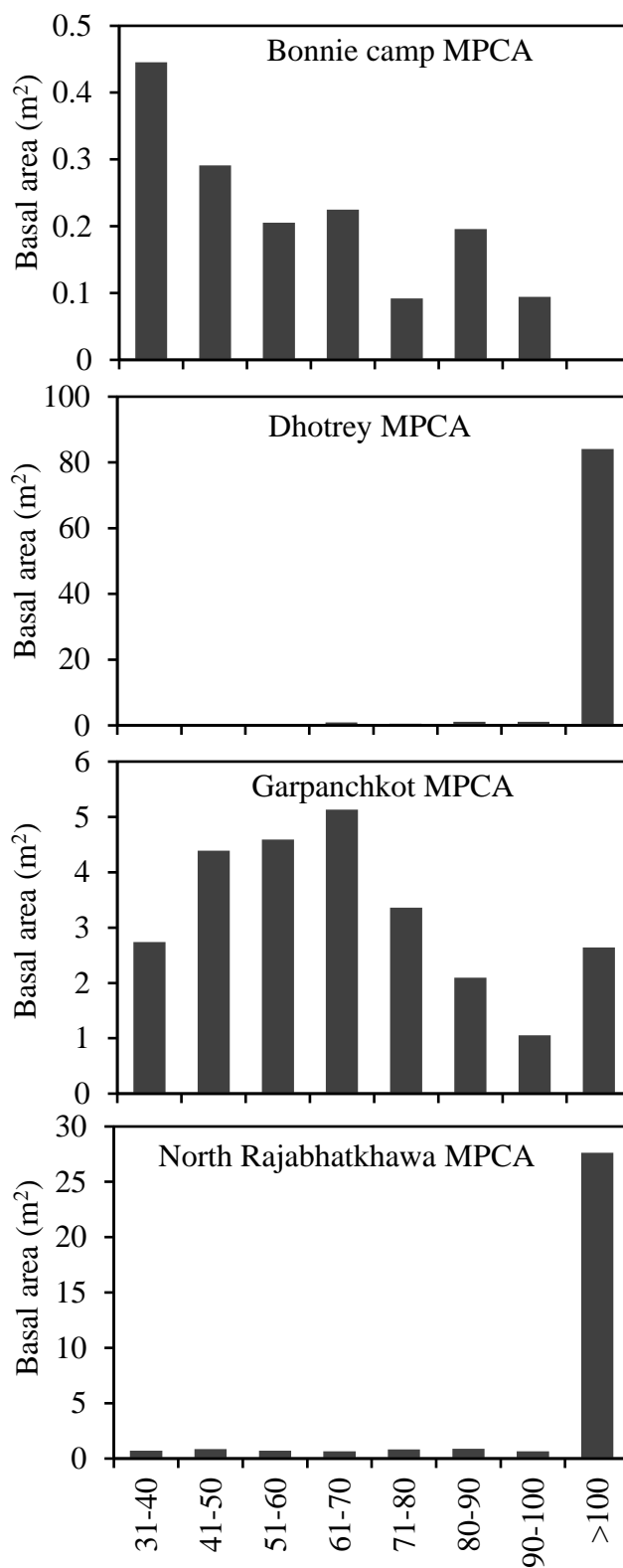
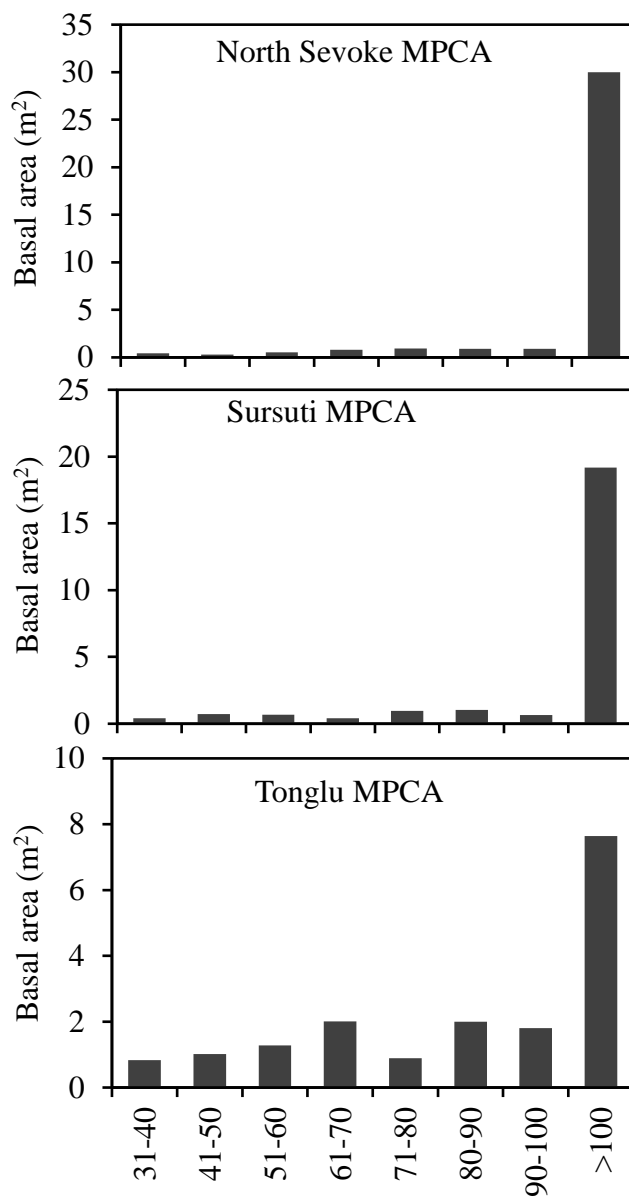


Figure 39. Forest stand structure based on woody plants basal area calculated in the seven MPCAs in West Bengal



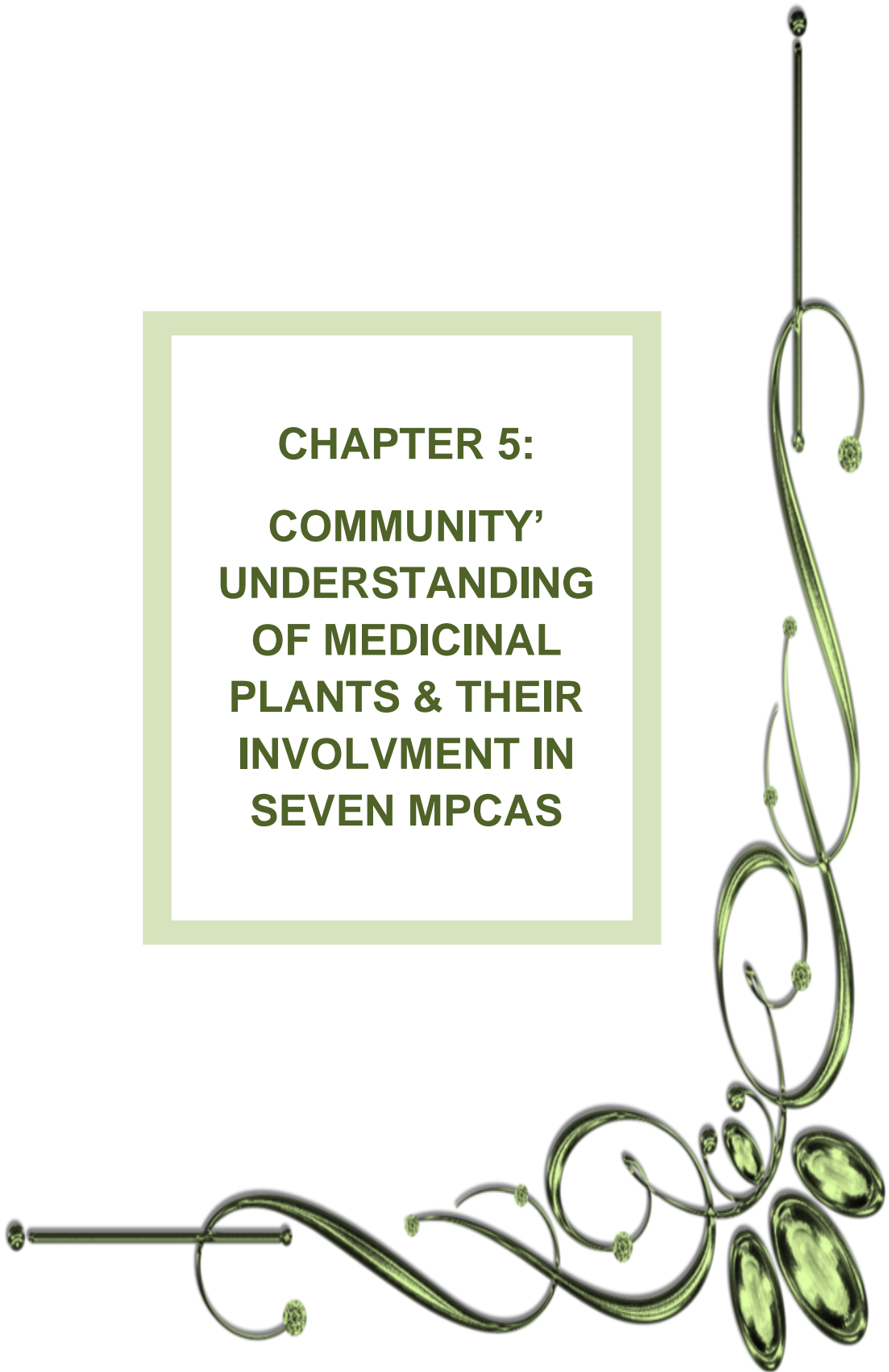


4.4. Conclusion

The quantitative assessment of MPCA areas in West Bengal state covering research on floristic diversity, population status, plant species distribution, forest stand structure and threatened species population, etc. were still inadequate as compared to the other protected areas and wildlife sanctuaries in India. This focal research has generated quantitative information on population status of woody plant species, plant saplings and woody shrubs, herbs, shrubs and plant seedlings in seven MPCAs in West Bengal state.

The conservation of small patches of large contiguous forest areas through establishing MPCAs would be possible and justified as they harbour a greater number of medicinal plant species with stabilised population showing good stand density and basal area. Medicinal plants diversity varies greatly from site to site, largely due to variation in biogeography, habitat and history of anthropogenic interventions like resource extraction and disturbance. The quantitative assessment in MPCAs revealed that these sites appeared to be a refugia of medicinal plant genetic resources preserving the plant population in good status.

**CHAPTER 5:
COMMUNITY'
UNDERSTANDING
OF MEDICINAL
PLANTS & THEIR
INVOLVMENT IN
SEVEN MPCAS**





Documentation exercise with community members

5.1 Introduction

Medicinal Plants Conservation Areas (MPCAs) are the part of contiguous forest areas that are rich in diversity, and happened to be genepool refugia of conservation concern medicinal plants with viable population. These forest areas provide number of ecosystem services and one of which is the medicinal plants. As they are rich in medicinal plants, the understanding the dynamics of medicinal plant resources would be very useful to the forest department and resource user groups in the conservation and sustainable use of medicinal plants. It is important that local community members, who reside close to the MPCAs, should have the knowledge of medicinal plant resources and how they are important to their households interms of health and livelihood security. Their level of understanding about medicinal plants is usually in relation to their sustenance and survival and also to the extent of knowing the importance of existence of plant resources at least for their continuous use. In that way, it is always better for them to keep updated on the current status of medicinal plant resources, ownership and responsibility on resources for sustainable use and various conservation strategies. There have to be activities involving local community members carried out in order to maintain and protect the medicinal plant resources, which are conserved in-situ in MPCAs.

As part of MPCA establishment program, a management work plan is prepared for a specific period for each MPCA. This management plan would cover number of activities to be carried out in MPCA sites, and also address how local community can be involved in undertaking the proposed activities within and outside the MPCAs. Besides, this management plan may have suggestions on locally relevant alternate livelihood options for community members in order to reduce their forest dependence. Since MPCA program and management plan duly recognize the role of local community members, as a follow-up on the MPCA establishment, community studies in neighbouring villages would be a crucial part in terms of documenting their forest dependence and also their willingness to participate in MPCA related activities.

There are seven MPCAs established between 2008 and 2009 by the West Bengal's State Forest Department in the natural habitats that are relatively undisturbed forest areas hosting rich diversity of medicinal plants. These sites are being maintained as in-situ conservation sites to conserve and protect the medicinal plant resources covering different forest types. At the time of establishment of MPCAs, apart from the botanical exercise, the basic details of villages located close to MPCA were documented. The information including presence of JFMCs, distance from MPCA, community members' dependency on medicinal plants from MPCA for

their livelihood income, etc. were provided in the MPCA-wise management plan prepared. Besides that, there have not been any further surveys or studies conducted among community members in the local villages to understand their knowledge and understanding on the medicinal plants and how much they are dependent on the medicinal plants for their livelihood income. Hence, this study was conducted to understand the community's knowledge and understanding on medicinal plants and their involvement in maintaining and protecting MPCAs through using questionnaire formats for documentation of information from village community members.

5.2 Materials and methods

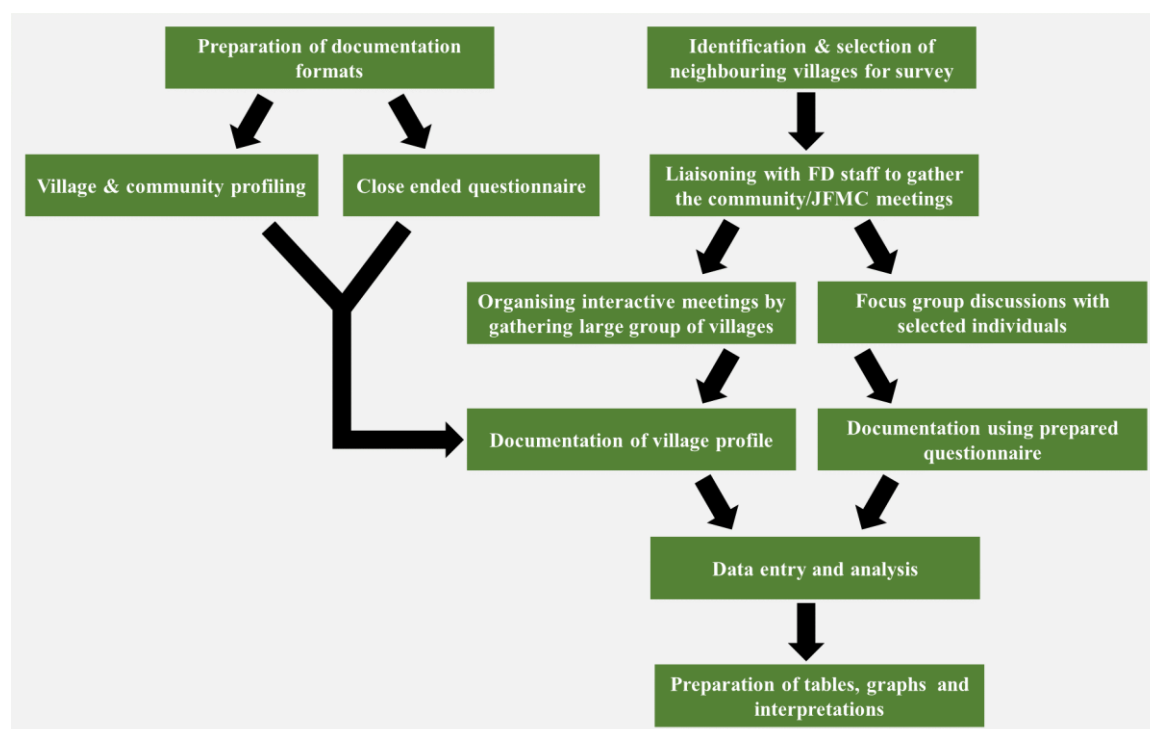
As a follow-up of quantitative assessment carried out in the seven Medicinal Plants Conservation Areas (MPCAs), community surveys were undertaken in villages that are neighbouring MPCAs. The same team from FRLHT, Bengaluru, which conducted the field assessment made visits to neighbouring villages to hold focus group discussions and interactive meetings with village members using close ended questionnaire formats. Meetings were organised with the support of local forest departmental staff members involving Joint Forest Management Committee (JFMC) members. The above exercises were carried out to understand the awareness and knowledges of local village members on medicinal plants and MPCAs, their dependency on medicinal plants through collection and their current involvement in monitoring and management of MPCAs.

5.2.1 Study approach

Following survey framework was used at the time of studying the knowledge and the understanding on medicinal plants among community members of villages neighbouring seven MPCAs in West Bengal:

- ❖ At the time of population assessment, the details related to villages that are located closely to seven MPCAs were collected. The specific information including the name of the village, distance from MPCA, village population, presence of JFMC, etc. were documented (Table 15).
- ❖ With the support of the forest department frontline staff members, the details were collected. Based on the proximity to MPCAs (within 2 km) and the dependency of villagers on medicinal plants for their livelihood income, villages that are were selected for conducting surveys.

- ❖ Frontline staff members connected the field team with JFMC members in each village to hold initial meetings and discussions regarding conducting the survey.
- ❖ Meanwhile, a simple format was prepared to document village and community profile. Close ended questionnaire format (Figure 40) was also prepared to document the community's knowledge and understanding on medicinal plants and their involvement in MPCAs. Formats were translated into local language for respondents to fill the format by themselves.
- ❖ For the purpose of documentation, two types of meetings were conducted: interactive meetings involving large group of villagers and focus group discussion with selected resource persons.
- ❖ Using the formats, the documentation of village and community profile and community's understanding was carried out. The number of respondents in each village depends on village population and willingness and interests to share information.
- ❖ In most cases, formats were filled by the volunteers or field team with the responses to questions asked to community respondents. In some sites, local language translator was used to make the community members understand the questions. After collecting the information from the villagers, the data was entered in the excel sheet and analysed to make tables and graphs for writing interpretations.




Prior to the community survey, the information was given well in advance through emails and phone calls to concerned Divisional Forest Officers and Range Forest Officers to take permission, and also to make logistic arrangements. It has been made sure in every visit to villages neighbouring MPCAs to meet the concerned ACFs and RFOs to brief them about the purpose of community surveys. In all the meetings at local villages, frontline staff members have accompanied the team members to facilitate activities.

Table 15. List of villages and number of community members selected in each MPCA for the purpose of conducting community surveys

MPCA	Neighbourhood villages	No. of community members interviewed
Bonnie camp	Ambika nagar	60
	Purbashreedharpur	38
Dhotrey	Chotahatta	24
	Dhotrey	26
	Sellembong	5
Garpanchkot	Bagmara	55
	Rampur	63
	Shiulibari	46
North Rajabhatkhawa	Buxa 28 Forest Village	13
	Buxa 29 Forest Village	17
North Sevoke	10mile	16
Sursuti	Bamni	15
	Borodighi	12
Tonglu	Dilpa	12
	Magma	12
	Tonglu	7
	Tumling	6
Grand Total		427

Figure 40. Questionnaire format used during community surveys



REVISITING OF SEVEN OLD MEDICINAL PLANTS CONSERVATION AREAS (MPCAS) IN WEST BENGAL

QUESTIONNAIRE SURVEY TO UNDERSTAND LOCAL COMMUNITY'S KNOWLEDGE AND UNDERSTANDING ON MEDICINAL PLANTS AND THEIR INVOLVEMENT IN MPCA MANAGEMENT


Name of the MPCA: _____ Name of the village: _____
Name of the community member: _____
Gender: MALE / FEMALE Age: _____
Source of income or occupation: _____

1. Do you use medicinal plants from inside MPCA areas and/or neighbouring MPCA areas?
YES / NO
If YES, then provide the list of medicinal plants and other details like quantity traded, domestic use, collection frequency, etc.

2. Are you aware of the MPCA which is located close to the village **YES / NO**
3. IF YES, do you know the purpose of establishing MPCA in your neighbourhood? **YES / NO**
4. Have you observed any changes in vegetation status and population of medicinal plants in MPCA in the last 5 years? **IMPROVED / DECLINED / NO IDEA**
5. Are you involved in the protection of MPCA by the forest department **YES / NO**
6. Do you get benefits from the MPCA **YES / NO**
7. Is there a nursery located close to the MPCA or village **YES / NO**

Remarks:

Date: _____ Collected by: _____



5.3. Results and Discussion

The outcomes of the interactions held with community members as a whole and questionnaire surveys conducted during the focus group discussions were entered in the excel sheets. The village profile is provided in Annexure 18. It gives the details of respondents, who participated in the community survey, from villages neighbouring seven MPCAs. In some cases, if respondents filled the formats in local language, the formats were then translated into English prior to enter the data. The list of medicinal plants that are collected from MPCA areas and / or forest areas neighbouring MPCA were prepared after collating the list of plants gathered during community meetings and focus group discussions. In this way, the list of medicinal plants collected/used along with other details were prepared at village level in each MPCA.

Focus group discussions with selected local community members were useful in understanding the level of their awareness and involvement about the MPCA. Focus group discussions involved at least one traditional folk healer in the village to explain the current scenario and various information related to their dependence on forest resources, their livelihood aspects and involvement in forest management. Many of the forest watchers belonged to selected villages and had good knowledge and understanding on the medicinal plant species present in the forest, their use and animal diversity. They shared in details about the forest dependency and socio-economic perspective of villagers.

Few years ago, agriculture or farming used to be a major activity in all the villages, but in the recent years, there had been decline in the agricultural practices largely due to human-animal conflict. In some villages, wherever there is a farming activity even at small level, there had been frequent incidences of strayed animals destroying the crops or plants. In the recent years, people from these villages started to move to nearby towns for daily wage work or in tea estate gardens. In some high-altitude regions, local people started to enter into homestay business as there is a demand for ecotourism related activities in the forest neighbourhoods. Apart from that community members very often engaged in collection of medicinal plants, NTFPs like fuelwood, mushrooms, fallen branches, wood for domestic purposes and also for trading in the local markets. Overall, community members consider the forest areas including MPCA areas as resourceful and available for collection and trade. Since there is a protection given by the forest department and also awareness about the need for protecting these forests, community members were not exploitive in nature. Besides that, many of the local community members

from the selected villages in all seven MPCAs had less or no knowledge about the importance of MPCA for medicinal plants conservation.

The responses to questionnaire were analysed and graphs were prepared separately for each village in each MPCA. The interpretations of graphs are provided MPCA-wise below.

5.3.1. Bonnie camp MPCA

Bonnie camp MPCA is located faraway from the human settlements. Two villages namely Ambikanagar and Prubashridharpur were selected as they were the closest villages to Bonnie camp MPCA. For community survey, in Ambikanagar village, 60 households from 265 households (23%) and in Prubashridharpur village, 38 households from 152 families (23%) were selected. In both the villages, females were 55 and 61 percent of respondents in Ambikanagar and Prubashridharpur respectively (Figure 41-42). Since these two villages are far away from MPCA area, villagers had very less knowledge of presence of MPCA (<10 percent in both villages) and also the purpose behind the establishment of MPCA (nearly zero percent) (Figure 41-42). When it comes to their occupation, agriculture farming or grazing was the major source of income to households in these two villages (Figure 41-42). Besides, they engaged in other job works including teaching, ecotourism, etc.

Though the respondents had no idea of MPCA, however 67 and 66 percent of respondents from Ambikanagar and Prubashridharpur villages respectively could agree that forest vegetation have improved in the vicinity of their settlements in the last five years (Figure 41-42). In this case, respondents referred to large forest patches in the Sundarbans which include MPCA area. Villagers were involved in the forest related activities by the forest department (37 and 47 percent in Ambikanagar and Prubashridharpur villages respectively) (Figure 41-42). As expected, respondents from both the villages informed that they received no or less benefits directly from MPCA (Figure 41-42).

Villagers from these villages especially the older generation were aware of medicinal plants available in the forests and also their medicinal uses. They are involved in collection of these medicinal plants, but largely for domestic uses and very few for trading in the local market. The list of medicinal plants and their details are provided (Table 16). The medicinal plants that are collected from forests and sold in the market were common plants and available in large volumes (for e.g., *Andrographis paniculata*, *Clitoria ternatia*, *Alternanthera sessilis*, *Ocimum* spp. etc.).

Figure 41. Responses to questions asked in the questionnaire survey conducted among community members of Ambika nagar village near Bonnie camp MPCA

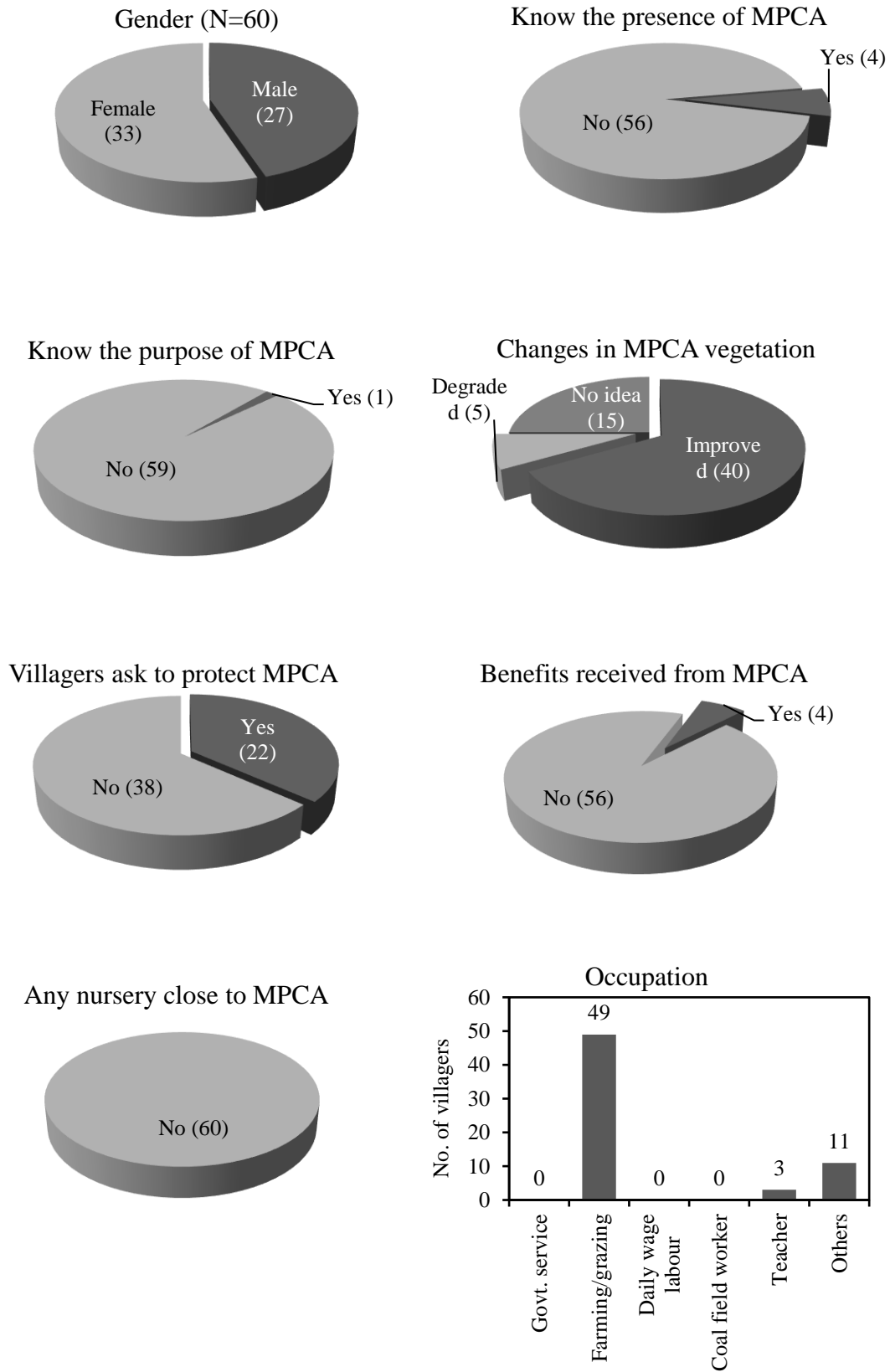


Figure 42. Responses to questions asked in the questionnaire survey conducted among community members of Prubashridharpur village near Bonnie camp MPCA

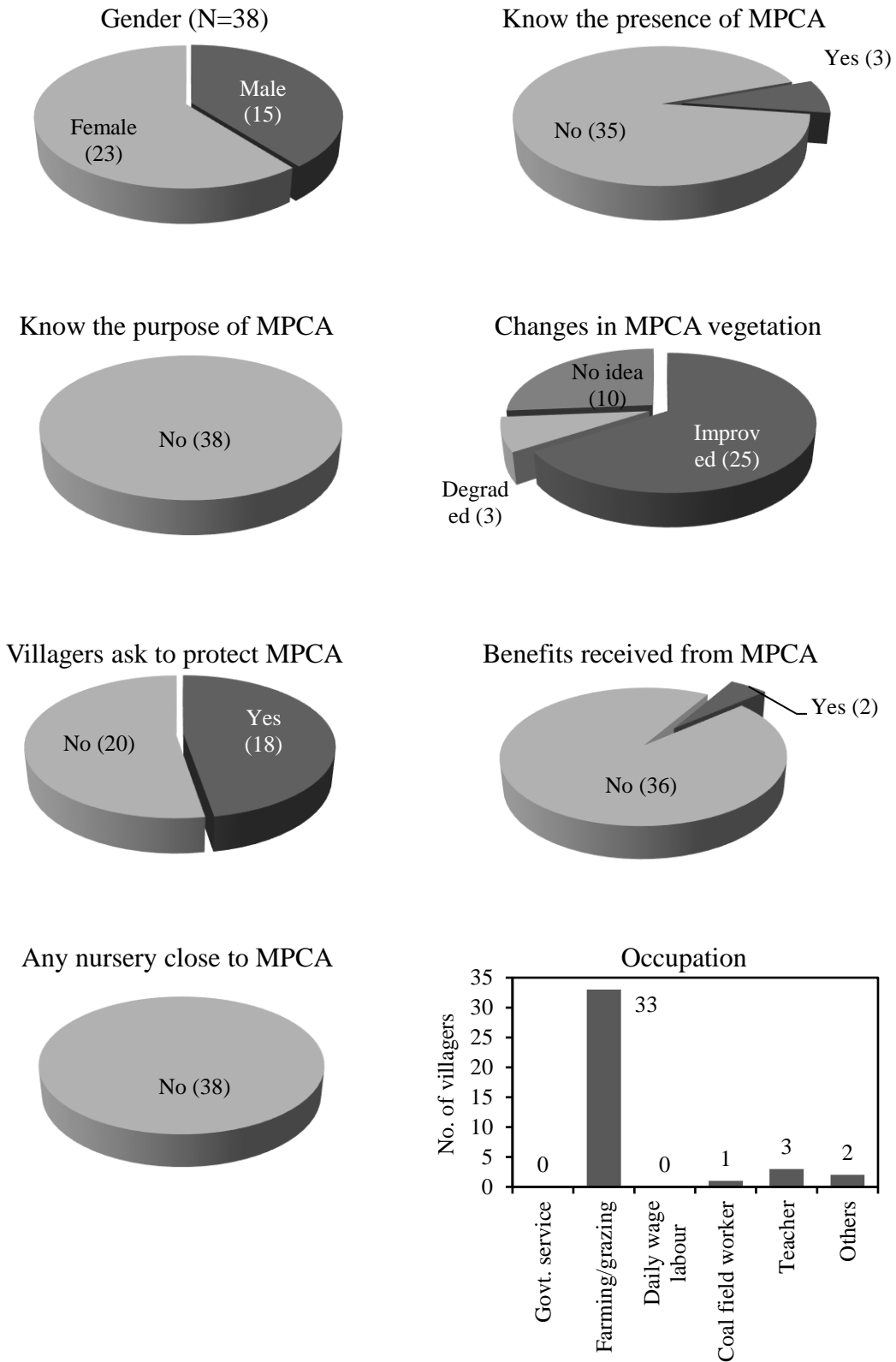


Table 16. Details of medicinal plants collected by villagers in the neighbourhood of Bonnie camp Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Other uses	Quantity collected/day (g)	Price (₹)
1	Goran	<i>Ceriops roxburghiana</i>	used in gastrointestinal problem, blotting and dyspepsia	Bark juice used in fishing net	1000-2000	
2	Gnewa	<i>Excoecaria agallocha</i>	Latex used in cut, fish piercing; bark ash used against skin disease; Bark extract used in anxiety, headaches, insomnia and seizures		100-150	
3	Ora	<i>Sonneratia griffithii</i>	Treatment of injuries, diarrhoea, wound and fever	Carpentry, boat ribs, paddles, window and door frames	250-300	
4	Tora	<i>Aegialitis rotundifolia</i>	Antidote for insect bites and treatment of pains		250-300	
5	Kholsi	<i>Aegiceras corniculatum</i>	Diseases like atherosclerosis, rheumatoid arthritis, asthma	Conserved to get special type of Kholsi Honey	250-300	
6	Kalo Bain	<i>Avicennia alba</i>	Roots used in cut and sore		100-150	
7	Kakra	<i>Bruguiera gymnorhiza</i>	Leaves and roots used to treat diarrhoea, fever, diabetes, and pain		100-150	
8	Horkocha	<i>Acanthus illicifolius</i>	Used in asthma		100-150	
9	Hetal	<i>Phoenix palludosa</i>	The fruit used as a tonic and restorative, and is also used as an analgesic to get relief from backache	Fruits are edible and leaf are used as broom	250-300	
10	Sundari	<i>Heriteria fomes</i>	Root decoction used to treat mouth infection and toothache.	Wood for furniture	100-150	
11	Gorjon	<i>Rhizophora apiculata</i>	Used to treat pain, inflammation and reduce blood glucose level	Wood for furniture	250-300	
12	Dhundul	<i>Xylocarpus granatum</i>	Bark extract used in anxiety, headaches, insomnia and seizures	wood for furniture and fire wood	250-300	
13	Brahmi Sag	<i>Bacopa monnieri</i>	Memory enhancer, reduces blood pressure,		100-150	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Other uses	Quantity collected/day (g)	Price (₹)
14	Chak keora	<i>Sonneratia alba</i>	Fruit mashed and applied in back pain		250-300	
15	Tulsi	<i>Ocimum tenuiflorum</i>	Tulsi and salt - gas relief,		50-100	10/50gm
16	Baen	<i>Avicennia officinalis</i>	The bark is used in rheumatism, paralysis, asthma, dyspepsia, stomach pain, tumours		250-300	
17	Golpata	<i>Nypa fruticans</i>	Shoot juice with coconut milk used for skin disease	Fruit edible; Leaf used for roof making	500-600	40-50/kg
18	Jotanote	<i>Amaranthus viridis</i>	Used in the treatment of fever, asthma, diabetes, dysentery, urinary disorders, liver disorders	As leafy vegetable	100-150	10/250g m
19	Khude kesto	<i>Eclipta alba</i>	Leaves fried and taken with rice for gyno problems		250-300	
20	Khola kuchi	<i>Altenanthera pernaceadas</i>	Good for health; used in treatment of diuretic, cooling, tonic and laxative properties.	As leafy vegetable	250-300	10/250g m
21	Durga phota	<i>Abutilon indicum</i>	Against snake bite - roots with other medicine, fruits used forehead for religious impression for religious purposes		100-150	
22	Matha jota	<i>Xanthium indicum</i>	Tender shoots as vegetables; roots for fish thorn pain		100-150	
23	Dulche modranga	<i>Alternanthera sessilis</i>	Used in treatment of hepatitis, chest problem, tonic and laxative	As leafy vegetable; roots poisonous for cattle	250-300	10/250g m
24	Shiyalmoti / Pede mulo	<i>Blumia lacera</i>	Cattle diarrhoea; roots in human dysentery; leaf juice in bleeding piles,		100-150	
25	Gogon tulsi	<i>Ageratum conizoides</i>	Used as febrifuge against fever, anti-ulcer and wound dressing		100-150	
26	Pati ghas	<i>Cyperus rotundus</i>	Used in diarrhoea, diabetes, inflammation, stomach and bowel disorder	To prepare chatni/ Umbrella	100-150	
27	Bhringraj	<i>Eclipta prostrata</i>	Juice applied for good hair growth and quality		100-150	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Other uses	Quantity collected/day (g)	Price (₹)
28	Thankuni	<i>Centella asiatica</i>	Leaf juice in Stomach problem; diarrhoea and dysentery		50-100	
29	Aloevera	<i>Aloe vera</i>	Juice applied for good hair growth and quality		100-150	
30	Kanchan ghas	<i>Chloris barbata</i>	leaf and mustard oil applied on chest	Used for religious purpose particularly In kalipuja	50-100	
31	Hibiscus	<i>Hibiscus rosa-sinensis</i>	Leaf juice with water eaten orally for disease related to menstruation and keeping body cool		100-150	
32	Mansha pata	<i>Opuntia ficus-indica</i>	Leaves in cough and cold		250-300	
33	Safila (Salook)	<i>Nymphaea nouchali</i>	Used to improve the digestion process	Used as vegetable; dried and roasted seeds edible	250-300	20/500g m
34	Porgacha fern	<i>Asplenium nidus</i>	leaf juice used against blotting of cattle stomach; labour pain and fever		100-150	
35	Durba	<i>Cynodon dactylon</i>	Used in dysentery		50-100	
36	Paresh gach	<i>Thespesia poperlaria</i>	Fruits as garland and kept on surrounding haed for headache		250-300	
37	Mot goran	<i>Ceriops tagal</i>	Fruit against diabetic		100-150	
38	Papaya	<i>Carica papaya</i>	Latex taken with sugar and batasha (sugar cake) against dysentery		50-100	
39	Pulm	<i>Borassus flabellifer</i>	Leaf used in making chatai (chatai), leaf stock juice applied externally for mumps		100-150	
40	Babla	<i>Acacia nilotica</i>	Gum used in Fishing net and boat hole, against acidity		50-100	
41	Siuli	<i>Nyctanthes arbor-tristis</i>	Leaf juice used for fever		100-150	
42	Arjun tree	<i>Terminalia arjuna</i>	Bark used for stomach disorder and heart problem		400-500	10/100g m
43	Kathali kola	<i>Musa paradisiaca</i>	Roots boiled and orally taken for dysentery		1000-1500	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Other uses	Quantity collected/day (g)	Price (₹)
44	Harbhanga gach	<i>Cissus quadrangularis</i>	To set bones and fracture		100-150	
45	Ulat kombili	<i>Abroma augusta</i>	Pre-soaked seeds used for keeping body cool		50-100	
46	Chinigura	<i>Scoperia dulcis</i>	Leaf juice is taken orally against fever		50-100	
47	kalomegh	<i>Andrographis paniculata</i>	Leaf juice against jaundice and liver problem		50-100	40/50gm
48	Beradudhi/sag	<i>Euphorbia hirta</i>	Used against stomach ulcer; astringent, bowel complaint	Used as vegetable	100-150	10/250gm
49	Tridhara	<i>Tridax procumbens</i>	Leaf juice is useful against parasitic infestation, worms		100-150	
50	Aparajita	<i>Clitoria ternatea</i>	Flower juice with milk given to children against cough and cold; seeds as purgative and roots against ulcer, dysentery		50-100	10/50gm
51	Chitrak	<i>Plumbago zeylanica</i>	Root used for high fever		50-100	
52	Bon Begun	<i>Solanum indicum</i>	Fruits in tooth and gum problem		50-100	
53	Ora	<i>Sonneratia caseolaris</i>	Fruits used in treatment of worms	Fruits edible	250-300	
54	Goran	<i>Heritiera fomes</i>	Used in treatment of hepatic disorder and diabetic and skin problem		100-150	
55	Malia	<i>Cyperus bulbosus</i>	Used as astringent, diuretic, tonic and antibacterial.	Used as thatch	100-150	
56	Hogla	<i>Typha elephantina</i>	Used in boils, wounds, burns and bacterial infections		100-150	
57	Keora	<i>Sonneratia apetala</i>	The leaves juice used in hepatitis, dysentery, sprains and bruises & open sores	Fruits edible	250-300	
58	Ora	<i>Sonneratia caseolaris</i>	Semi matured fruits are used in treatment of coughs; fruits used to make poultice; matured fruit skin used for worms and pounded fruits in small pox.	Edible fruits	250-300	

5.3.2. Dhotrey MPCA

In Dhotrey, three villages namely Dhotrey forest village (Nearest), Chota hatta village (Nearest) and Sellempong forest village (Farthest) were selected for the survey based on the criteria of nearest and farthest around 2 km radius from MPCA. Out of 205 households in the 3 selected villages/hemlets, a total of 55 with 26 households in Dhotrey village, 5 households in Sellempong village and 24 households in Chotahatta village were selected for conducting the survey. The survey covered 26.8% of total households in three selected villages. Of the total respondents, 57% were male and 43% females. The number of male respondents was 50, 60 and 63 percent respectively in Dhotrey, Sellempong and Chotahatta village (Figure 43-45).

For local community members from three selected villages, farming and grazing was the primary occupation (Figure 43-45). However, people also engaged in various other occupations such as homestay business, collection of NTFPs, medicinal plants and working as tourist guides, etc. They could earn good income from homestay business. Govt. employees were present only in Dhotrey village (2 respondents). Village-wise analysis showed that people had animal-based economy and farming in all three villages.

On assessing the understanding and engagement of the local community members in the monitoring and mangement of MPCA, it was observed that people were less aware of the existence of MPCA in their vicinity (54, 40 25 percent in Dhotrey, Sellempong and Chotahatta villages respectively) (Figure 43-45). Further, only 4 to 12% of them were aware of the year of notification, establishment of the MPCA and the very purpose of establishing MPCA in their area. In Sellempong village, none of the respondents were having the above knowledge about MPCA. Nevertheless, people in Dhotrey village are comparatively having better knowledge of the presence of MPCAs and its purpose as this village is located adjacent to MPCA. Further, it was noticed that female respondents had very little idea about the existence of MPCA. The detailed discussions with the respondents who are aware of the MPCA revealed that they were directly involved in the MPCA related activities such as the Village Headman (mandol) and Forest Daily wage Labours (DL).

The respondents shared the information about various medicinal plants available in the surrounding forests including MPCA and details of their usual collection. The details of medicinal plants collected by community members from three villages in the neighbourhood of Dhotrey MPCA is presented (Table 17a,b,c). Around 41 medicinal plants were collected by the community membets of Dhotrey village, while people from Sellempong and Chotahatti

villages gathered 29 and 30 medicinal plants respectively. Most of these plants are commonly found in the forests and collected largely for domestic purposes and not for commercial sale. Hence, the quantity collected was only in minimum volumes. Though most of the plants collected were common to all three villages, however there were few unique medicinal plants available in few locations and collected for specific purposes that are known to few people in the village. The purpose for which these plants collected especially for medicinal use was documented.

When they were asked whether the status of the forest inside the MPCA has improved over the last 5 years, on an average 36 percent of the respondents from the three villages around Dhotrey MPCA gave a positive response and remaining 63 percent did not have any understanding. However, 1 percent informed about the degradation of the forest. Overall, most respondents (60-65 percent) of the villages had no idea about the changes and the overall status of vegetation and medicinal plant population in the MPCA area in the last 5 years (Figure 43-45). The involvement of community in the conservation and development of MPCA seemed fairly low. People of these villages were asked whether the Forest Department in any time in the past requested their village to protect the MPCAs. Around 60 to 96 percent of respondents informed that they were not asked by the Forest Department to protect the MPCA (Figure 43-45).

Responding to the question on the benefits derived from the MPCA, only 4 percent respondents from Chotahatta village received any benefits, while 20 to 23 percent of people respectively from Sellempong and Dhotrey were benefited. Benefits were largely from the eco-tourism related activities and the domestic use of various medicinal plants among the local people. However, the reaping of benefits was not confined to MPCA area, but from the entire forest areas. According to Dhotrey village people, there used to be a regular practice of wild collection and trade of medicinal plants from forest areas around 7 to 8 years back. The respondents gave a 100% negative response to their knowledge of the existence of any nursery attached to the MPCAs in all the three villages situated around the MPCAs.

Figure 43. Responses to questions asked in the questionnaire survey conducted among community members of Dhotrey village near Dhotrey MPCA

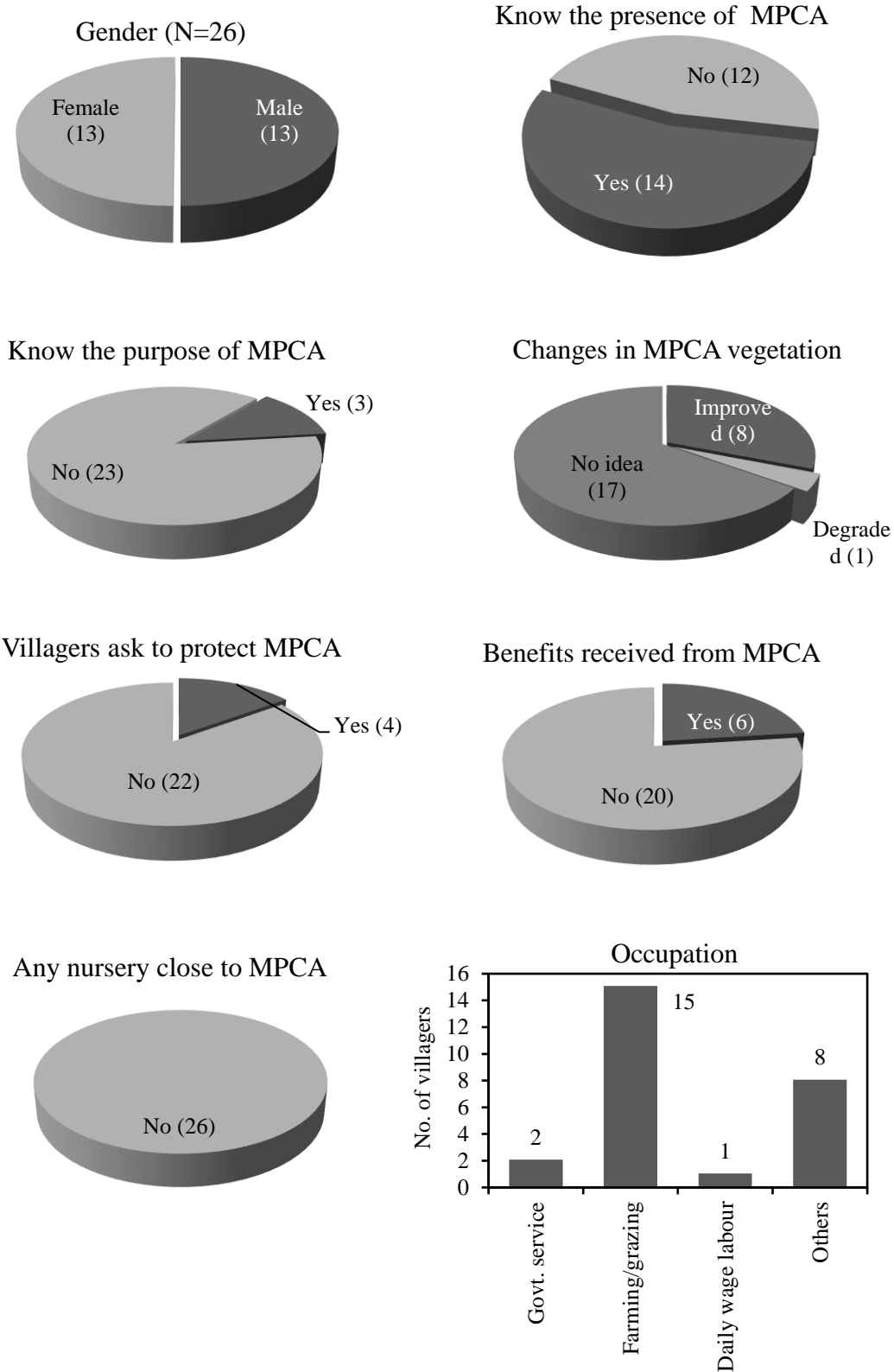


Figure 44. Responses to questions asked in the questionnaire survey conducted among community members of Sellempong village near Dhotrey MPCA

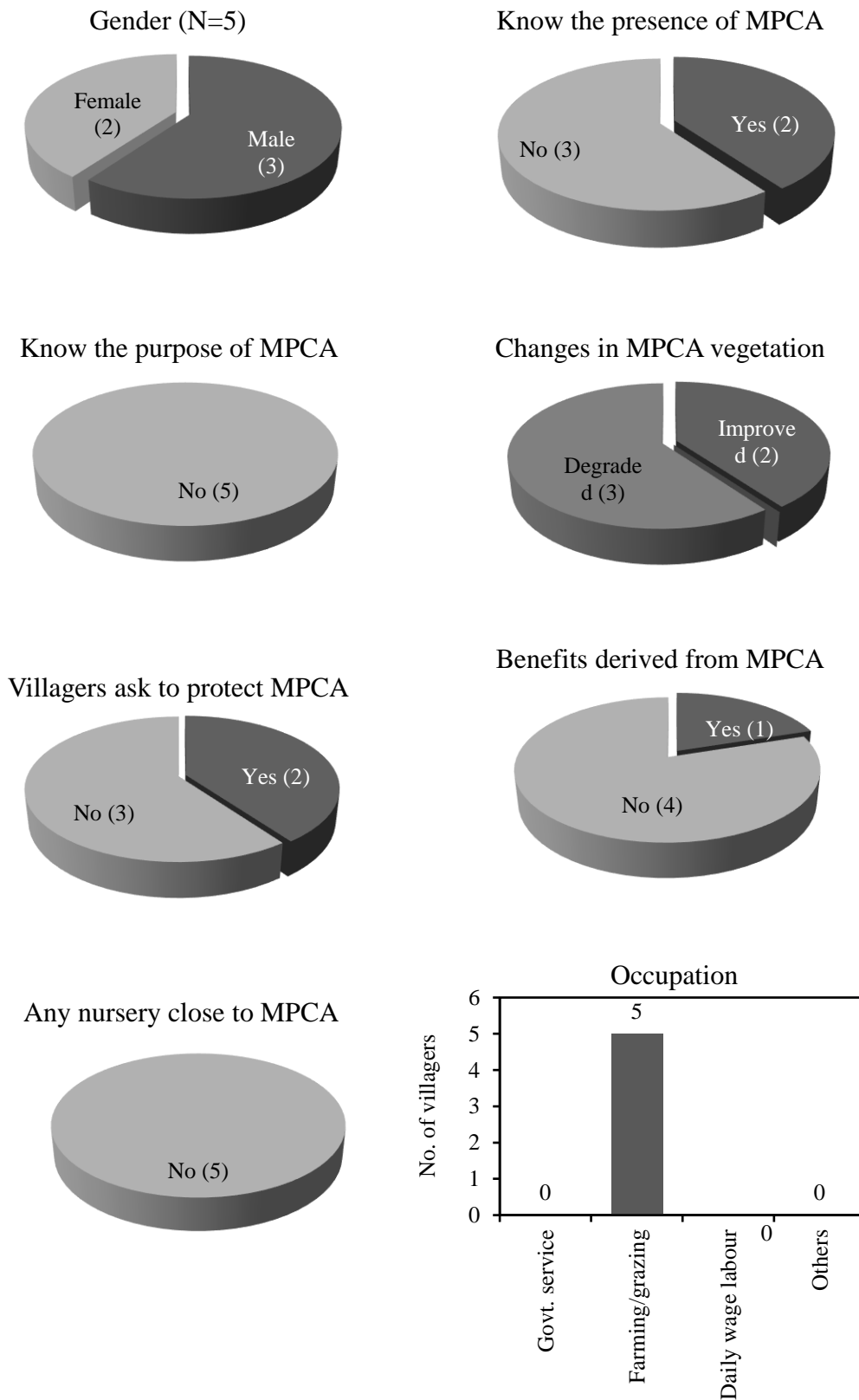


Figure 45. Responses to questions asked in the questionnaire survey conducted among community members of Chotahatta village near Dhotrey MPCA

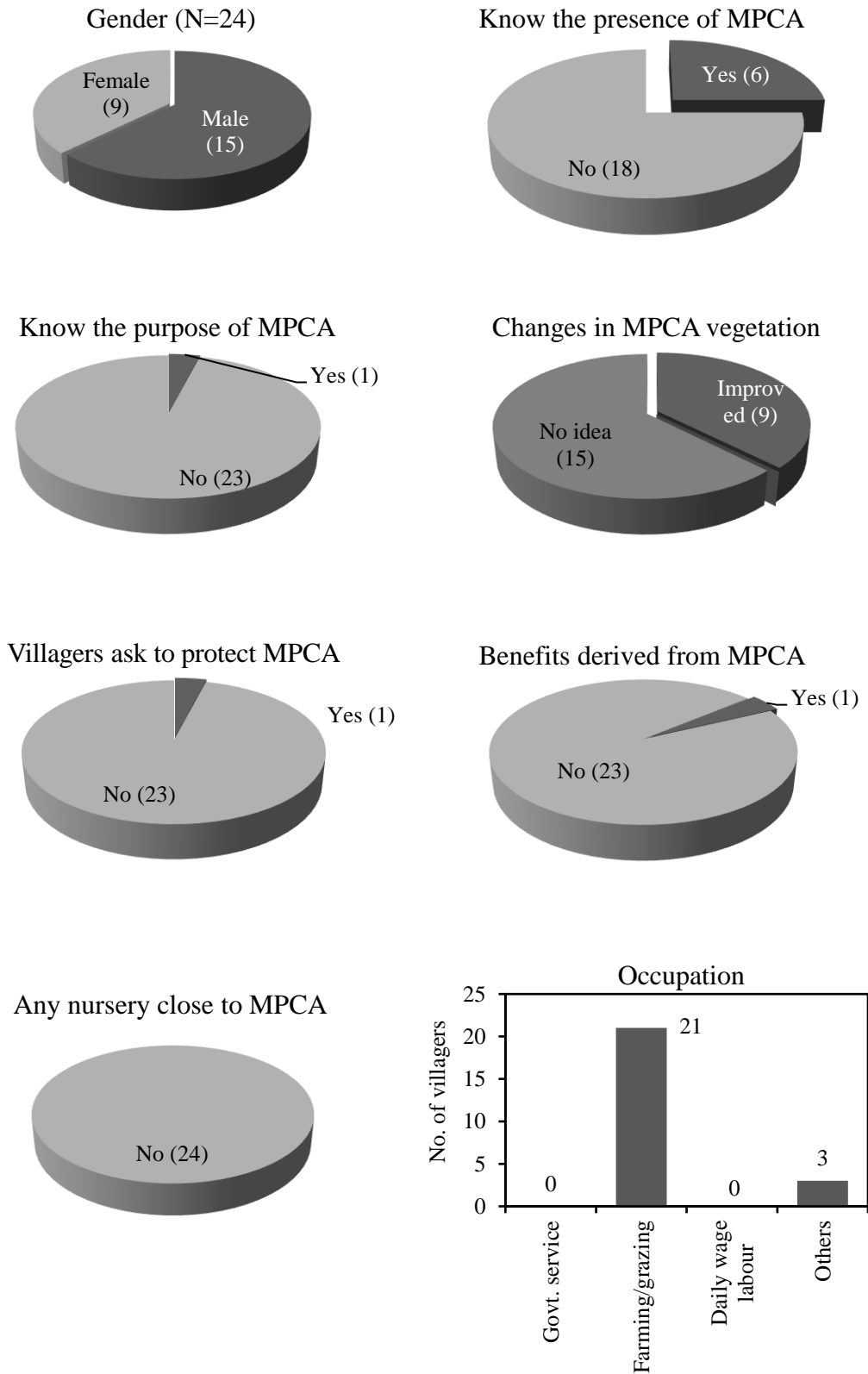


Table 17a. Details of medicinal plants collected by Dhotrey villagers in the neighbourhood of Dhotrey Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Chharreya salla	<i>Abies densa</i>	Leaves powder in urinary infection, epilepsy	Commonly found in the surrounding forest	0.7-0.8
2	Bojo/Boch	<i>Acorus calamus</i>	Root in sore and wound; Roots in skin disease and itching	Less common in the forest	0.4-0.5
3	Thekiphal	<i>Actinidia callosa</i>	Fruits used to prepare local drinks used for cough and cold; used against asthma and in dysentery; fruits eaten by Red panda	Commonly found in the surrounding forest	0.4-0.5
4	Tite pat	<i>Artemisia vulgaris</i>	Leaves in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Commonly found in the surrounding forest	0.15-0.2
5	Malingo	<i>Arundinaria maling</i>	Shoots eaten in stomach pain and ulcer	Commonly found in the surrounding forest	0.5-0.8
6	Buro Ukhoti/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; Strengthen gum; root mixed with ghee and butter and given to mother after delivery; body pain; Roots in diarrhoea and dysentery	Commonly found in the surrounding forest	0.2-0.3
7	Kesari	<i>Berberis aristata</i>	Leaves in diabetic problem; barks used in jaundice	Less common in the forest ; traded earlier	0.3-0.4
8	Pinase Lahara	<i>Clematis acuminata</i>	Roots used in sinusitis	Commonly found in the surrounding forest	0.1-0.2
9	Lokhoti	<i>Daphne bholua</i>	Barks used as decoction against constipation	Commonly found in the surrounding forest	0.1-0.2
10	Avijalo/Lahare jhar	<i>Drymaria cordata</i>	Antiseptic and throat pain; in sinus problem	Commonly found in the surrounding open area	0.15-0.2
11	Kukure jhar	<i>Equisetum sp.</i>	Roots given for kidney problem	Commonly found in the forest	0.1-0.2

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
12	Bonmara/kalijhar	<i>Eupatorium odoratum</i>	Leaves as antiseptic; used in cut and wound	Abundant in the roadside and fragmented area	0.15-0.2
13	Khanakpa	<i>Evodia lunu-ankenda</i>	Bark used in Kidney problem; fruits used in gastritis, cough, fever and body ache	Less common in the forest	0.4-0.5
14	Kakmala	<i>Hemiphragma heterophyllum</i>	Roots and fruits in tonsillitis	Commonly found in the forest	0.1-0.15
15	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Less common in the forest; some time sold in local market	0.2-0.3
16	Gole Patta/Atani jhar/ Gore thapray	<i>Hydrocotyle asiatica</i>	Leaves in tonsillitis and sore throat	Abundant in the roadside and fragmented area	0.1-0.2
17	Okkhor	<i>Juglense regia</i>	Used in enhancing memory and for good health	Less common in the forest	0.4-0.5
18	Sil Timur	<i>Litsea citrata</i>	In cattle blotting symptoms; mixed with chimphing, khanakpa fruits; used in cough, fever, body ache; sore throat	Less common in the forest	0.26-0.3
19	Angeri	<i>Lyonia ovalifolia</i>	Leaves applied for skin disease and itching	Abundant in the forest	0.4-0.5
20	Chutro	<i>Mahonia acanthifolia</i>	Roots used in kidney and diabetic problem; also used in fever, joint pain and throat pain	Less common in the forest; traded earlier	0.3-0.4
21	Simrayo	<i>Nasturium officinale</i>	Leaves boiled and given in T.B. and chest pain; in jaundice; leaf juice given in tuberculosis	Commonly found with the streams	0.25-0.3
22	Chari Amilo	<i>Oxalis acitocella</i>	Leaves in dysentery	Commonly found on the road side and fragmented area	0.05-0.1
23	Salaney	<i>Panax-pseudo ginseng</i>	Rhizome in good health and aphrodisiac	Rare in the forest due to unsustainable collection; traded earlier	0.5-0.2

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
24	Satwa	<i>Paris polyphylla</i>	Roots used as antidotes; for treatment of boil	Less common in the forest; traded earlier	0.2-0.3
25	Kaunlo	<i>Persea fructifera</i>	Fruits edible and aphrodisiac	Less common in the forest	0.5-0.8
26	Nashejhar	<i>Plantago erosa</i>	Applied in cut and wound	Abundant in the forest	0.15-0.2
27	Mulajhar	<i>Potentilla polyphylla</i>	Roots used in diarrhoea; root paste in burn and skin damage	Abundant in the forest	0.15-0.3
28	Gaikhure Unew	<i>Pteris excelsa</i>	Fruits given in bone fracture	Commonly found in the forest	0.15-0.3
29	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest	0.3-1.5
30	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest; traded earlier	0.3-0.4
31	Holholay	<i>Rumax nepalensis</i>	Roots used in Jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice and liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
32	Chinday	<i>Schefflera impressa</i>	Young shoots, barks boiled and given for kidney and urinary trouble	Less common in the forest	0.3-0.5
33	Kukurdani	<i>Smilax elegans</i>	Roots powder used in joint pain	Less common in the forest; traded earlier	0.15-0.2
34	Tenga	<i>Sorbus vestita</i>	Fruits used in respiratory problems; improves digestion	Less common in the forest	0.1-0.25
35	Tambarke	<i>Stephania hernandifolia</i>	The tuber is used against bird flu and chicken disease	Less common in the forest; some time sold in the local market	0.3-0.5
36	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fever	Commonly found in the forest in patches; traded earlier	0.15-0.2
37	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the	0.7-0.8

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
				forest due to large scale trade in the past; traded earlier	
38	Chitray	<i>Thalictrum foliolosum</i>	Roots used in dyspepsia, stomach ache and ulcer	Less common in the forest; traded earlier	0.15-0.2
39	Harchur	<i>Viscum articulatum</i>	Used in bone fracture and back pain; mixed with egg, mouri, honey, milk, mishri and Bergenia	Rare in the forest due to unsustainable collection; sometime sold in the local market	0.1-0.15
40	Boke Timur	<i>Zanthoxylum alatum</i>	Fruits used in headache and anti-gastritis; fruits in leach repellent	Less common in the forest; sometime sold in the local market	0.2-0.3
41	Timbur	<i>Zanthoxylum oxyphyllum</i>	Used in sore throat, cough and cold	Less common in the forest	0.1-0.2

Table 17b. Details of medicinal plants collected by Sellempong villagers in the neighbourhood of Dhotrey Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Bojo/Boch	<i>Acorus calamus</i>	Root in sore and wound; Roots in skin disease and itching	Less common in the forest; traded earlier	0.4-0.5
2	Thekiphal	<i>Actinidia callosa</i>	Fruits used to prepare local drinks used for cough and cold; used against asthma and in dysentery; fruits eaten by Red panda	Commonly found in the surrounding forest	0.4-0.5
3	Tite pat	<i>Artemisia vulgaris</i>	Leaves in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Commonly found in the surrounding forest	0.15-0.2
4	Malingo	<i>Arundinaria maling</i>	Shoots eaten in stomach pain and ulcer	Commonly found in the surrounding forest; shoots	0.5-0.8

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
				sold in local market; bamboo sold in bundles	
5	Buro Ukhoti/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; Strengthen gum; root mixed with ghee and butter and given to mother after delivery; body pain; Roots in diarrhoea and dysentery	Commonly found in the surrounding forest	0.2-0.3
6	Pinase Lahara	<i>Clematis acuminata</i>	Roots used in sinusitis	Commonly found in the surrounding forest	0.1-0.2
7	Avijalo/Lahare jhar	<i>Drymaria cordata</i>	Antiseptic and throat pain; in sinus problem	Commonly found in the surrounding open area	0.15-0.2
8	Bonmara/kalijhar	<i>Eupatorium odoratum</i>	Leaves as antiseptic; used in cut and wound	Abundant in the roadside and fragmented area	0.15-0.2
9	Khanakpa	<i>Evodia lunu-ankenda</i>	Bark used in Kidney problem; fruits used in gastritis, cough, fever and body ache	Less common in the forest	0.4-0.5
10	Kakmala	<i>Hemiphragma heterophyllum</i>	Roots and fruits in tonsillitis	Commonly found in the forest	0.1-0.15
11	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Less common in the forest	0.2-0.3
12	Gole Patta/Atani jhar/ Gore thapray	<i>Hydrocotyle asiatica</i>	Leaves in tonsillitis and sore throat	Abundant in the roadside and fragmented area	0.1-0.2
13	Sil Timur	<i>Litsea citrata</i>	In cattle blotting symptoms; mixed with chimphing, khanakpa fruits; used in cough, fever, body ache; sore throat	Less common in the forest	0.26-0.3
14	Chutro	<i>Mahonia acanthifolia</i>	Roots used in kidney and diabetic problem; also used in fever, joint pain and throat pain	Less common in the forest	0.3-0.4

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
15	Salaney	<i>Panax-pseudo ginseng</i>	Rhizome in good health and aphrodisiac	Rare in the forest due to unsustainable collection; traded earlier	0.05-0.2
16	Satwa	<i>Paris polyphylla</i>	Roots used as antidotes; for treatment of boil	Less common in the forest; traded earlier	0.2-0.3
17	Nashejhar	<i>Plantago erosa</i>	Applied in cut and wound	Abundant in the forest	0.15-0.2
18	Gaikhure Unew	<i>Pteris excelsa</i>	Fruits given in bone fracture	Commonly found in the forest	0.15-0.3
19	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest	0.3-1.
20	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest; traded earlier	0.3-0.4
21	Holholay	<i>Rumax nepalensis</i>	Roots used in Jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice and liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
22	Chinday	<i>Schefflera impressa</i>	Young shoots, barks boiled and given for kidney and urinary trouble	Less common in the forest	0.3-0.5
23	Kukurdani	<i>Smilax elegans</i>	Roots powder used in joint pain	Less common in the forest; traded earlier	0.15-0.2
24	Tambarke	<i>Stephania hernandifolia</i>	The tuber is used against bird flu and chicken disease	Less common in the forest	0.3-0.5
25	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fever	Commonly found in the forest in patches; traded earlier	0.15-0.2
26	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the forest due to large scale trade in the past; traded earlier	0.7-0.8
27	Harchur	<i>Viscum articulatum</i>	Used in bone fracture and back pain; mixed with egg, mouri, honey, milk, mishri and Bergenia	Rare in the forest due to unsustainable collection	0.1-0.15

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
28	Boke Timur	<i>Zanthoxylum alatum</i>	Fruits used in headache and anti-gastritis; fruits in leach repellent	Less common in the forest	0.2-0.3
29	Timbur	<i>Zanthoxylum oxyphyllum</i>	Used in sore throat, cough and cold	Less common in the forest	0.1-0.2

Table 17c. Details of medicinal plants collected by Chotahatta villagers in the neighbourhood of Dhotrey Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Bojo/Boch	<i>Acorus calamus</i>	Root in sore and wound; Roots in skin disease and itching	Less common in the forest	0.4-0.5
2	Tite pat	<i>Artemisia vulgaris</i>	Leaves in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Commonly found in the surrounding forest	0.15-0.2
3	Malingo	<i>Arundinaria maling</i>	Shoots eaten in stomach pain and ulcer	Commonly found in the surrounding forest	0.5-0.8
4	Buro Ukhoti/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; Strengthen gum; root mixed with ghee and butter and given to mother after delivery; body pain; Roots in diarrhoea and dysentery	Commonly found in the surrounding forest	0.2-0.3
5	Pinase Lahara	<i>Clematis acuminata</i>	Roots used in sinusitis	Commonly found in the surrounding forest	0.1-0.2
6	Avijalo/Lahare jhar	<i>Drymaria cordata</i>	Antiseptic and throat pain; in sinus problem	Commonly found in the surrounding open area	0.15-0.2
7	Bonmara/kalijhar	<i>Eupatorium odoratum</i>	Leaves as antiseptic; used in cut and wound	Abundant in the roadside and fragmented area	0.15-0.2
8	Khanakpa	<i>Evodia lunu-ankenda</i>	Bark used in Kidney problem; fruits used in gastritis, cough, fever and body ache	Less common in the forest	0.4-0.5
9	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis,	Less common in the forest	0.2-0.3

Community' understanding of medicinal plants & MPCAs

			body pain; fruits in high altitude sickness and acidity		
10	Gole Patta/Atani jhar/ Gore thapray	<i>Hydrocotyle asiatica</i>	Leaves in tonsillitis and sore throat	Abundant in the roadside and fragmented area	0.1-0.2
11	Okkhor	<i>Juglense regia</i>	Used in enhancing memory and for good health	Less common in the forest	0.4-0.5
12	Sil Timur	<i>Litsea citrata</i>	In cattle blotting symptoms; mixed with chimphing, khanakpa fruits; used in cough, fever, body ache; sore throat	Less common in the forest	0.26-0.3
13	Chutro	<i>Mahonia acanthifolia</i>	Roots used in kidney and diabetic problem; also used in fever, joint pain and throat pain	Less common in the forest	0.3-0.4
14	Chari Amilo	<i>Oxalis acitocella</i>	Leaves in dysentery	Commonly found on the road side and fragmented area	0.05-0.1
15	Salaney	<i>Panax-pseudo ginseng</i>	Rhizome in good health and aphrodisiac	Rare in the forest due to unsustainable collection	0.05-0.2
16	Satwa	<i>Paris polyphylla</i>	Roots used as antidotes; for treatment of boil	Less common in the forest	0.2-0.3
17	Kaunlo	<i>Persea fructifera</i>	Fruits edible and aphrodisiac	Less common in the forest	0.5-0.8
18	Nashejhar	<i>Plantago erosa</i>	Applied in cut and wound	Abundant in the forest	0.15-0.2
19	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest	0.3-1.5
20	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest	0.3-0.4
21	Holholay	<i>Rumax nepalensis</i>	Roots used in Jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice and liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
22	Chinday	<i>Schefflera impressa</i>	Young shoots, barks boiled and given for kidney and urinary trouble	Less common in the forest	0.3-0.5
23	Kukurdani	<i>Smilax elegans</i>	Roots powder used in joint pain	Less common in the forest	0.15-0.2

Community' understanding of medicinal plants & MPCAs

24	Tenga	<i>Sorbus vestita</i>	Fruits used in respiratory problems; improves digestion	Less common in the forest	0.1-0.25
25	Tambarke	<i>Stephania hernandifolia</i>	The tuber is used against bird flu and chicken disease	Less common in the forest	0.3-0.5
26	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fiver	Commonly found in the forest in patches	0.15-0.2
27	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the forest due to large scale trade in the past.	0.7-0.8
28	Harchur	<i>Viscum articulatum</i>	Used in bone fracture and back pain; mixed with egg, mouri, honey, milk, mishri and Bergenia	Rare in the forest due to unsustainable collection	0.1-0.15
29	Boke Timur	<i>Zanthoxylum alatum</i>	Fruits used in headache and anti-gastritis; fruits in leach repellent	Less common in the forest	0.2-0.3
30	Timbur	<i>Zanthoxylum oxyphyllum</i>	Used in sore throat, cough and cold	Less common in the forest	0.1-0.2

5.3.3. Garpanchkot MPCA

Garpanchkot MPCA is located in the Panchet hill. There is a huge earthen dam constructed around 3-4 km away from the foothill region of Panchet. Many of the villages that are now submerged under the water of the Panchet Dam (also locally known as DVC dam or Damodar Vally Corporation Dam) in Purulia were resettled around this MPCA. Therefore, the demand for natural resources particularly forestry-based resources for e.g., fuel wood, timber, medicinal plants, wild fruits and other NTFPs, became high among the villagers. Fishing from the DVC Panchet dam is also one of the important sources of income for the local communities. Most of the villages are inhabited by the Santhal community (ST), while there are many other communities such as Scheduled Caste (SC) and Other Backward Caste (OBC) including Brahmin communities present in those villages. Three villages were identified for the survey based on the distance from the MPCA. Villages were selected keeping the criteria of nearest and farthest around 2 km radius from MPCA. Forest villages selected for the community survey were Bagmara (closest), Siulibari and Rampur (farthest).

A total of 140 households in three villages were selected for conducting the survey which is around 42 percent of total households. The population sample for the survey included various age groups of respondents covering young (0-30 years), adult (30-50 years) and old generation (50-100 years). The emphasis was given to cover respondents from different professional background such as farmers, traditional healers/ kabiraj, govt. workers, teachers, students and others. Special emphasis was given on gender aspect. Stratified sampling method with a semistructured questionnaire format was used to gather the required information. Of the total respondents, about 65% were male and 35% females (Figure 46-48). Village-wise proportion of male respondents was 75, 86 and 57 percent respectively in Bagmara, Rampur and Shiulbari villages. Of the total respondents, farming was found to be the main occupation followed by fishing and employment in coal mining sector, in hotels in Jharkhand state, in tourist lodge, daily workers and various other occupations (Figure 46-48).

In general, it was observed that people were not aware of the purpose for which MPCA was established in their neighbourhood forests, though more than 80 percent of people from three villages know its presence (Figure 46-48). As most of the respondents did not know the purpose of MPCA, they could not inform much about the status of MPCA whether the density of the plants increased over the year or availability of animal diversity enhanced, etc. Nevertheless, they could share the information about various medicinal plants collected from this forest and

also few medicinal plants those are traded from that area (Table 18). Medicinal plants collected from three villages were combined and presented with local names, medicinal uses and approximate quantity collected (Table 18). There were 58 medicinal plants were gathered from three villages together. Local community members visit MPCA and the surrounding areas for the collection of fuel wood, fodder, medicinal plants, various other NTFPs and for recreational purposes. Though these plants are largely collected for domestic uses, some of them are traded in the local market in small quantities. It was noticed that there has been a gradual decline of traditional knowledge on medicinal plants among community members. Out of 58 medicinal plants, a total of 17 species has been recorded for their trade. The trade of some of these species are restricted to the local markets only. Furthermore, there were only few folk healers left in the community, while the younger generation is not showing any interest in the oral transfer of

Women are the major stakeholders in the utilization of forest resources as they are depending on forests on a daily basis especially for the collection of fuel wood and sal leaves from surrounding forest areas. **Dr. Biswarupa Ghosh**, one of the team members, managed the focus group discussions especially with women, and shared her understanding about community' dependence on forest resources. Following are her observations: many of the households in Bauri para and Mallick para in Rampur village are land less and they are working as daily wage labourers in others cultivated land. They are much dependent on forest resources for their household consumption. Unless and until there is an alternate livelihood option provided to such families, who were displaced during the construction of the Panchet Dam, conservation of medicinal plants would remain a challenge.

Dr. Ghosh also observed that "Quacks" locally known as Ojhas were still predominant traditional healers of the area. They still treat snake bite with chantings without any medicines. Unfortunately, non of the villagers had the knowledge of availability of medicines for snake bite. Interestingly, the knowledge of medicine can still improve the status of a person among rural communities as it was observed during the discussion with Mrs Sarbori Mahato (name changed), who heals through prayers and some medicinal concoctions. She reported that after receiving powers and blessings from Goddess Manasha, her health and personal relationship with her husband, his family and the community improved substantially. She now earns around Rs 2000-3000/- per month through her role as a religious healer.

traditional knowledge. There were only five traditional healers found across three villages, of which there was a woman from Bagmara village.

Only 2% women of the age group from 50 to 60 years had the knowledge about plants used in treating gynaecological problems. Many respondents expressed their interests for arranging number of training programs on the medicinal uses of plants available in Garpanchkot targeting younger generation. For better management of MPCA, all respondents agreed that there is a greater need for creating awareness among villagers and the labelling of medicinal plants with their use to encourage local people to conserve and protect.

Around two third of respondents in all three villages opined that the population of medicinal plants in MPCA forest area have improved in the last five years (Figure 46-48), while remaining proportion of people observed the degradation of plant population within MPCA. Nearly half of the respondents agreed that they have been involved in the MPCA related activities by the forest department (Figure 46-48). The proportion of respondents acknowledged about the benefits received from MPCA was 36, 38 and 44 percent respectively in Bagmara, Rampur and Shiulibari villages. Villagers were not aware of any nurseries present close to MPCA.

In response to question related to medicinal plant species trade, majority of the respondents informed that there used to be very intensive trade few years back and now it is limited to only few species such as *Paederia foetida* locally kown as Gundhailpata, *Hygrophylla spinosa* locally known as Quilaykhara, *Terminalia chebula*, *Aegle mermelos*, *Azadirachta indica*, *Centella asiatica*, *Andrographis paniculata*, *Hollarrhena antidysenterica*, *Asperagus racemosus*, *Aristolochia indica* and *Oroxylum indicum*. Among these species, following species are exclusively sold in the local market: the leaves of *Azadirachta indica*, *Centella asiatica*, *Hygrophylla spinosa*.

Figure 46. Responses to questions asked in the questionnaire survey conducted among community members of Bagmara village near Garpanchkot MPCA

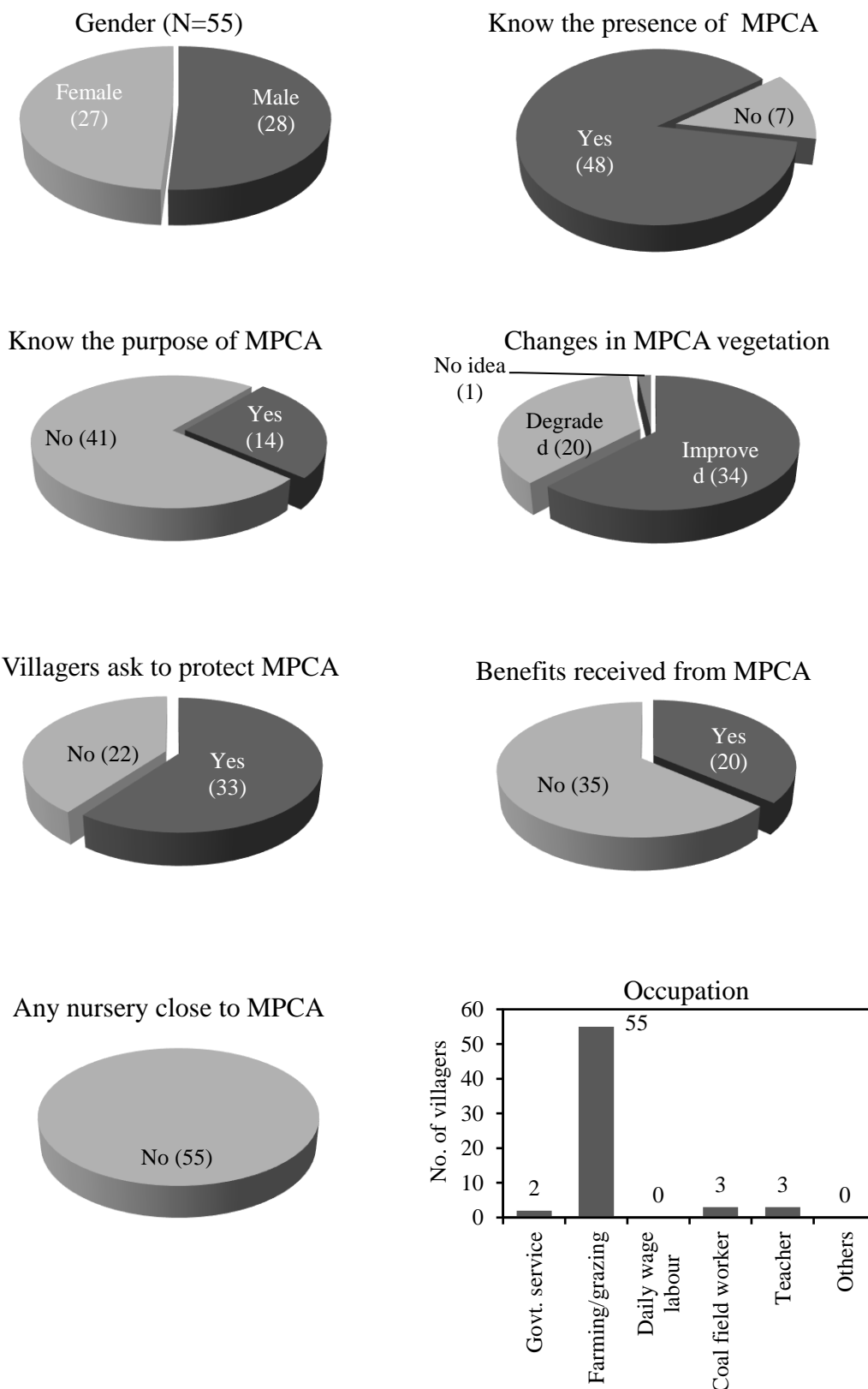


Figure 47. Responses to questions asked in the questionnaire survey conducted among community members of Rampur village near Garpanchkot MPCA

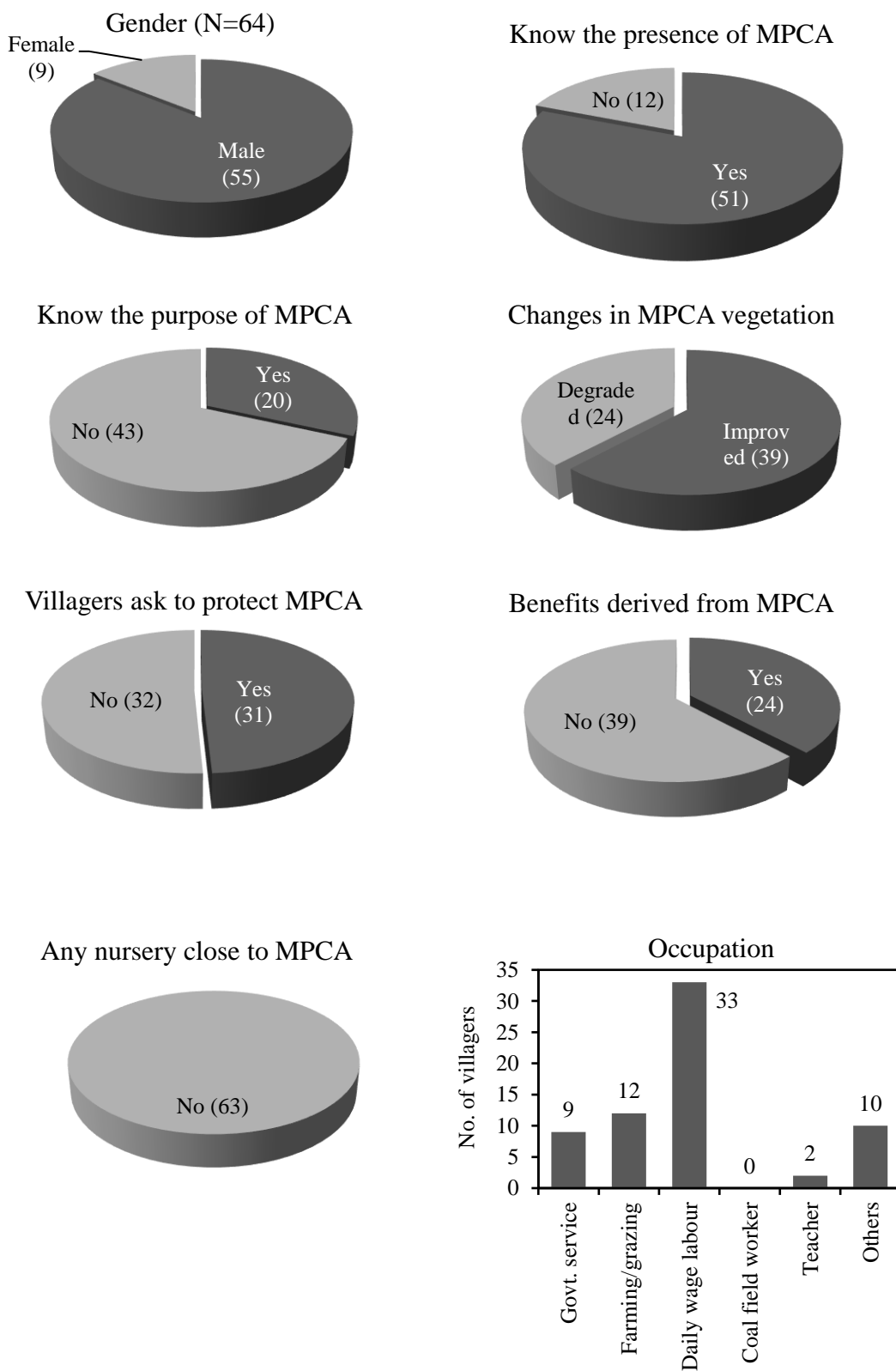


Figure 48. Responses to questions asked in the questionnaire survey conducted among community members of Shiulibari village near Garpanchkot MPCA

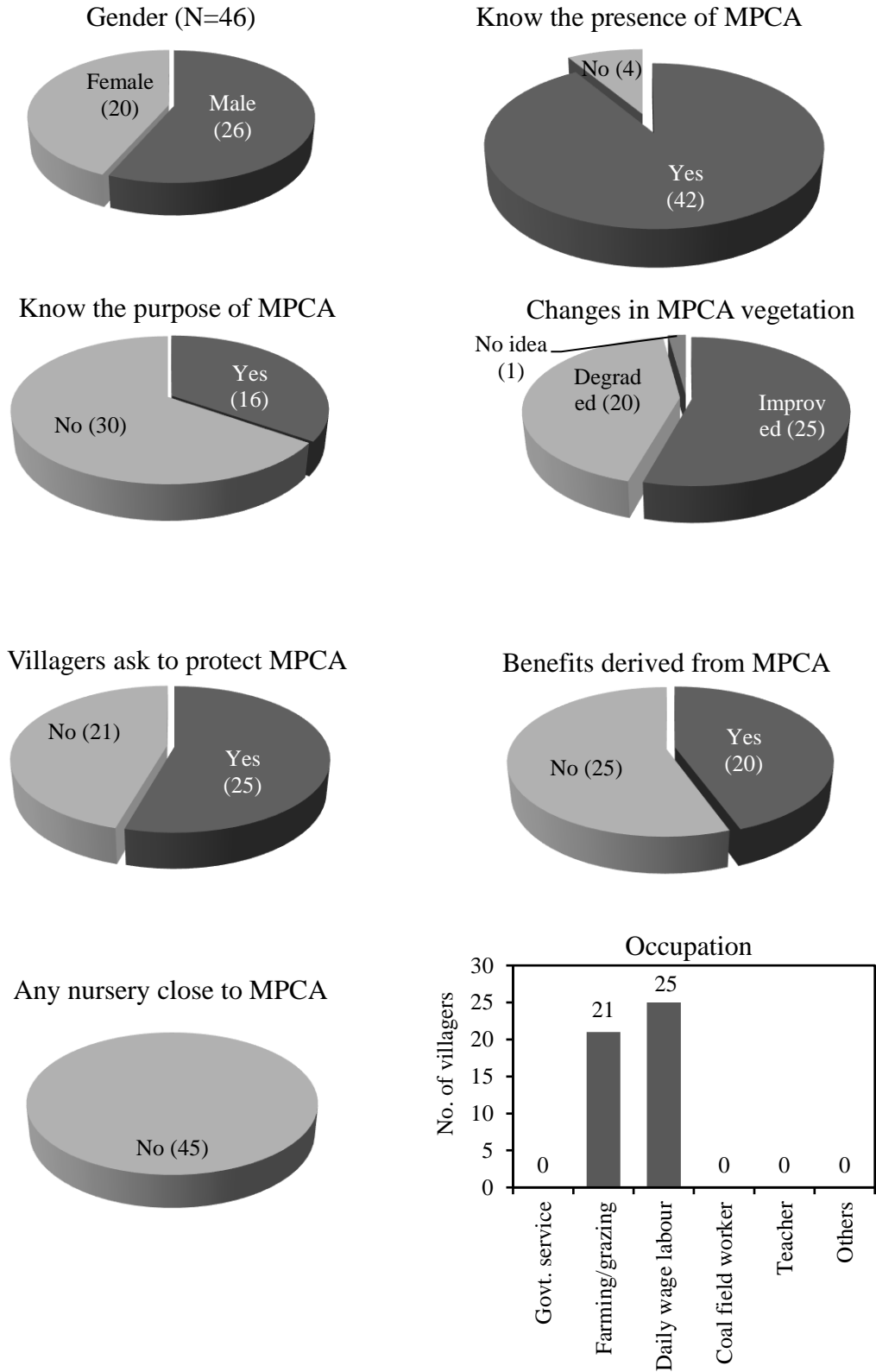


Table 18. Details of medicinal plants collected by villagers in the neighbourhood of Garpanchkot Medicinal Plants Conservation Area (MPCA)

Sl. No	Local name	Botanical name	Medicinal use	Quantity collected/day (g)	Price (₹)
1	Gamochra	<i>Helictrus isora</i>	Roots decoction is given to check diarrhoea; fruits boiled with mustard oil for baby massage	50-100	20/100g
2	Ghetu	<i>Clerodendrum viscosum</i>	Leaves extract used in worm infestation	100-150	
3	Kunch/Kawet/ Swetkunch	<i>Abrus precatorius</i>	Roots used for animal cataract	50-100	50/100g
4	Kumarlat	<i>Ampelocissus latifolia</i>	Roots are crushed and applied externally on the cramp or pain for cattle	100-150	
5	Kalmegh	<i>Andrographis paniculata</i>	Used against liver trouble, jaundice and worm; roots used to treat general debility, dyspepsia; whole plant used in fever	50-100	60/100g
6	Neem	<i>Azadirachta indica</i>	Seed oil is used in case of skin disease; leaves are boiled and orally given for worms;	50-100	25/100g
7	Bagjati	<i>Sida rhombifolia</i>	Pounded leaves used to relieve swelling; fruits are used in headache, root used to treat rheumatism	50-100	
8	Mirubaha	<i>Abutilon indicum</i>	Used as laxative, in treatment of jaundice, piles, skin disease and urinary disease	50-100	
9	Assan	<i>Terminalia alata</i>	Bark decoction used in diarrhoea and dysentery;	250-300	
10	Paldha/Marar/ Arhul/ Madar	<i>Erythrina stricta</i>	Fresh leaves juice on sores, ulcers and wounds; Crushed leaves on swellings, boils, sprain; bark decoctions in worm infestation and dysentery	100-150	
11	Dushtina/ Jhagar/ Ulatchandal	<i>Gloriosa superba</i>	Leaves paste applied for skin disease; roots against snakebites and small pox; for impotence and infertility;	100-150	
12	Bael	<i>Aegle marmelos</i>	Leaves juice is given in empty stomach for acidity; fruits help as laxative and in digestion.	400-500	10-20/fruit
13	Sonali/Bandarauri /Mirjubaha nuru	<i>Cassia fistula</i>	Fruits are used as laxative; bark decoction used as cleaning agent for ulcer and wound; Warm fruits are applied on swollen throats of cattle;	400-500	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local name	Botanical name	Medicinal use	Quantity collected/day (g)	Price (₹)
14	Bhelwa/Soso daru/Bhela	<i>Semecarpus anacardium</i>	Used to improve digestion and potency; Crushed Seeds is used in case of swollen mouth and ulcer of cattle;	100-150	30/100g
15	Kukur chita	<i>Litsea glutinosa</i>	Bark used in bone fracture and setting; root bark and leaves are used in fever, swelling, and diarrhoea	250-300	
16	Piyal	<i>Buchanania lanzan</i>	Fruits are used in treating coughs and asthma; roots in the treatment of diarrhoea; leaves in treatment of skin diseases;	100-150	
17	Akaona/ Madar	<i>Calotropis gigantea</i>	Warm leaves applied externally on swollen part or painful area of body or for joint pain.	100-150	
18	Bhengrati/ Bhringaraj	<i>Eclipta alba</i>	whole plant used as antiseptic, febrifuge juice is given in anaemia and cough; used as scalp tonic for promoting hair growth	100-150	
19	Rypan/Ripan/ Ramdatun	<i>Smilax ovalifolia</i>	Roots used in pyorrhoea and mouth ulcer	100-150	
20	Roktorohara	<i>Soymida febrifuga</i>	Bark used in diarrhoea, dysentery and fever; also, as a general tonic	250-300	
21	Sidha	<i>Lagerstroemia parviflora</i>	The bark is used in diabetic	400-500	
22	Benchi/ Karonda/Khunti	<i>Carissa spinarum</i>	Roots used against asthma; leaves paste applied for swollen mouth in cattle; roots applied for skin disease of cattle	100-150	
23	Dudhia/Lal keru	<i>Euphorbia hirta</i>	Plant juice used in dysentery, bowel complaints,	100-150	10/200g
24	Haritaki	<i>Terminalia chebula</i>	Fruits used for good digestion, acidity	250-300	30/kg
25	Ethka /Alkushi	<i>Mucuna pruriens</i>	Seeds used to cure impotency	250-300	50-300/kg
26	Anantamul	<i>Hemidesmus indicus</i>	Roots are used broadly in kidney troubles; used against general debility	100-150	
27	Bhui amla	<i>Phyllanthus niruri</i>	Whole plant is used as antipyretic, diuretic and to cure jaundice	100-150	
28	Chirchit /Apang	<i>Achyranthes aspera</i>	Roots and leaves used in the treatment of boils, asthma, bleeding, bronchitis, leukoderma and skin diseases.	50-100	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local name	Botanical name	Medicinal use	Quantity collected/day (g)	Price (₹)
29	Titakhari/Ursha	<i>Desmodium gangeticum</i>	Used as aphrodisiac; in postnatal complaints, chronic fever, cough and asthma	50-100	
30	Chitaway/ Sada chita	<i>Plumbago zeylanica</i>	used in female contraceptive and abortifacient	50-100	
31	Mutha	<i>Cyperus rotundus</i>	Roots used to treat leprosy	50-100	
32	Satamuli	<i>Asperagus racemosus</i>	Tubers used in blood dysentery; to enhance the production of mother's milk,	250-300	200/kg
33	Peet jhanti	<i>Barleria prionitis</i>	Whole plant decoction is used to cure dropsy, jaundice, tonic making, swelling of joints; Urinary infection	50-100	
34	Salparni	<i>Desmodium gangeticum</i>	Roots used to cure chronic fever, chronic infection of the chest and lungs; used to treat asthma	100-150	
35	Ayapan	<i>Ayapana triplinervis</i>	Used in jaundice, intestine ulcer; it is stimulant, tonic and also laxative	50-100	
36	Bantulsi	<i>Ocimum americanum</i>	Leaves used to stop bleeding, gastric disorder	50-100	
37	Mitha pata	<i>Scoparia dulcis</i>	Used to treat gallbladder stone and kidney complaints	50-100	
38	Nimukha /Tejomala	<i>Stephania japonica</i>	Roots used to treat bowl complaints, stomach pain and dyspepsia	100-150	
39	Dandmari	<i>Smilax macrophylla</i>	Roots used to treat venereal disease, urinary trouble and dental problem	100-150	
40	Palash	<i>Butea monosperma</i>	Leaves, seeds and gum	100-150	
41	Jhinjhir	<i>Bauhinia variegata</i>	Seeds and flowers are used for the treatment of bleeding haemorrhoids, dysentery, TB, bronchitis. It is also used as an astringent, tonic and anthelmintic.	100-150	
42	Thankuni	<i>Centella asiatica</i>	Leaves are chewed and eaten to check gastric and acidity.	50-100	20/100g
43	Kend	<i>Diospyros melanoxylon</i>	Leaves, fruits and seeds are used as styptic, in scabies and old wounds; as laxative and carminative medicine; dried fruit powder is useful in treating urinary, skin and blood diseases	100-150	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local name	Botanical name	Medicinal use	Quantity collected/day (g)	Price (₹)
44	Kham aloo	<i>Dioscorea alata</i>	Tubers are used in leprosy, burns, fungal diseases, rheumatism and as contraceptive	250-300	60/kg
45	Mahul	<i>Madhuca longifolia</i> var. <i>latifolia</i>	Flower extracts are used against heart diseases, bronchitis and tonsillitis; also, for leucorrhoea, menorrhagia; barks used for rheumatism, chronic bronchitis, leaves in rheumatism	250-300	150-250/kg
46	Sal	<i>Shorea robusta</i>	Seed oil is analgesic and anti-inflammatory	250-300	30-40/kg
47	Parashi	<i>Cleistanthus collinus</i>	Leaves and bark used as antiseptic, antifungal, insecticidal and larvicidal	50-100	
48	Doka	<i>Lannea coromandelica</i>	Bark, stem and leaves used to treat fever, dyspepsia, general debility; also used in leprosy, ulcers, wounds.	250-300	
49	Chakalta	<i>Adina cordifolia</i>	Used in jaundice, swelling in stomach; roots in diarrhoea and dysentery; also, in chronic cough.	50-100	
50	Shiakul	<i>Ziziphus nummularia</i>	Roots and fruits used in treatment of mental retardation, hysteria and as a nervine tonic; in dysentery, diarrhoea, ulcers, wound healing; also used in cold, bronchitis, anaemia and irritability	100-150	
51	Antarilata	<i>Combretum decandrum</i>	Used as antidote, antioxidant; also used as antifungal and in skin disease	50-100	
52	Shyاملata	<i>Ichnocarpus frutescens</i>	Whole plant used to treat dysentery, bleeding gums, convulsions, cough and measles.	50-100	
53	Bon pui	<i>Rivea hypocrateriformis</i>	Stem and roots used in rheumatic pain, fever and urogenital problem and skin disease; also used in piles.	50-100	
54	Lal veranda	<i>Jatropha gossypifolia</i>	Leaves and latex used as contraceptive; also used as purgative and in venereal disease, as a biopesticide.	100-150	
55	Bon alu	<i>Dioscorea bulbifera</i>	Tubers used in treatment of piles, dysentery, syphilis, ulcers, leprosy; also used in cough and asthma	250-300	40-50/kg
56	Talmuli	<i>Curculigo orchoides</i>	Roots used in treatment of impotence; also, in arthritis of the lumbar and knee joints	50-100	80-90/kg
57	Ishwarmul	<i>Aristolochia indica</i>	Roots used to prevent seizures, boost the immune system and as aphrodisiac	50-100	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local name	Botanical name	Medicinal use	Quantity collected/day (g)	Price (₹)
58	Boichi	<i>Flacourtia indica</i>	The leaves and roots are used in treatment of snakebite; bark in arthritis. Used for cough, pneumonia, and bacterial throat infection.	50-100	

5.3.4. North Rajabhatkhawa MPCA

Forest villages selected for the community survey in and around Rajabhatkhawa MPCAs in North Bengal were (1) Buxa 28-mile Forest village (Nearest) and (2) Buxa 29-mile Forest Village (Farthest). The survey was conducted involving 28% of the total households in two villages in the proximity of the North Rajabhatkhawa MPCA. A total of 30 households (13 from Buxa 28-mile village and 17 from Buxa 29-mile village) of the total 117 households in the two villages was selected for conducting the survey. In both the villages, 75 percent of respondents were males (Figure 49-50). Around 74 percent of respondents were engaged in farming activities as their main occupation. Nevertheless, people are also engaged in various other occupations such as running small grocery shops, homestay business, collection of NTFPs, medicinal plants, etc. In Bux 28-mile village, only a few households recently started homestay business in the Buxa 28 village.

On assessing the understanding and engagement of the local people in monitoring and management of MPCA, it was found that people were not much aware of the existence of a MPCA in the proximity of their village (Figure 49-50). About 23 percent respondents said that they are aware of the existence of their nearest MPCA. Furthermore, only 15 to 23 percent of them know the year of notification and the establishment of MPCA. The detailed discussions held with the respondents revealed that local community members from these villages were directly involved in the MPCA related activities such as the Village Headman and nursery work. Village wise analysis shows that people do have farming as a major source of income.

Local community members from these two selected villages shared their knowledge about various medicinal plants that are present and collected from neighbourhood forests. The list of medicinal plants that are collected and used for domestic purposes especially for their medicinal uses are provided (Table 19). There were about 31 medicinal plants that are being collected and traded sometimes in the local market. The quantity collected was very minimal. Some of the traded plants were found to have their populations decreased in the wild for e.g., *Litsea glutinosa*. When they were asked whether the status of the forest inside the MPCA has improved over the last 5 years, on an average only 4% of respondents from the the villages gave a positive response and remaining 92% did not have any understanding. However, 4% informed about the degradation of the forest (Figure 49-50).

The involvement of the community in the conservation and development of the MPCA was found to be fairly low in both the villages. People of these villages were asked whether the

Forest Department in any time in the past requested them to protect the MPCA. Surprisingly, 100% people informed that they were not requested or informed by the Forest Department to protect the MPCA although in general they were told about the protection of forest and not to cut any tree. Similarly, the response to deriving any benefits from the MPCA by the villagers was negative. Respondents gave a 100% negative response to their knowledge of the existence of any nursery attached to the MPCA. People shared their practices that are undertaken during the collection of various medicinal plants from the forest.

Figure 49. Responses to questions asked in the questionnaire survey conducted among community members of Buxa 28 village near North Rajabhatkhawa MPCA

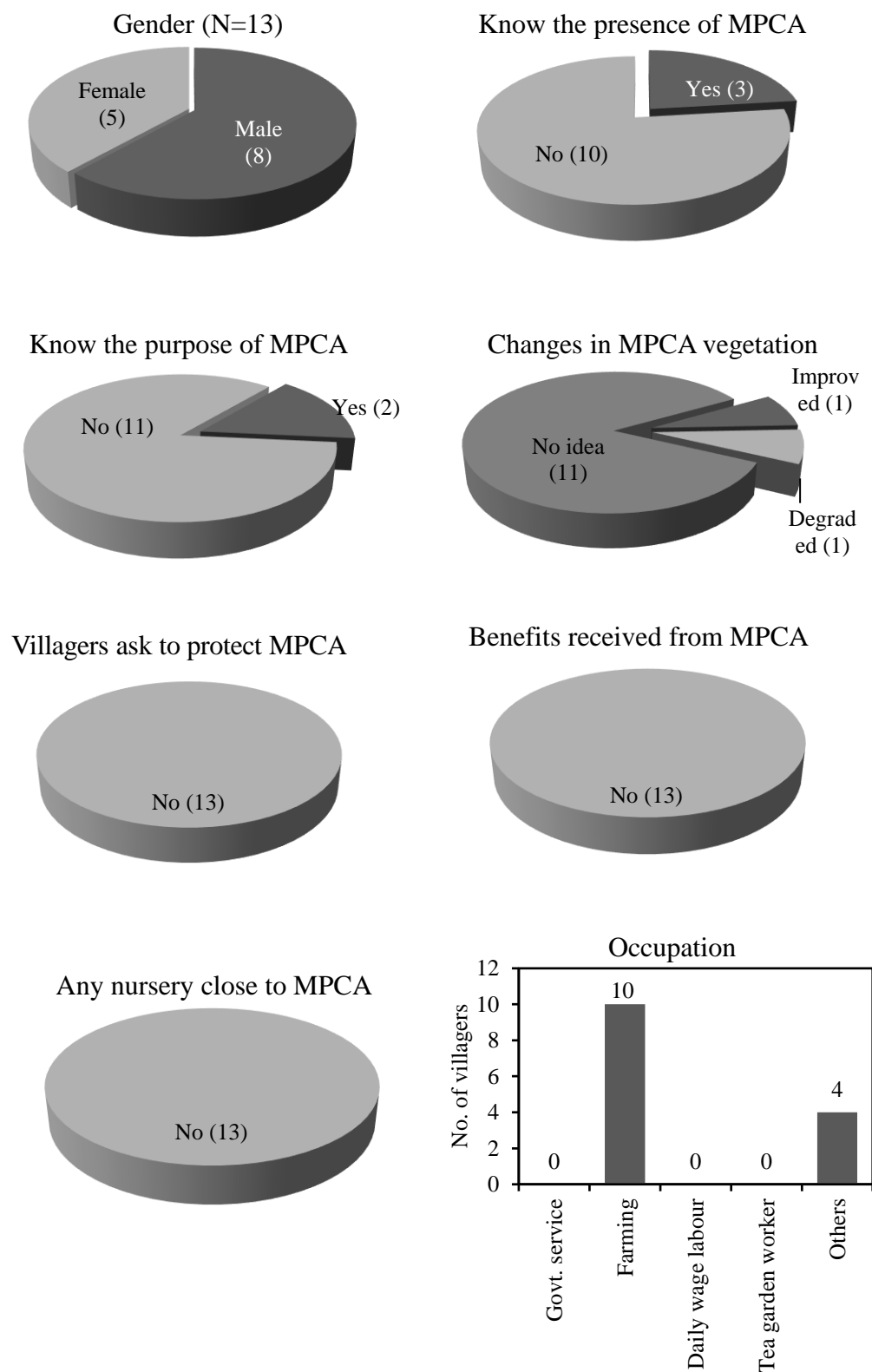


Figure 50. Responses to questions asked in the questionnaire survey conducted among community members of Buxa 29 village near North Rajabhatkhawa MPCA

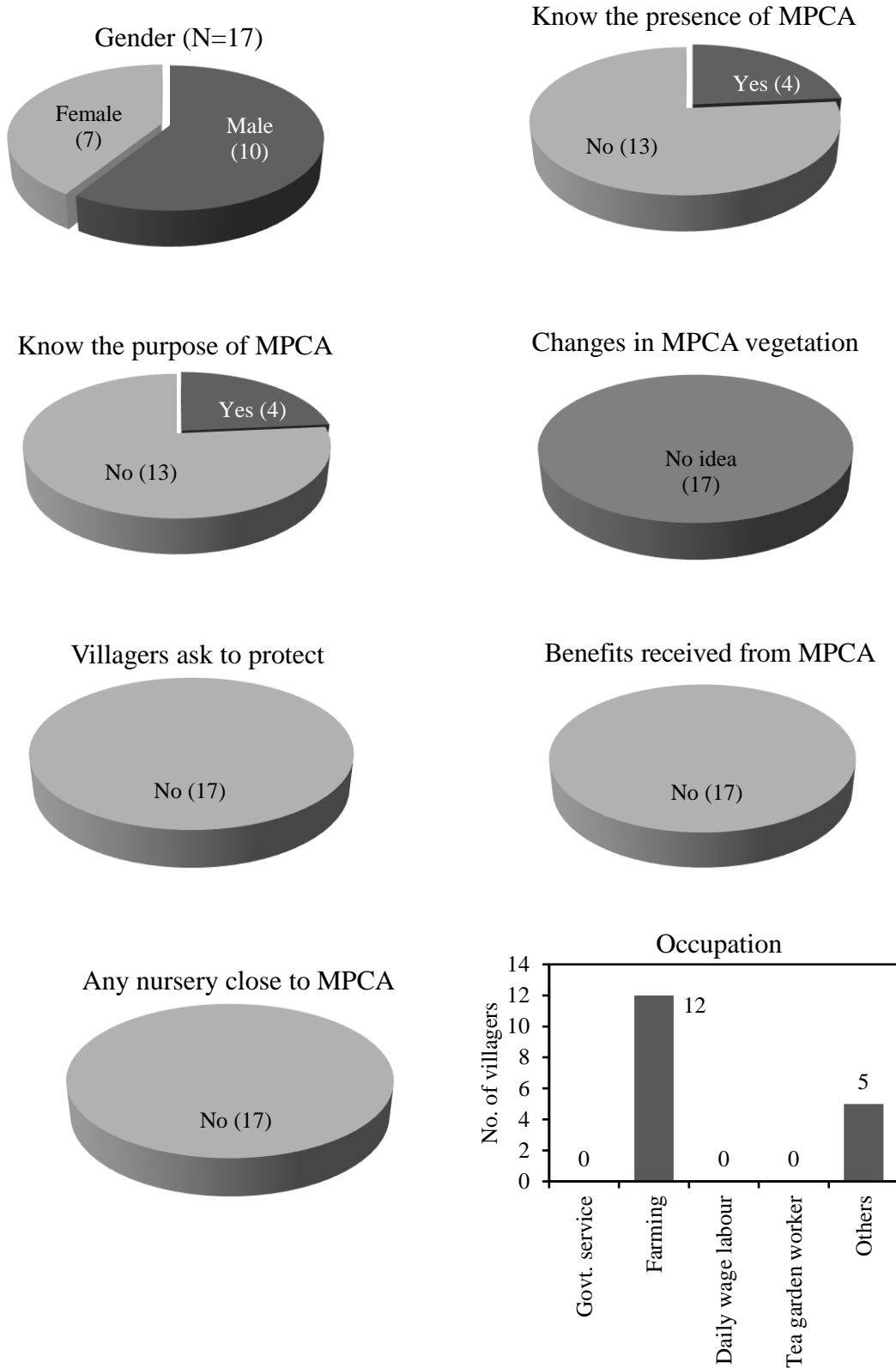


Table 19. Details of medicinal plants collected by villagers in the neighbourhood of North Rajabhatkhawa Medicinal Plants Conservation Area (MPCA)

Sl. No	Local name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
1	Nagbail/Nagbelia/Kulein	<i>Rauvolfia serpentina</i>	Roots used for fever	Rare in the forest; roots have been used by the local people and also sold in the market	0.1-0.3	40-50/kg
2	Bhat	<i>Clerodendron</i> sp.	High blood Pressure		0.2-0.3	
3	Dhebrey Cheo/Mushroom	<i>Trametes versicolor</i>	For decoration	People are collecting at present and will continue up to December end	3-5	14-20/kg
4	Golden Cheo	<i>Polyporus</i> sp.	For decoration	People are collecting at present and will continue up to December end	800-2000 pc	100/1000 pc
5	Assamia lahara/ Bonmara	<i>Eupatorium odoratum</i>	Cut and wound	Local use	0.05-0.1	
6	Gondhejhar	<i>Azaratum conyzoides</i>	Cut and wound	Local use	0.05-0.1	
7	Harchur	<i>Cissus quadrangularis</i>	Bone fracture	Local use	0.1-0.2	
8	Kanaidinga/Totola	<i>Oroxylum indicum</i>	Bark used for jaundice; seeds used to treat pneumonia	Traded and locally used; population has been decreased in the forest over the year	5-10	18-20/kg
9	Harrah/Haritaki	<i>Terminalia chebula</i>	Fruits used locally for cough	Traded and locally used	1-2	15-20/kg
10	Borrah/Bohera	<i>Terminalia bellirica</i>	For decoration	Traded and locally used	2-3	15-20/kg
11	Amlaki/Aamla	<i>Phyllanthus emblica</i>	Fruits consumed with Harrah and Borrah for stomach problem	Local use	0.5-1	20-25/kg
12	Narkeli	<i>Pterygota alata</i>		Fruit shells are traded; seeds are eaten locally	5-6	15-20/kg
13	Pipla	<i>Piper</i> sp.	Locally used for cough	Traded and locally used	1-2	300-400/kg

Community' understanding of medicinal plants & MPCAs

Sl. No	Local name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
14	Fatalali	<i>Dysoxylum</i> sp.		Traded	3-4	20-25/kg
15	Orchids	<i>Dendrobium densiflorum</i>		Traded		
16	Mushroom	<i>Lentinus</i> sp. <i>Auricularia</i> sp.	Edible	Edible	2-5	80/kg
17	Kaula bark	<i>Litsea glutinosa</i>		Traded; Population has been decreased over the year	5-10	20-22/kg
18	Udal/Odal	<i>Sterculia</i> sp.		Traded	2-3	15-20/kg
19	Dheki sag	<i>Diplazium esculentum</i>	Edible; used as laxative	Local use	0.4-0.8	
20	Arjun bark	<i>Terminalia arjuna</i>	Chest pain	Local use	0.5-1	
21	Gokul gum			Local use	0.05-0.06	
22	Sal gum	<i>Sorea robusta</i>	Diarrhoea and stomach upset	Local use	0.05-0.06	
23	Koiche pata	<i>Wrightia arboria</i>	Fruits	Traded	2-5	10-15/kg
24	Ulat kamal	<i>Abroma augusta</i>	Roots and barks used in dhatu and Stomach upset	Local use	0.1-0.2	
25	Gante	<i>Gynocardia odorata</i>	Skin disease; ring worm or fungal disease	Seeds are traded and locally used	5-6 fruits/day	50-60/kg
26	Bee Dana	<i>Solanum torvum</i>	Used for high Blood pressure	Local use	0.1-0.2	
27	Gamari	<i>Gmelina arborea</i>	Bark used in stomach upset	Local use		
28	Ginari	<i>Canarium strictum</i>	Bark in appetizer	Local use		
29	Harjor/Harchur	<i>Cissus quadrangularis</i>	Bone fracture	Local use		
30	Betlauri	<i>Costus speciosus</i>	Rhizome and stem in stomach upset and jaundice	Local use	0.4-0.5	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
31	Gila	<i>Entada pursaetha</i>	Seeds used for treatment of carbuncles	Local use		

5.3.5. North Sevoke MPCA

A village by name, '10th mile', which is adjacent to North Sevoke MPCA (within 2 km radius), was selected for conducting the community survey. Though there are villages located close to this MPCA by distance, but they are separated from MPCA by a river, which blocks the entry of community members into MPCA areas. Hence, the only one village, 10th mile forest village, which is directly associated with the MPCA area, was considered for this survey.

A total of 16 households from presently dwelling 70 households (24 percent) in the two settlements in 10th mile village neighbouring the MPCA area were selected for conducting the survey. Of the total respondents, 63% were male and 37% females (Figure 51). Community members from this village were engaged mostly as daily wage labourers (37.5%) and a small percent of people working as government employees (6.25%) (Figure 51). The remaining people are engaged in other kind of job works such as collection of NTFPs, medicinal plants, charcoal making from wood, fuel wood collection, etc. There have been number of records of elephant movement close to this village, as there is an old elephant corridor is just located adjacent to the village. For this reason, local community members are unable to cultivate any major cash crops in the cultivable lands, which are frequently damaged during the movement of elephant herds.

While responding to the questions related to their understanding and engagement in monitoring and mangement of MPCA, local community members informed that they are not much aware (only 6 percent responded 'Yes') of the existence of a MPCA in the proximity of their village (Figure 51). The same 6 percent of respondents had the knowledge of the year of notification and the purpose of establishing MPCA in their neighbourhood forests. During the discussions, local community members responded that they are being directly involved in MPCA related activities such as the Village Headman and workers, who are engaged in maintaining the nursery. However, they were not engaged in any other activities within MPCA areas by the forest department.

When asked about their association with medicinal plants in relation to collection, domestic use, trade, etc., respondents shared their regular practices, collection frequency, and the list of medicinal plants that are available in MPCA and surrounding forest areas. The list of medicinal plants collected, their local names, medicinal uses, approximate quantity of collection, and trade details are provided (Table 20). There were about 21 medicinal plants being collected from neighbouring forest areas by the community members of 10th mile village. Mushrooms

contribute larger portion of their collection from forests. Only 6 percent of respondents from 10th mile village informed that the forest areas within MPCA and surrounding area improved in the last five years, while the remaining had no idea about the changes in the plant population (Figure 51).

The involvement of the community in the conservation and development of the MPCA was found to be none as all the respondents (100 percent) replied that forest department did not involve them in MPCA related activities in the forests, but informed about the importance of protection of forest and not to remove any plants from forests. Similarly, respondents informed that they did not get any benefits from MPCA. They did not have any knowledge of the existence of any nursery attached to MPCA.

Figure 51. Responses to questions asked in the questionnaire survey conducted among community members of 10th mile village near North Sevoke MPCA

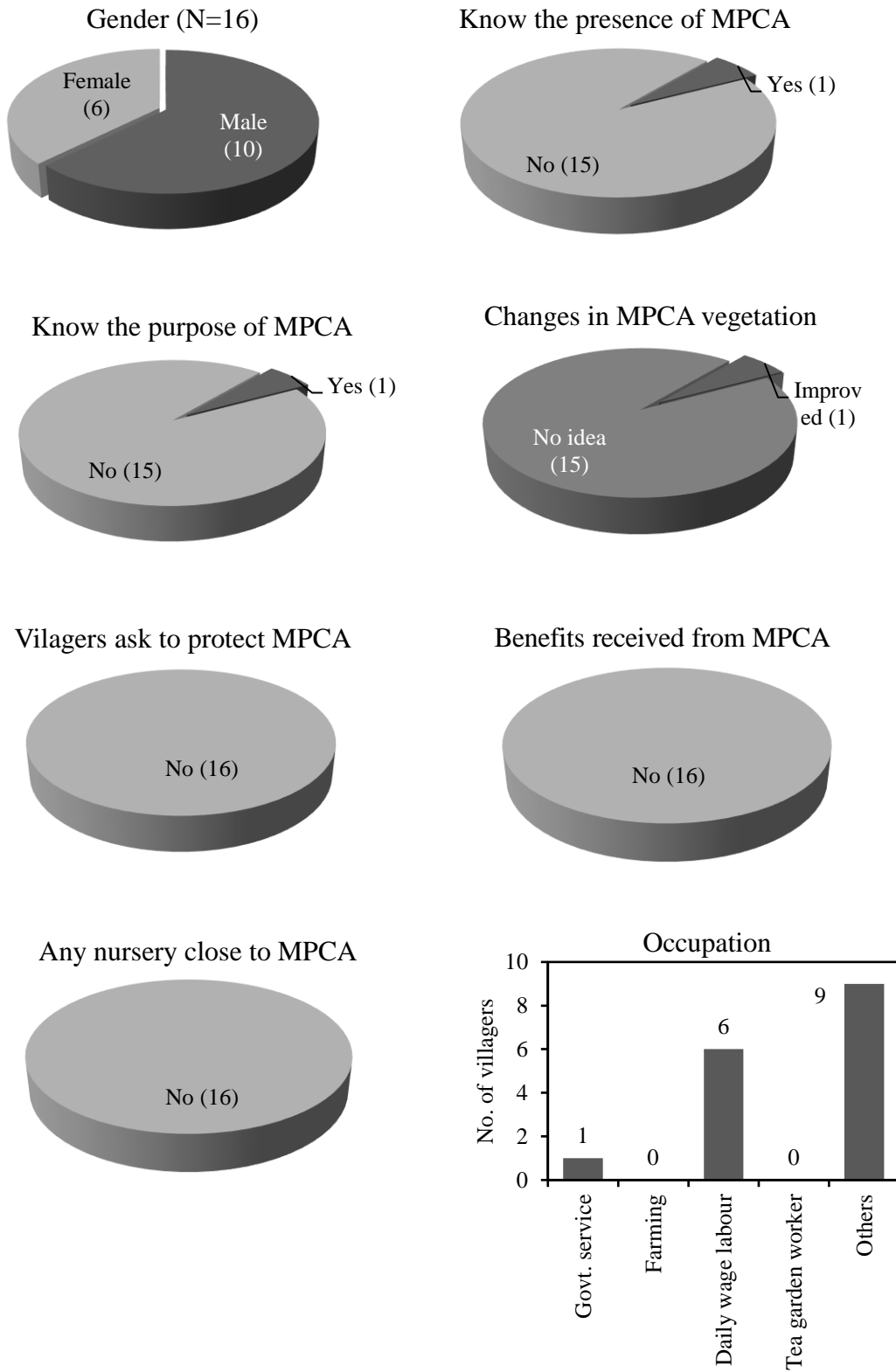


Table 20. Details of medicinal plants collected by villagers in the neighbourhood of North Sevoke Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
1	Betlauri	<i>Costus speciosa</i>	Stem and rhizome in Jaundice and intestinal problem	Local use	0.2-0.3	
2	Totola	<i>Oroxylum indicum</i>	Bark used for jaundice; seeds used to treat pneumonia	Traded and locally used; population has been decreased in the forest over the year	8-10/day	15-20/kg
3	Elamay	<i>Azaratum conyzoides</i>	Cut and wound	Local use	0.05-0.1	
4	Simbrik					
5	Bikoma					
6	Akh/Akan	<i>Calotropis gigantea</i>	Body and joint pain	Local use	0.1-0.2	
7	Kulein	<i>Rauvolfia serpentina</i>	Roots used for fiver	Rare in the forest; roots has been used by the local people and also sold in the market	0.1-0.3	40-50/kg
8	Pipla	<i>Piper sp.</i>	Locally used for cough	Traded and locally used	0.5-1	200-250/kg
9	Harchur	<i>Cissus quadrnagularis</i>	Bone fracture	Local use	0.1-0.2	
10	Cheo	<i>Lentinus sp.</i> <i>Auricularia sp.</i>	Edible	Local use	1-2	80-100/kg
11	Aonla	<i>Phyllanthus emblica</i>	Fruits as food suppliment	Local use and traded	0.5-1	20-25/kg
12	Janglipan		Cough and body pain	Local use		
13	Bonmara	<i>Eupatorium odoratum</i>	Cut and wound	Local use	0.05-0.1	
14	Kusum	<i>Baccurea sapida</i>	Bark used in skin disease: fruit cover in body pain	Local use	2-5	
15	Jangli Boyer	<i>Ziziphus sp.</i>	Seeds used for treatment of scabies	Local use	0.1-0.15	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
16	Pipal/Bot	<i>Ficus religiosa</i>	Leaves juice for fiver	Local use	0.2-0.3	
17	Jangli Tomato	<i>Solanum sp.</i>	Leaves are applied externally for arthritis	Local use	0.1-0.2	
18	Dadpata/Namaste patta	<i>Cassia alata</i>	Skin disease specially ringworm	Local use	0.05-0.1	
19	Harrah/Hartaki	<i>Terminalia chebula</i>	Fruits used locally for cough	Traded and locally used	1-2	15-20/kg
20	Borrah/Bohera	<i>Terminalia bellirica</i>	Ulcer and stomach ailment	Traded and locally used	2-3	15-20/kg
21	Sarnalata	<i>Cuscuta reflexa</i>	Used for jaundice	Local use	0.05-0.1	

5.3.5. Sursuti MPCA

In Sursuti MPCA, two villages namely Bamni (nearest) and Borodighi (farthest) were identified for the survey based on the distance and their association with MPCA areas. Out of 102 households dwelling in two villages, 27 households (30 percent) were identified for conducting this survey. Of the total respondents, 63% were male and 37% females. The proportion of male respondents was 60 and 67 percent respectively in Bamni and Borodighi villages (Figure 52-53). Most of the community members from both the villages involved in farming activities (80 percent in Bamni village and 45 percent in Borodighi). Farming was considered to be the major source of income in both the villages. In Borodighi village, around 45 percent of people are working as labourers in tea estates. Besides, people from both villages are engaged in various other occupations such as collection of Fuel wood, NTFPs, medicinal plants, etc.

Local community members were asked about their understanding and engagement in the monitoring and mangement of MPCA. Less than 20 percent of respondents from Bamni (13%) and Borodighi (17%) villages were aware of exsistence of MPCA in their proximity (Figure 52-53). The same set of people only had the knowledge of the establishment of MPCA. During our focus group discussions, respondents shared about their experiences and associations with medicinal plants that are available within MPCA areas and its surroundings. When they were asked about the status of forests inside MPCA areas has improved over the last 5 years, 13 and 17 percent of respondents respectively from Bamni and Borodighi villages acknowledged the improvement in the plant populations in the last five years. The remaining respondents had no knowledge of whether any improvement or degradement in the plant population in MPCA areas (Figure 52-53). Respondents from both the villages received no benefits from MPCA related activities and they were not asked to get involved in the activities as part of management and protection of MPCA with an exception of only 13 percent of respondents from Bamni village. Forest department informed that there should not be any commercial collection of forest resources from MPCA areas. None of the respondents had no idea of existence of any nursery close to MPCA. Local community members shared the list of medicinal plants that are being collected, used for domestic purposes and traded. The details of medicinal uses and quantity collected and trading price are provided (Table 21).

Figure 52. Responses to questions asked in the questionnaire survey conducted among community members of Bamni village near Sursuti MPCA

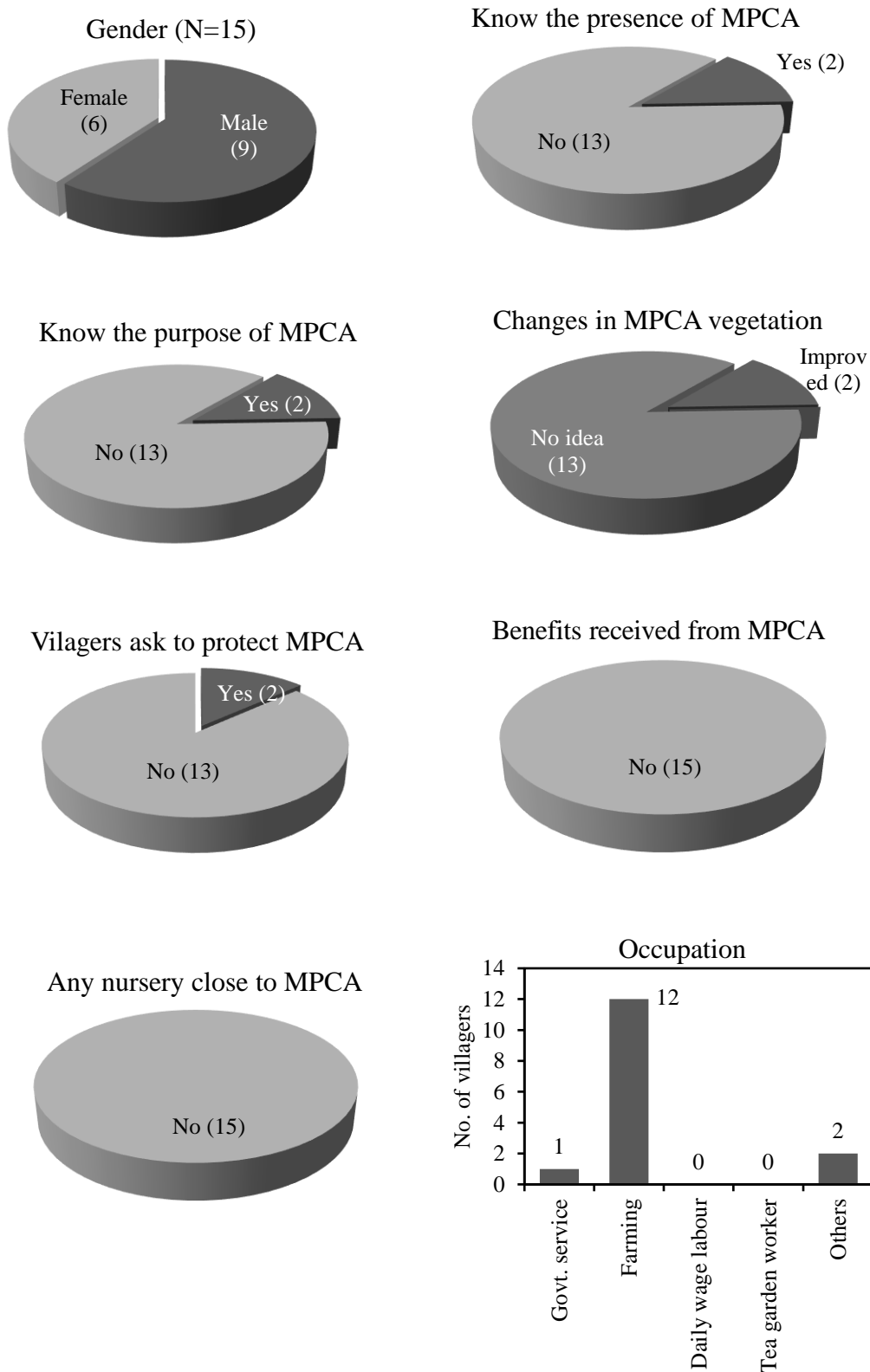


Figure 53. Responses to questions asked in the questionnaire survey conducted among community members of Borodighi village near Sursuti MPCA

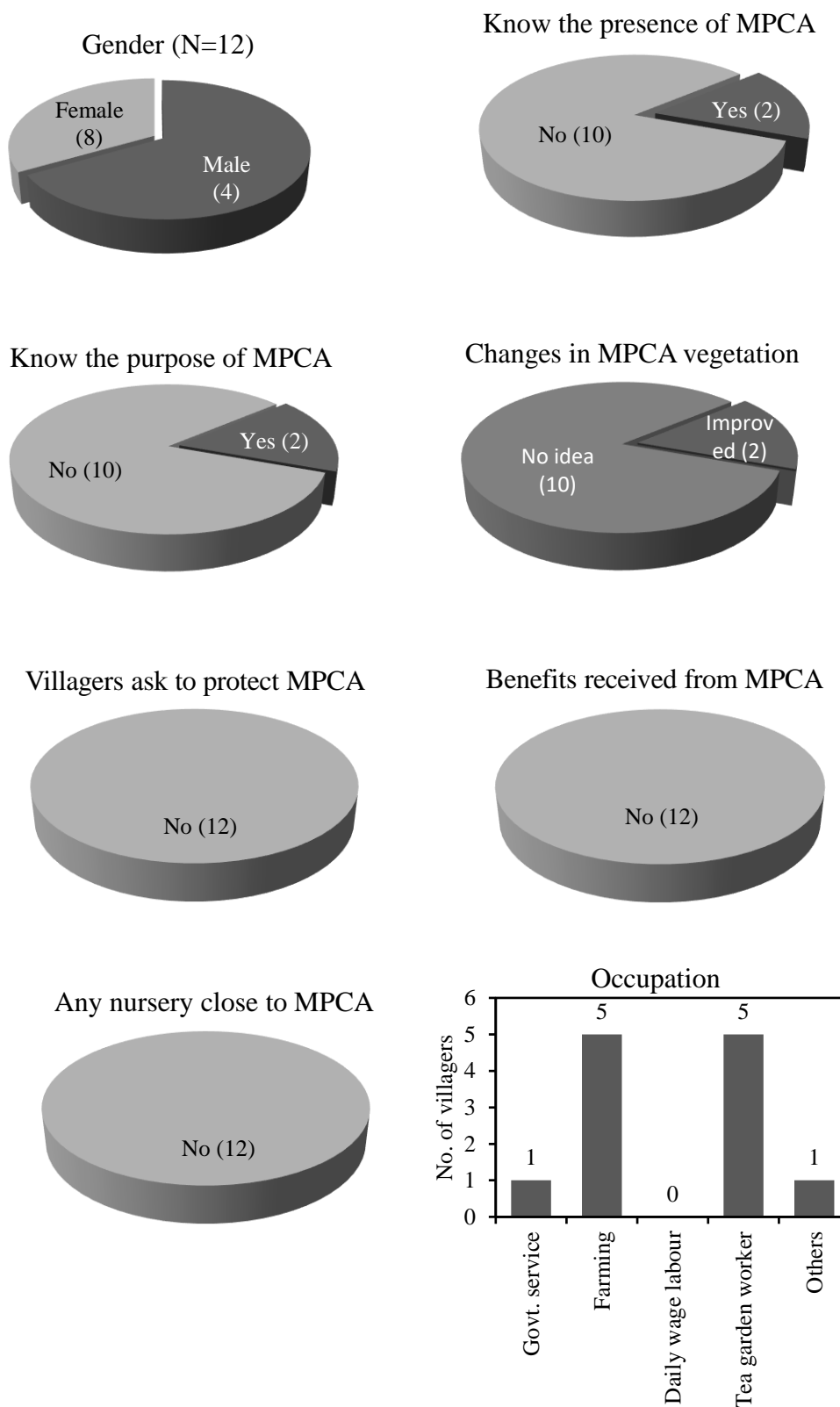


Table 21. Details of medicinal plants collected by villagers in the neighbourhood of Sursuti Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
1	Totola	<i>Oroxylum indicum</i>	Bark used for jaundice; seeds used to treat pneumonia	Traded and locally used; population has been decreased in the forest over the year	8-10/day	15-20/kg (dry)
2	Satamul/Kalyani	<i>Asperagus racemosus</i>		Traded and locally used	3-4	25-28/kg
3	Shoti	<i>Curcuma</i> sp.		Traded	8-10	5-6/kg
4	Panpata	<i>Piper</i> sp.		Traded	5-6	10-12/kg
5	Kathkukri	<i>Mushroom</i>	For decoration	People are collecting at present and will continue up to December end	3-5	14-15/kg
6	Udal	<i>Sterculia</i> sp.		Traded	2-3	15-20/kg
7	Rokton			Traded		
8	Fatalali	<i>Dysoxylum</i> sp.		Traded	3-4	20-25/kg (dry)
9	Amlaki	<i>Phyllanthus emblica</i>	Fruits consumed with Harrah and Borrah for stomach problem	Local use	0.5-1	20-25/kg (dry)
10	Harrah/Hartaki	<i>Terminalia chebula</i>	Fruits used locally for cough	Traded and locally used	1-2	15-20/kg (dry)
11	Arjun	<i>Terminalia arjuna</i>	Chest pain	Local use	0.5-1	
12	Nagbeil	<i>Rauwolfia serpentina</i>	Roots used for fiver	Rare in the forest; roots have been used by the local people and also sold in the market	0.1-0.3	40-50/kg (dry)
13	Mechia pat			Traded		
14	Thunimankoni	<i>Centrela asiatica</i>	Stomach upset	Local use		
15	Lajjbati	<i>Mimusa pudica</i>	Dhaturog	Local use		

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
16	Assamia lat	<i>Eupatorium odoratum</i>	Cut and wound	Local use	0.05-0.1	
17	Edible mushroom	<i>Lentinus sp.</i> <i>Auricularia sp.</i>	Edible	Local use	2-5	70-80/kg
18	Borrah	<i>Terminalia bellirica</i>	Ulcer and stomach ailment	Traded and locally used	2-3	15-20/kg (dry)
19	Sal sap	<i>Sorea robusta</i>	Diarrhoea and stomach upset	Local use		
20	Kaula/Khagar/Khardar	<i>Litsea glutinosa</i>	Bark in diarrhoea and as head poultice during jaundice	Traded; Population has been decreased over the year	5-10	20-22/kg
21	Kalokochu	<i>Colocasia sp.</i>	Sap for cut and wound	Local use		
22	Chakkor/Gila/ka drufal	<i>Entada pursaetha</i>	Seeds used for treatment of carbuncles	Local use	1-2 fruits/day	
23	Harjor		Bone fracture	Local use	0.1-0.2	
24	Bagindri			Local use		
25	Akan	<i>Calotropis gigantea</i>	Body and joint pain	Local use	0.2-0.3	
26	Katalia	<i>Solanum sp.</i>	Tooth ache	Local use	0.1-0.2	
27	Manimuni	<i>Centrela asiatica</i>		Local use	0.1-0.2	
28	Bonmara	<i>Eupatorium odoratum</i>	Cut and wound	Local use	0.05-0.1	
29	Gurjo lorong/Guloncho	<i>Tinospora cordifolia</i>	Liver tonic	Traded and locally used	8-10	10-12/kg
30	Jangli olkachu	<i>Arisaema sp.</i>	For the treatment of pathabimar or tumer	Local use	0.5-1	
31	Koriya		Stomach ache and fiver	Local use		
32	Rambasak	<i>Phlogacanthus thyrsiformis</i>	Cough, cold and asthma	Local use	0.2-0.3	

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)	Price (₹)
33	Patal kumra	<i>Pueraria tuberosa</i>	for high blood sugar	Local use	0.3-0.4	
34	Ulatkamal	<i>Abroma augusta</i>	Roots and barks used in dhatu and Stomach upset	Local use	0.1-0.2	
35	Chhit			Local use		
36	Basak	<i>Adhatoda vasica</i>	Cough	Local use	0.1-0.2	
37	kusum			Local use		
38	Kanda	<i>Dioscorea sp.</i>	Stomach problem	Local use	0.3-0.5	
39	Borari	<i>Ziziphus sp.</i>	Seeds used for treatment of scabies	Local use	0.1-0.15	
40	Sal sap	<i>Sorea robusta</i>	For treatment of diarrhoea	Local use	10-20ml/day	
41	Chakonda	<i>Cassia alata</i>	Skin disease; ring worm or fungal disease	Local use	0.1-0.2	
42	Rampan	<i>Smilax sp.</i>	Rhizome as energy tonic	Local use	0.3-0.4	
43	Goma/Dandakal ash	<i>Leucas cephaloites</i>	Leaves used for appetite and headache	Local use	0.02-0.05	
44	Boch	<i>Acorus sp.</i>	Nerve tonic and to treat people of ghost symptom	Traded and locally used	0.1-0.2	15-20/kg
45	Dhekia	<i>Diplazium esculentum</i>	Edible; used as laxative	Local use	0.4-0.8	
46	Gante	<i>Gynocardia odorata</i>	Skin disease; ring worm or fungal disease	Seeds are traded and locally used	5-6 fruits/day	50-60/kg
47	Shimul	<i>Bombax ceiba</i>	Roots in dhatu problem	Local use	0.5-0.8	
48	Chalta	<i>Dillenia indica</i>	To treat dandruff and falling hair	Local use	2-3 fruits/day	
49	Borrah/Bohera	<i>Terminalia bellirica</i>	For decoration	Traded and locally used	2-3	15-20/kg (dry)

5.3.7. Tonglu MPCA

Four villages were identified for the survey based on the criteria of nearest and farthest from the MPCA. They were (1) Magma (nearest village on the otherside of Indo-Nepal border road); (2) Tumling (nearest village on the otherside of Indo-Nepal border road); (3) Tonglu (nearest village in the Indian side); (4) Dilpa (farthest village in the Indian side). A sample of 32 households from the total of 110 households (30%) dwelling in four villages/hamlets around MPCA was selected for conducting the survey. Village-wise number of households selected was 12 from Dilpa, 7 from Tonglu, 12 from Magma and 6 from Tumling village (Figure 54-57). The selected respondents covered various age groups of people including young, adult and old generation (0-30, 30-50 and 50-100 years).

Males were in greater proportion in Tumling (68 percent), Dilpa and Magma (58 percent), while 71 percent respondents in Tonglu village were females (Figure 54-57). Overall, 53 percent were male and 47 percent females. Farming or grazing was the major occupation in Magma (67 percent) and Dilpa villages (Figure 54-57). In the other two villages, respondents were engaged in various other jobs including homestay business, collection of NTFPs, medicinal plants, etc., working as tourist guides, etc. People with Govt. employment was found only in Tonglu village (4%). Apart from farming or grazing, homestay business contributes more to the household income in all four villages.

It was observed that respondents from all villages were aware of the existence of MPCA in their vicinity (Figure 54-57). The proportion was 100 and 66 percent in Tonglu and Magma village respectively, while only 33 percent of respondents from farthest villages, Tumling and Dilpa were aware of MPCA (Figure 54-57). The same proportion was not maintained across four villages for their knowledge on the purpose of establishment of MPCA. The proportion of respondents with knowledge about MPCA was 8 percent in Dilpa, 17 percent in Tumling, 43 percent in Tonglu and 50 percent in Magma village. Furthermore, it was noticed that female respondents were less aware of the existence of MPCA. Respondents having the knowledge of MPCAs were mostly involved in the MPCA related activities such as the village headman (mandol) and forest daily wage labourers.

The details on the medicinal plants and their medicinal uses and quantity collected and traded were shared by respondents were collated to prepare village-wise list of medicinal plants (Table 22a,b,c,d). In Tonglu village, respondents collect, use and trade 23 medicinal plants, while 37, 21 and 27 medicinal plants respectively from Dilpa, Tumling and Magma villages. Many of

these medicinal plants were commonly found in all four villages. Respondents had the knowledge of medicinal uses of these plants and have been using them regularly on a daily basis. Since the purpose of collection of medicinal plants was for domestic use, the collection quantity was always in minimal volumes. However, some of the common plants, which are found in large population, were traded occasionally in the local market. The collection area did not confine to MPCA, rather a large continuous forest areas adjoining the MPCA.

Overall, around 51 percent of respondents from all four villages acknowledged that the forests have improved in terms of positive changes in the population of medicinal plants in the last five years. Village-wise proportion of respondents, who thought the forest landscape in MPCA and its surroundings have improved, were 57, 50 33 and 25 percent in Tonglu, Magma, Tumling and Dilpa villages respectively (Figure 54-57). Otherwise, respondents claimed their ignorance of the changes happened in the last five years. Local community members in Dilpa, Magma and Tonglu villages were well informed about the MPCA and its importance by the forest department, and hence they were aware of the conservation and development of the MPCAs. Respondents from the farthest village, Tumling, were comparatively not having solid knowledge of the conservation and development of MPCA.

At least one fourth of respondents from villages namely, Dilpa, Magma and Tonglu, agreed that they received benefits from MPCA through organising eco-tourism activities and also through collection of medicinal plants and other NTFPs (Figure 54-57). The farthest village, Tumling, had no respondents deriving any benefits from MPCA.

Figure 54. Responses to questions asked in the questionnaire survey conducted among community members of Dilpa village near Tonglu MPCA

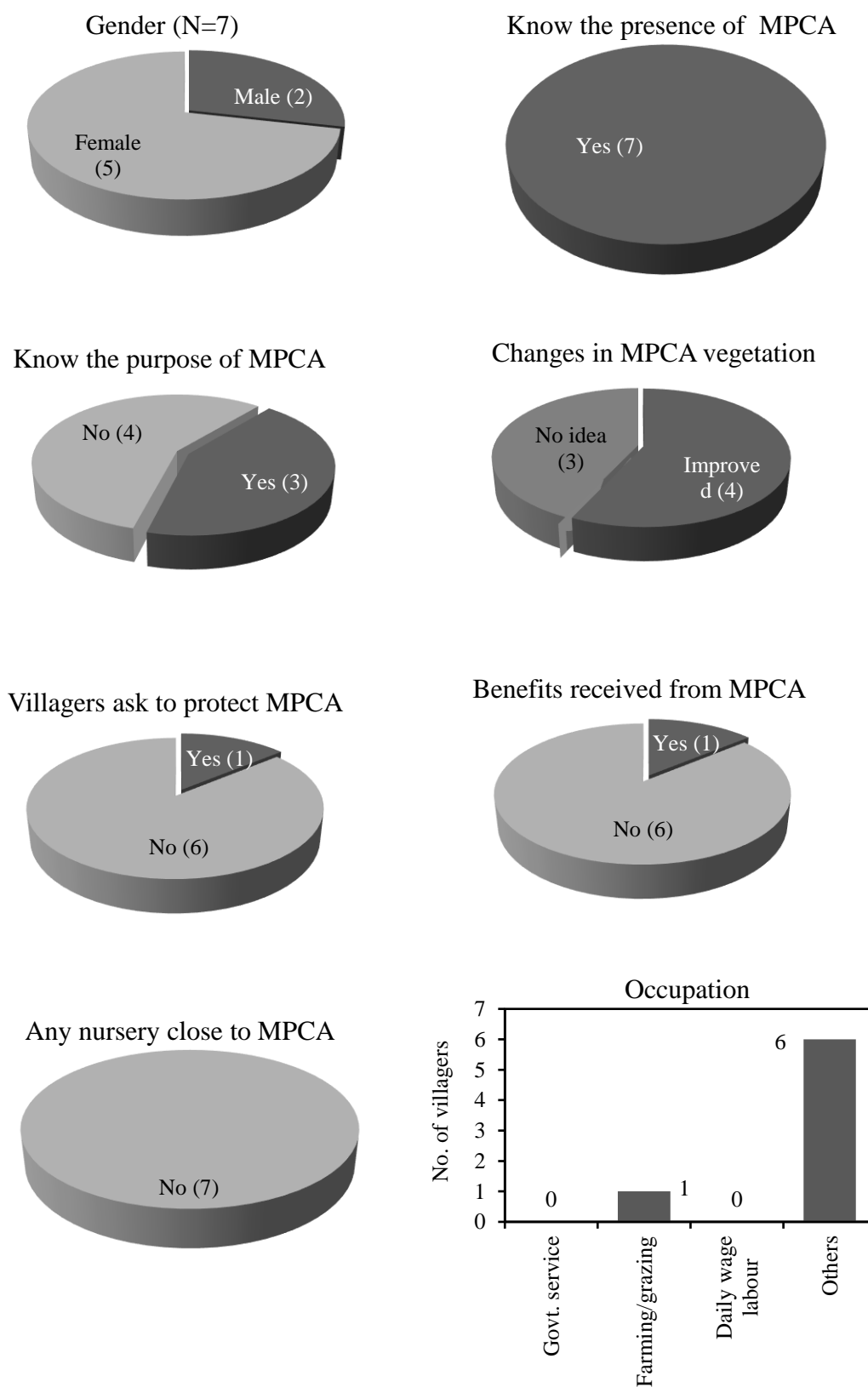


Figure 55. Responses to questions asked in the questionnaire survey conducted among community members of Tonglu village near Tonglu MPCA

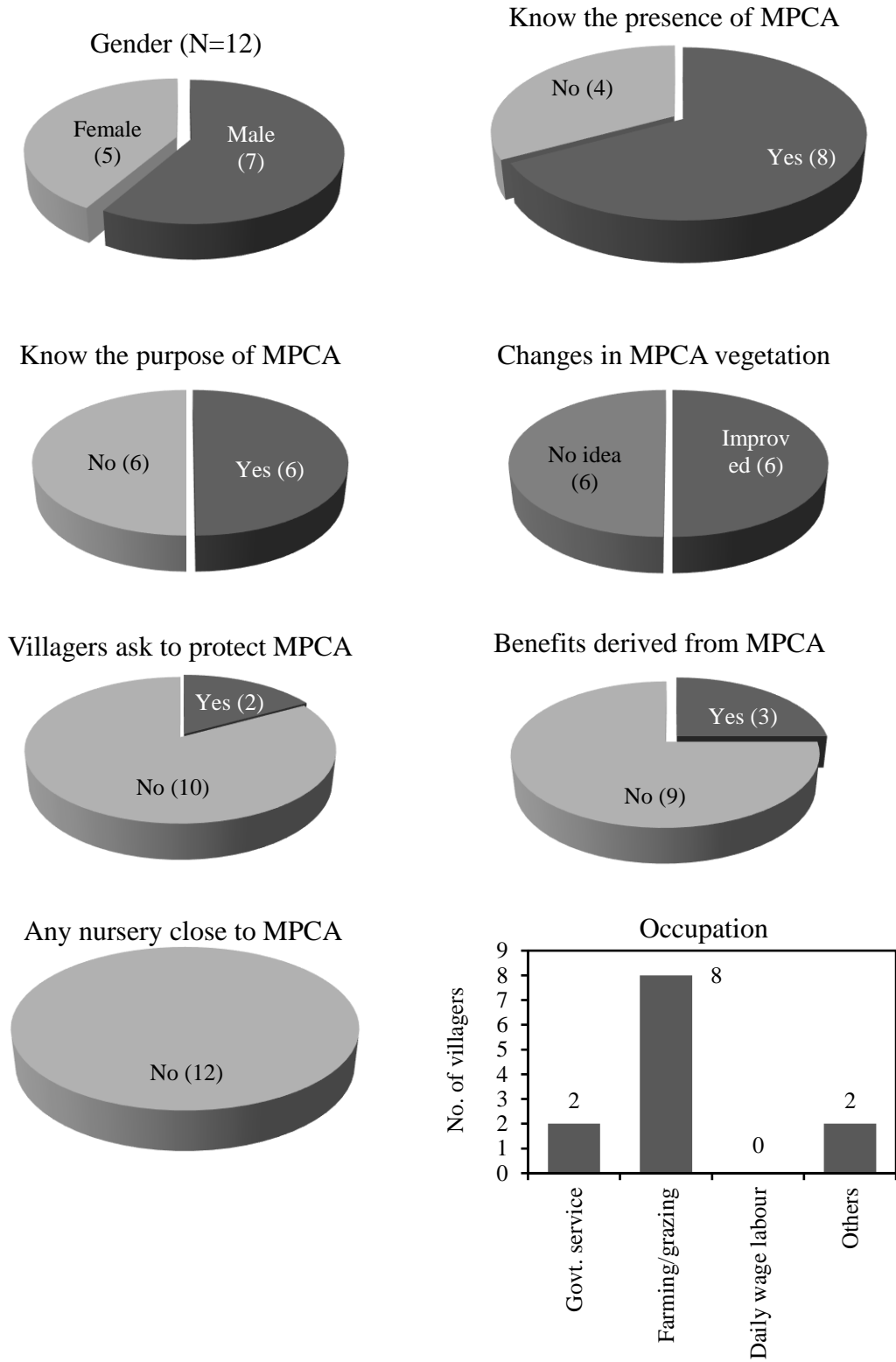


Figure 56. Responses to questions asked in the questionnaire survey conducted among community members of Magma village near Tonglu MPCA

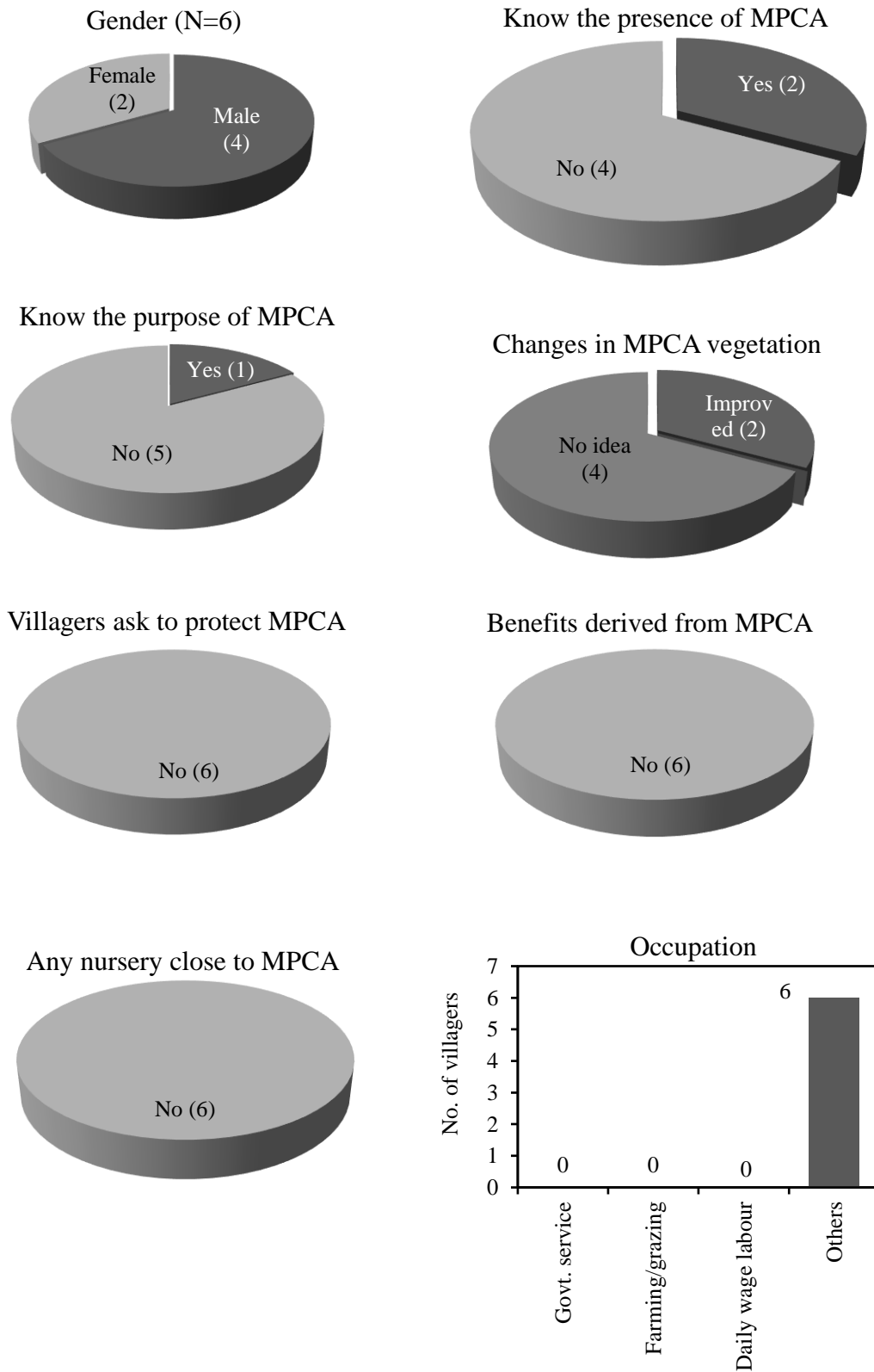


Figure 57. Responses to questions asked in the questionnaire survey conducted among community members of Tumling village near Tonglu MPCA

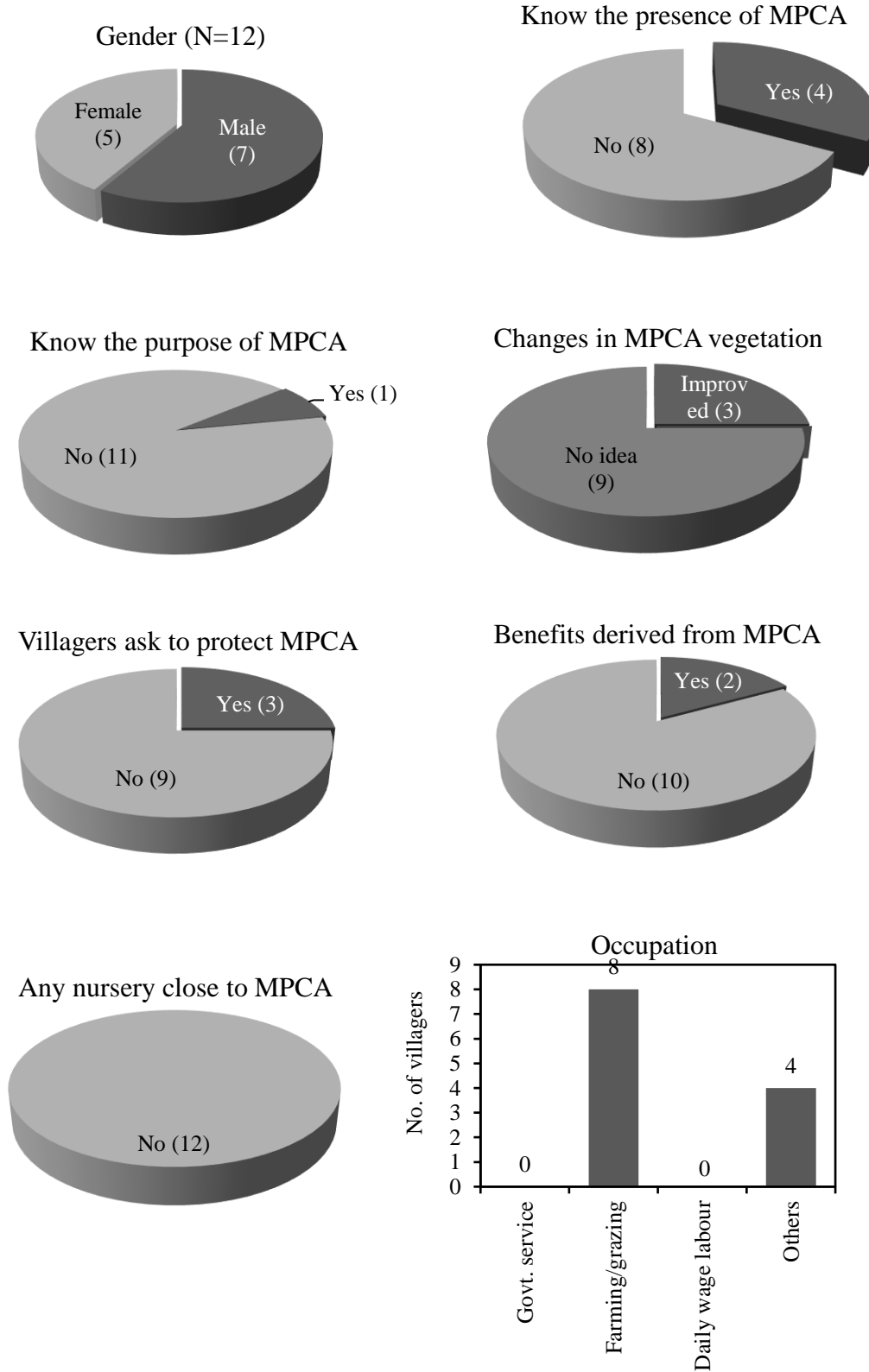


Table 22a. Details of medicinal plants collected by Tonglu villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Bikhma	<i>Aconitum ferox</i>	Food poisoning	Rare in the forest due to unsustainable collection	0.1-0.15
2	Bikhma	<i>Aconitum heterophyllum</i>	Tuber against food poisoning and as antidote	Rare in the forest due to unsustainable collection	0.1-0.15
3	Jangli dung dung/Gokpa	<i>Allium wallichii</i>	Used in stomach ache, bacterial and microbial infection in nail or skin; gastritis	Less common in the forest	0.1-0.15
4	Buro Ukhoti/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; strengthen gum; root mixed with ghee and butter and given to mother after delivery; body pain; Roots in diarrhoea and dysentery	Commonly found in the surrounding forest	0.2-0.3
5	Kesari	<i>Berberis aristata</i>	Leaves in diabetic problem; barks used in jaundice	Less common in the forest	0.3-0.4
6	Pakhanbhed	<i>Berginia ciliata</i>	Roots used in back and joint pain; used in diarrhoea and body pain	Commonly found in the surrounding forest	0.15-0.2
7	Panchungli	<i>Dactylorhiza hatagirea</i>	Roots applied in cuts and wounds	Rare in the forest due to unsustainable collection	0.05-0.2
8	Kakmala	<i>Hemiphragma heterophyllum</i>	Roots and fruits in tonsillitis	Commonly found in the forest	0.1-0.15
9	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Less common in the forest	0.2-0.3
10	Gophla	<i>Holboella latifolia</i>	Ripen fruits are good for constipation; commonly eaten by Red Panda	Commonly found in the forest	0.5-1.5
11	Okkhor	<i>Juglense regia</i>	Used in enhancing memory and for good health	Less common in the forest	0.4-0.5

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
12	Angeri	<i>Lyonia ovalifolia</i>	Leaves applied for skin disease and itching	Abundant in the forest	0.4-0.5
13	Simrayo	<i>Nasturium officinale</i>	Leaves boiled and given in T.B. and chest pain; in jaundice; leaf juice given in tuberculosis	Commonly found with the streams	0.25-0.3
14	Satwa	<i>Paris polyphylla</i>	Roots used as antidotes; for treatment of boil	Less common in the forest	0.2-0.3
15	Kutki	<i>Picrorhiza kurroa</i>	Roots and rhizome used in body ache and fever	Rare in the forest due to unsustainable collection	0.2-0.3
16	Papari	<i>Podophyllum hexandrum</i>	Plant used for treatment of skin scars; used in gynaecological infections and other sexual infections; roots as blood purifier	Rare in the forest	0.1-0.2
17	Mulajhar	<i>Potentilla polyphylla</i>	Roots used in diarrhoea; root paste in burn and skin damage	Abundant in the forest	0.15-0.3
18	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest	0.3-1.5
19	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest	0.3-0.4
20	Holholay	<i>Rumax nepalensis</i>	Roots used in Jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice and liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
21	Tenga	<i>Sorbus vestita</i>	Fruits used in respiratory problems; improves digestion	Less common in the forest	0.1-0.25
22	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fever	Commonly found in the forest in patches	0.15-0.2
23	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the forest due to large scale trade in the past.	0.7-0.8

Table 22b. Details of medicinal plants collected by Dilpa villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Bikhma	<i>Aconitum ferox</i>	Food poisoning	Rare in the forest due to unsustainable collection	0.1-0.15
2	Bikhma	<i>Aconitum heterophyllum</i>	Tuber against food poisoning and as antidote	Rare in the forest due to unsustainable collection	0.1-0.15
3	Bojo/Boch	<i>Acorus calamus</i>	Root in sore and wound; Roots in skin disease and itching	Less common in the forest	0.4-0.5
4	Thekiphal	<i>Actinidia callosa</i>	Fruits used to prepare local drinks used for cough and cold; used against asthma and in dysentery; fruits eaten by Red panda	Commonly found in the surrounding forest	0.4-0.5
5	Jangli dung dung/Gokpa	<i>Allium wallichii</i>	Used in stomach ache, bacterial and microbial infection in nail or skin; gastritis	Less common in the forest	0.1-0.15
6	Tite pat	<i>Artemisia vulgaris</i>	Leaves in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Commonly found in the surrounding forest	0.15-0.2
7	Buro Ukhoti/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; Strengthen gum; root mixed with ghee and butter and given to mother after delivery; body pain; Roots in diarrhoea and dysentery	Commonly found in the surrounding forest	0.2-0.3
8	Kesari	<i>Berberis aristata</i>	Leaves in diabetic problem; barks used in jaundice	Less common in the forest	0.3-0.4
9	Pakhanbhed	<i>Bergenia ciliata</i>	Roots used in back and joint pain; used in diarrhoea and body pain	Commonly found in the surrounding forest	0.15-0.2
10	Panchungli	<i>Dactylorhiza hatagirea</i>	Roots applied in cuts and wounds	Rare in the forest due to unsustainable collection	0.15-0.2
11	Kakmala	<i>Hemiphragma heterophyllum</i>	Roots and fruits in tonsillitis	Commonly found in the forest	0.1-0.15

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
12	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Less common in the forest	0.2-0.3
13	Gophla	<i>Holboella latifolia</i>	Ripen fruits are good for constipation; commonly eaten by Red Panda	Commonly found in the forest	0.5-1.5
14	Okkhor	<i>Juglense regia</i>	Used in enhancing memory and for good health	Less common in the forest	0.4-0.5
15	Angeri	<i>Lyonia ovalifolia</i>	Leaves applied for skin disease and itching	Abundant in the forest	0.4-0.5
16	Simrayo	<i>Nasturium officinale</i>	Leaves boiled and given in T.B. and chest pain; in jaundice; leaf juice given in tuberculosis	Commonly found with the streams	0.25-0.3
17	Satwa	<i>Paris polyphylla</i>	Roots used as antidotes; for treatment of boil	Less common in the forest	0.2-0.3
18	Kutki	<i>Picrorhiza kurrooa</i>	Roots and rhizome used in body ache and fever	Rare in the forest due to unsustainable collection	0.2-0.3
19	Papari	<i>Podophyllum hexandrum</i>	Plant used for treatment of skin scars; used in gynaecological infections and other sexual infections; roots as blood purifier	Rare in the forest	0.1-0.2
20	Mulajhar	<i>Potentilla polyphylla</i>	Roots used in diarrhoea; root paste in burn and skin damage	Abundant in the forest	0.15-0.3
21	Khokim	<i>Rheum emodi</i>	Root decoction used in fever, cough and body ache; body pain and fracture; mixed with horchur, Buro Ukhoti and Pakhambhed and Khoir	Rare in the forest	0.2-0.3
22	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest	0.3-1.5

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
23	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest	0.3-0.4
24	Holholay	<i>Rumax nepalensis</i>	Roots used in Jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice & liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
25	Tenga	<i>Sorbus vestita</i>	Fruits used in respiratory problems; improves digestion	Less common in the forest	0.1-0.25
26	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fever	Commonly found in the forest in patches	0.15-0.2
27	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the forest due to large scale trade in the past.	0.7-0.8
28	Boke Timur	<i>Zanthoxylum alatum</i>	Fruits used in headache and anti-gastritis; fruits in leach repellent	Less common in the forest	0.2-0.3
29	Timbur	<i>Zanthoxylum oxyphyllum</i>	Used in sore throat, cough and cold	Less common in the forest	0.1-0.2
30	Chitray	<i>Thalictrum foliolosum</i>	Roots used in dyspepsia, stomach ache and ulcer	Less common in the forest	0.15-0.2
31	Salaney	<i>Panax-pseudo ginseng</i>	Rhizome in good health and aphrodisiac	Rare in the forest due to unsustainable collection	0.15-0.2
32	Sil Timur	<i>Litsea citrata</i>	In cattle blotting symptoms; mixed with chimping, khanakpa fruits; used in cough, fever, body ache; sore throat	Less common in the forest	0.26-0.3
33	Avijalo/Lahare jhar	<i>Drymaria cordata</i>	Antiseptic and throat pain; in sinus problem	Commonly found in the surrounding open area	0.15-0.2
34	Kukure jhar	<i>Equisetum sp.</i>	Roots given for kidney problem	Commonly found in the forest	0.1-0.2
35	Bonmara/kalijhar	<i>Eupatorium odoratum</i>	Leaves as antiseptic; used in cut and wound	Abundant in the roadside and fragmented area	0.15-0.2

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
36	Khanakpa	<i>Evodia lunu-ankenda</i>	Bark used in Kidney problem; fruits used in gastritis, cough, fever & body ache	Less common in the forest	0.4-0.5
37	Tite pat	<i>Artemisia vulgaris</i>	Leaves in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Commonly found in the surrounding forest	0.15-0.2

Table 22c. Details of medicinal plants collected by Tumling villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Bikhma	<i>Aconitum ferox</i>	Food poisoning	Rare in the forest due to unsustainable collection	0.1-0.15
2	Bikhma	<i>Aconitum heterophyllum</i>	Tuber against food poisoning and as antidote	Rare in the forest due to unsustainable collection	0.1-0.15
3	Jangli dung dung/Gokpa	<i>Allium wallichii</i>	Used in stomach ache, bacterial and microbial infection in nail or skin; gastritis	Less common in the forest	0.1-0.15
4	Buro Ukhote/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; Strengthen gum; root mixed with ghee and butter and given to mother after delivery; body pain; Roots in diarrhoea and dysentery	Commonly found in the surrounding forest	0.2-0.3
5	Kesari	<i>Berberis aristata</i>	Leaves in diabetic problem; barks used in jaundice	Less common in the forest	0.3-0.4
6	Pakhanbhed	<i>Bergenia ciliata</i>	Roots used in back and joint pain; used in diarrhoea and body pain	Commonly found in the surrounding forest	0.15-0.2
7	Panchungli	<i>Dactylorhiza hatagirea</i>	Roots applied in cuts and wounds	Rare in the forest due to unsustainable collection	50-0.2
8	Kakmala	<i>Hemiphragma heterophyllum</i>	Roots and fruits in tonsillitis	Commonly found in the forest	0.1-0.15

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
9	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Less common in the forest	0.2-0.3
10	Angeri	<i>Lyonia ovalifolia</i>	Leaves applied for skin disease and itching	Abundant in the forest	0.4-0.51
11	Simrayo	<i>Nasturium officinale</i>	Leaves boiled and given in T.B. and chest pain; in jaundice; leaf juice given in tuberculosis	Commonly found with the streams	0.25-0.3
12	Kutki	<i>Picrorhiza kurrooa</i>	Roots and rhizome used in body ache and fever	Rare in the forest due to unsustainable collection	0.2-0.3
13	Papari	<i>Podophyllum hexandrum</i>	Plant used for treatment of skin scars; used in gynaecological infections and other sexual infections; roots as blood purifier	Rare in the forest	0.1-0.2
14	Mulajhar	<i>Potentilla polyphylla</i>	Roots used in diarrhoea; root paste in burn and skin damage	Abundant in the forest	0.15-0.3
15	Khokim	<i>Rheum emodi</i>	Root decoction used in fever, cough and body ache; body pain and fracture; mixed with horchur, Buro Ukhote and Pakhambhed and Khoir	Rare in the forest	0.2-0.3
16	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest	0.3-1.5
17	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest	0.3-0.4
18	Holholay	<i>Rumax nepalensis</i>	Roots used in Jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice and liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
19	Tenga	<i>Sorbus vestita</i>	Fruits used in respiratory problems; improves digestion	Less common in the forest	0.1-0.25
20	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fever	Commonly found in the forest in patches	0.15-0.2

Community' understanding of medicinal plants & MPCAs

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
21	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the forest due to large scale trade in the past.	0.7-0.8

Table 22d. Details of medicinal plants collected by Magma villagers in the neighbourhood of Tonglu Medicinal Plants Conservation Area (MPCA)

Sl. No	Local Name	Botanical name	Medicinal use	Remarks	Quantity collected/day (kg)
1	Bikhma	<i>Aconitum ferox</i>	Food poisoning	Rare in the forest due to unsustainable collection; traded earlier	0.1-0.15
2	Bikhma	<i>Aconitum heterophyllum</i>	Tuber against food poisoning and as antidote	Rare in the forest due to unsustainable collection; traded earlier	0.1-0.15
3	Bojo/Boch	<i>Acorus calamus</i>	Root in sore and wound; Roots in skin disease and itching	Less common in the forest; traded earlier	0.4-0.5
4	Thekiphal	<i>Actinidia callosa</i>	Fruits used to prepare local drinks used for cough and cold; used against asthma and in dysentery; fruits eaten by red panda	Commonly found in the surrounding forest; fruits sometime used in preparation of local drinks	0.4-0.5
5	Jangli dung dung/Gokpa	<i>Allium wallichii</i>	Used in stomach ache, bacterial and microbial infection in nail or skin; in gastritis	Less common in the forest	0.1-0.15
6	Tite pat	<i>Artemisia vulgaris</i>	Leaves in blood pressure; cough and cold; nose bleeding; as skin oil, nose bleeding, oil for joint pain	Commonly found in the surrounding forest	0.15-0.2
7	Buro Ukhoti/Bon supari	<i>Astilbe rivularis</i>	Used in gum problem; strengthen gum; root mixed with ghee and butter and	Commonly found in the surrounding forest	0.2-0.3

Community' understanding of medicinal plants & MPCAs

			given to mother after delivery; body pain; Roots in diarrhoea and dysentery		
8	Kesari	<i>Berberis aristata</i>	Leaves in diabetic problem; barks used in jaundice	Less common in the forest	0.3-0.4
9	Pakhanbhed	<i>Bergenia ciliata</i>	Roots used in back and joint pain; used in diarrhoea and body pain	Commonly found in the surrounding forest; traded earlier	0.15-0.2
10	Panchungli	<i>Dactylorhiza hatagirea</i>	Roots applied in cuts and wounds	Rare in the forest due to unsustainable collection; traded earlier	0.05-0.2
11	Kakmala	<i>Hemiphragma heterophyllum</i>	Roots and fruits in tonsillitis	Commonly found in the forest	0.1-0.15
12	Chimphing	<i>Heracleum wallichii</i>	Roots used in cough, fever, body ache, joint pain; Leaves and flower eaten in gastritis, body pain; fruits in high altitude sickness and acidity	Less common in the forest; sometime sold in local market	0.2-0.3
13	Gophla	<i>Holboella latifolia</i>	Ripen fruits are good for constipation; commonly eaten by Red Panda	Commonly found in the forest	0.5-1.5
14	Okkhor	<i>Juglense regia</i>	Used in enhancing memory and for good health	Less common in the forest; sometime sold in local market	0.4-0.5
15	Angeri	<i>Lyonia ovalifolia</i>	Leaves applied for skin disease and itching	Abundant in the forest	0.4-0.5
16	Simrayo	<i>Nasturium officinale</i>	Leaves boiled and given in T.B. and chest pain; in jaundice; leaf juice given in tuberculosis	Commonly found with the streams	0.25-0.3
17	Satwa	<i>Paris polyphylla</i>	Roots used as antidotes; for treatment of boil	Less common in the forest; traded earlier	0.2-0.3
18	Kutki	<i>Picrorhiza kurrooa</i>	Roots and rhizome used in body ache and fever	Rare in the forest due to unsustainable collection; traded earlier	0.2-0.3
19	Papari	<i>Podophyllum hexandrum</i>	Plant used for treatment of skin scars; used in gynaecological infections and other sexual infections; roots as blood purifier	Rare in the forest; traded earlier	0.1-0.2

Community' understanding of medicinal plants & MPCAs

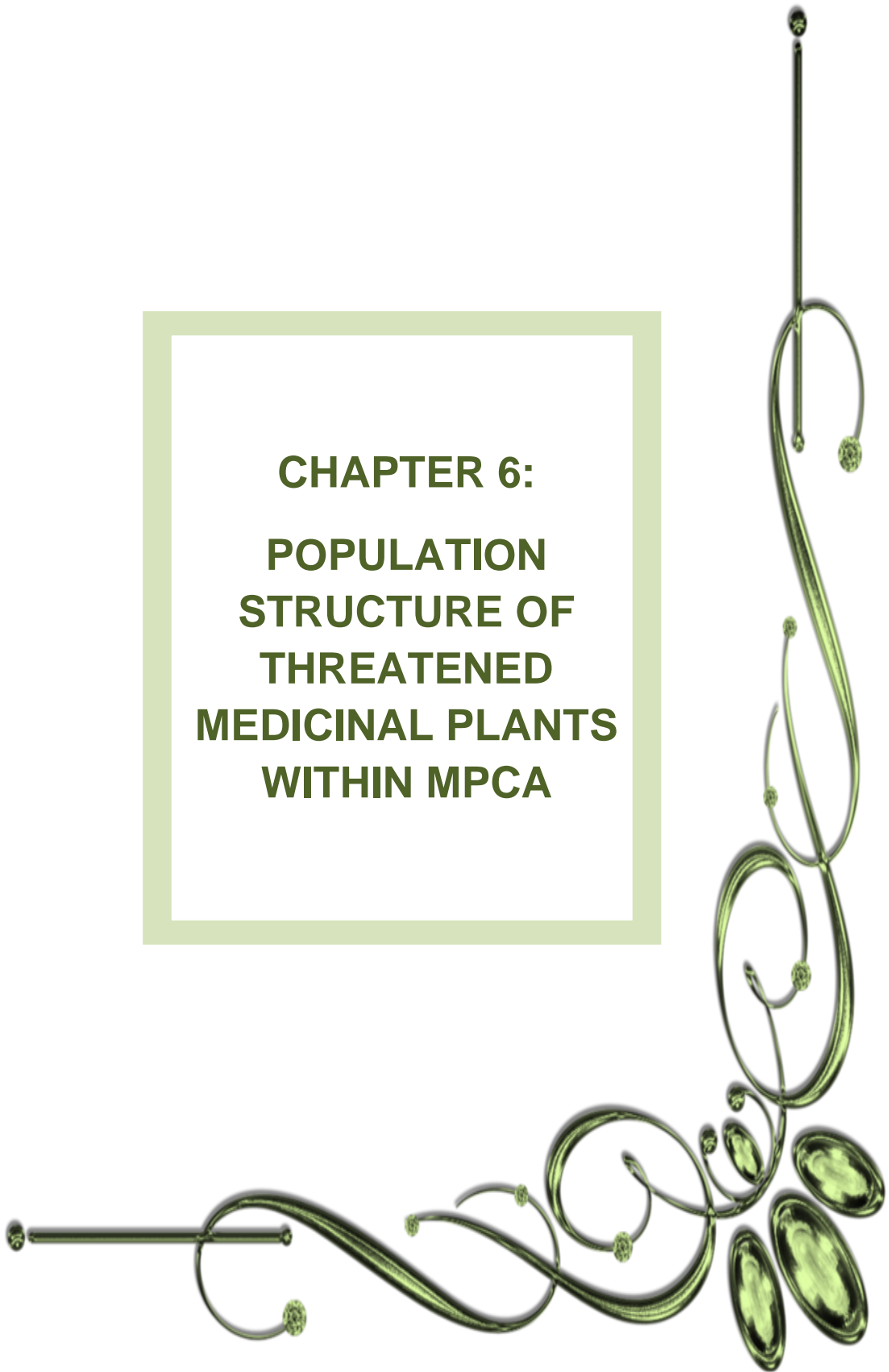
20	Mulajhar	<i>Potentilla polyphylla</i>	Roots used in diarrhoea; root paste in burn and skin damage	Abundant in the forest	0.15-0.3
21	Khokim	<i>Rheum emodi</i>	Root decoction used in fever, cough and body ache; body pain and fracture; mixed with horchur, Buro Ukhoti and Pakhambhed and Khoir	Rare in the forest; traded earlier	0.2-0.3
22	Lali Gorus	<i>Rhododendron arboreum</i>	Flowers used in removing fish bone stuck to the throat; used to prepare squash and local drinks	Abundant in the forest; flower used in preparation of local drinks and squash	0.3-1.5
23	Manjito	<i>Rubia manjith</i>	The plant roots used against urinary disorder; used in blood dysentery	Less common in the forest; traded earlier	0.3-0.4
24	Holholay	<i>Rumax nepalensis</i>	Roots used in jaundice, dysentery and diarrhoea; roots meshed in water given in jaundice and liver problem; used in hair loss	Commonly found in the forest	0.2-0.3
25	Tenga	<i>Sorbus vestita</i>	Fruits used in respiratory problems; improves digestion	Less common in the forest	0.1-0.25
26	Chiroto	<i>Swertia chirayita</i>	Whole plant used in fever	Commonly found in the forest in patches; traded earlier	0.15-0.2
27	Dhangre Salla	<i>Taxus wallichiana</i>	Cancer, joint pain, decoction of leaves in body pain; decoction given in high blood pressure	Less common in the forest; population declined in the forest due to large scale trade in the past.	0.7-0.8

4.4. Conclusion

As there is too much pressure on the forest areas including MPCA areas for fuel wood, fodder, timber and other NTFPs, there is a need for providing alternate livelihood options. During the survey, respondents expressed number of opportunities, which can be sustainably used by the local people. They are (a) cultivation of medicinal plants for commercial sale; (b) homestay business; (c) tourism and use of local craft skill; (d) improved agriculture system with proper irrigation system as water scarcity is one of the emerging issues in MPCA areas; (e) women empowerment through involving them in decision making.

Since MPCA is considered to be a hands-off area, there needs to be a strategic approach to involve local communities in the buffer zone. This is a high time to create awareness among local community members from villages surrounding the MPCAs on the importance of MPCA, the possible role they can play and how they can get engaged in monitoring and management of the MPCAs. There has to be development area in the buffer zone perhaps a part of JFMC area to make local community members get involved in various activities such as monitoring, raising nursery of important medicinal plants and generating sustainable livelihoods.

**CHAPTER 6:
POPULATION
STRUCTURE OF
THREATENED
MEDICINAL PLANTS
WITHIN MPCA**





Gynocardia odorata fruit

6.1 Introduction

The most critical aspect in the biodiversity conservation is the prioritisation of species as there may be number of species in need of immediate action. One of the ways to prioritise species especially plants is based on the threatened category the particular species belongs to. Apart from that how important the particular species is in the commercial trade market fetching more price value and also in great demand. In general, there is a RED data book published by the Botanical Survey of India with periodical updates while there is also an IUCN Red list of Threatened plants. In specific to medicinal plants, FRLHT has been organising number of Conservation Assessment and Management Prioritisation (CAMP) workshop at state level to conduct threat assessment for medicinal plants involving subject experts and taxonomists by following IUCN guidelines. The list of threatened medicinal plant species has been prepared for almost all states in India. Plant species that are listed as threatened species are given priority when it comes to undertaking any conservation actions.

6.2. Threatened medicinal plants of West Bengal state

Rapid assessment of threats to the medicinal plants of West Bengal was done through CAMP workshop held at state level. This workshop aimed at assigning the IUCN's qualitative Red List system to categorise each species to a degree of endangerment based on the estimates of the threats to the population and habitat. A total of 148 medicinal plant species was proposed for the assessment of which 43 species were assessed according to the IUCN Red List Criteria. Subject experts and taxonomists from West Bengal assessed their distribution and prepared the taxon sheets for each of 43 medicinal plant species prioritised for conservation in West Bengal.

In the current study, out of 43 medicinal plant species having threatened status in West Bengal through CAMP workshops conducted, 40 medicinal plant species are recorded in seven MPCAs. The list of threatened medicinal plants are given in the Chapter 3 as part of qualitative assessment study. The number of medicinal plant species across different threatened status categories are: 14 Vulnerable; 19 Endangered; 1 Near Threatened; 6 Critically Endangered. Among trees, there are 24 species in Vulnerable, 7 in Endangered and 3 in Near Threatened category. There are 6 trees and 4 climbers in Vulnerable category. Out of 15 herbs assessed, 8 species are in Endangered category. Out of 40 threatened medicinal plants recorded in MPCAs, 25 are under trade, while 16 are in high trade with volumes

exceeding 100 MT per annum. Three species that are not recorded in seven MPCAs are *Lycopodiella cernua* (Staghorn clubmoss), an Endangered herb; and two Near Threatened species: *Tylophora indica* (climber) and *Ipomoea mauritiana* (climber).

6.3 Population structure of threatened medicinal plants

Out of 40 threatened plant species recorded in the qualitative assessment, 23 plants were found in the quadrat study (Table 23). There were six threatened plants namely, *Cinnamomum bejolghota*, *Gynocardia odorata*, *Machilus glaucescens*, *Mesua ferrea*, *Stereospermum colais*, *Xylocarpus granatum*, found to have representation in adult (20m x 20m), sapling (5m x 5m) and seedling (1m x 1m) stages. There were 12 plant species with >30 cm gbh recorded in 20m x 20m quadrats. The summary of plant population status of threatened plant species with >30 cm gbh is provided (Table 24). In order to understand the population structure of threatened species, the Important Value Index (IVI) was used as a measure. The Critically Endangered (CE) medicinal plant species, *Machilus glaucescens*, was found to have a viable population especially in North Sevoke MPCA (IVI value 40.4) followed by North Rajabhatkhawa (IVI value 10.8), and Sursuti (IVI value 8.79) (Table 24). The population of another Critically Endangered species, *Taxus wallichiana*, was found to be good with high IVI value in Tonglu MPCA (28.9) and Dhotrey (11.9). Likewise, the Endangered plant species, *Gynocardia odorata*, had IVI value of 33.2 in North Rajabhatkhawa, 24.9 in Sursuti and 9.06 in North Sevoke MPCA. The IVI values of *Stereospermum colais*, the Vulnerable species, were 42.97, 31.89 and 17.87 respectively in North Sevoke, Sursuti and North Rajabhatkhawa MPCAs (Table 24). The lone Vulnerable species with >30cm gbh, *Xylocarpus granatum*, was found to have good population with IVI value 37.73 in Bonnie camp MPCA. In the 5m x 5m quadrat, only 11 species with ≤30 cm gbh plant size belonged to threatened plants category (Table 25). Most of them were saplings of trees and climbers/lianas. In the 1m x 1m sub-quadrat, there were 17 threatened plant species recorded. Of which, 6 species were shrubs and herbs, while the remaining were the seedlings of trees and climbers/lianas (Table 26).

Table 23. List of threatened medicinal plant species recorded in 20m x 20m quadrats with >30 cm gbh, in 5m x 5m quadrats with ≤30cm gbh and in 1m x 1m sub quadrats as shrubs, herbs and seedlings across seven MPCAs in West Bengal.

Sl.No	Species	Family	Habit	Threatened status	Plant type
1	<i>Abelmoschus moschatus</i>	Malvaceae	Herb	Near Threatened	Shrubs, herbs, seedlings
2	<i>Aconitum ferox</i>	Ranunculaceae	Herb	Endangered	Shrubs, herbs, seedlings
3	<i>Aconitum palmatum</i>	Ranunculaceae	Herb	Endangered	Shrubs, herbs, seedlings
4	<i>Aristolochia indica</i>	Aristolochiaceae	Climber	Vulnerable	Shrubs, herbs, seedlings
5	<i>Asparagus racemosus</i>	Asparagaceae	Climber	Endangered	Shrubs, herbs, seedlings
6	<i>Berberis aristata</i>	Berberidaceae	Shrub	Vulnerable	>30 cm gbh
					≤30cm gbh
7	<i>Celastrus paniculatus</i>	Celastraceae	Liana	Endangered	≤30cm gbh
					Shrubs, herbs, seedlings
8	<i>Cinnamomum bejolghota</i>	Lauraceae	Tree	Vulnerable	≤30cm gbh
					Shrubs, herbs, seedlings
					>30 cm gbh
9	<i>Cinnamomum cecidodaphne</i>	Lauraceae	Tree	Endangered	>30 cm gbh
10	<i>Gynocardia odorata</i>	Achariaceae	Tree	Endangered	≤30cm gbh
					Shrubs, herbs, seedlings
					>30 cm gbh
11	<i>Machilus glaucescens</i>	Lauraceae	Tree	Critically Endangered	≤30cm gbh
					Shrubs, herbs, seedlings
					>30 cm gbh
12	<i>Mesua ferrea</i>	Caryophyllaceae	Tree	Endangered	≤30cm gbh
					>30 cm gbh

Population structure of threatened medicinal plants within MPCAs

					Shrubs, herbs, seedlings
13	<i>Mucuna pruriens</i>	Fabaceae	Climber	Endangered	Shrubs, herbs, seedlings
14	<i>Olax nano</i>	Olacaceae	Shrub	Vulnerable	≤30cm gbh
				Vulnerable	Shrubs, herbs, seedlings
15	<i>Pterocarpus marsupium</i>	Fabaceae	Tree	Endangered	>30 cm gbh
16	<i>Rauvolfia serpentina</i>	Apocynaceae	Herb	Endangered	Shrubs, herbs, seedlings
17	<i>Sonneratia caseolaris</i>	Lythraceae	Tree	Endangered	>30 cm gbh
18	<i>Stereospermum colais</i>	Bignoniaceae	Tree	Vulnerable	≤30cm gbh
				Vulnerable	Shrubs, herbs, seedlings
				Vulnerable	>30 cm gbh
19	<i>Swertia chirayita</i>	Gentianaceae	Herb	Critically Endangered	Shrubs, herbs, seedlings
20	<i>Taxus wallichiana</i>	Taxaceae	Tree	Critically Endangered	≤30cm gbh
				Critically Endangered	>30 cm gbh
21	<i>Thalictrum foliolosum</i>	Ranunculaceae	Herb	Vulnerable	Shrubs, herbs, seedlings
22	<i>Toona ciliata</i>	Meliaceae	Tree	Vulnerable	≤30cm gbh
				Vulnerable	>30 cm gbh
23	<i>Xylocarpus granatum</i>	Meliaceae	Tree	Vulnerable	≤30cm gbh
				Vulnerable	Shrubs, herbs, seedlings
				Vulnerable	>30 cm gbh

Population structure of threatened medicinal plants within MPCAs

Table 24. Summary of population status of threatened medicinal plants with >30 cm gbh recorded in 20m x 20m quadrats across seven Medicinal Plants Conservation Areas (MPCAs), West Bengal

Sl. No	Species	Threatened status	MPCA	Frequency	Relative frequency	Density	Relative density	Basal area	Relative basal area	IVI
1	<i>Berberis aristata</i> DC.	Vulnerable	Tonglu	1	5	1	0.26	0.01	0.06	5.31
2	<i>Cinnamomum bejolghota</i> (Buch. -Ham.) Sweet	Vulnerable	Dhotrey	1	5	2	0.56	0.52	0.59	6.15
			North Rajabhatkhawa	2	10	2	0.65	0.03	0.08	10.73
			Sursuti	2	10	3	1.18	0.16	0.67	11.85
3	<i>Cinnamomum cecidodaphne</i> Meisn.	Endangered	Sursuti	2	10	2	0.79	0.18	0.75	11.54
4	<i>Gynocardia odorata</i> R.Br.	Endangered	North Rajabhatkhawa	5	25	14	4.56	1.21	3.68	33.24
			North Sevoke	1	5	1	0.40	1.27	3.66	9.06
			Sursuti	4	20	6	2.36	0.62	2.57	24.94
5	<i>Machilus glaucescens</i> (Nees) Wight	Critically Endangered	North Rajabhatkhawa	2	10	2	0.65	0.05	0.15	10.80
			North Sevoke	7	35	13	5.22	0.07	0.21	40.43
			Sursuti	1	5	1	0.39	0.82	3.40	8.79
6	<i>Mesua ferrea</i> L.	Endangered	North Rajabhatkhawa	3	15	6	1.95	0.14	0.42	17.37
			North Sevoke	1	5	1	0.40	0.04	0.10	5.50
			Sursuti	2	10	2	0.79	0.01	0.04	10.83
7	<i>Pterocarpus marsupium</i> Roxb.	Endangered	Garpanchkot	5	10	7	0.69	0.14	0.53	11.43

Population structure of threatened medicinal plants within MPCAs

8	<i>Sonneratia caseolaris</i> (L.) Engl.	Endangered	Bonnie camp	1	5	1	1.15	0.01	0.49	6.64
9	<i>Stereospermum colais</i> (Buch. - Ham. ex Dillwyn) Mabb.	Vulnerable	North Rajabhatkhawa	3	15	3	0.98	0.62	1.89	17.87
			North Sevoke	7	35	8	3.21	1.65	4.75	42.97
			Sursuti	5	25	7	2.76	0.99	4.14	31.89
10	<i>Taxus wallichiana</i> Zucc.	Critically Endangered	Dhotrey	2	10	3	0.83	0.91	1.03	11.86
			Tonglu	5	25	7	1.81	0.36	2.06	28.87
11	<i>Toona ciliata</i> M.Roem.	Vulnerable	North Rajabhatkhawa	2	10	2	0.65	0.13	0.38	11.03
			Sursuti	1	5	1	0.39	0.12	0.50	5.90
12	<i>Xylocarpus granatum</i> J.Koenig	Vulnerable	Bonnie camp	4	20	5	5.75	0.19	11.98	37.73

Population structure of threatened medicinal plants within MPCAs

Table 25. Summary of population status of threatened medicinal plants with ≤ 30 cm gbh recorded in 5m x 5m quadrats across seven Medicinal Plants Conservation Areas (MPCAs), West Bengal

Sl.No	Species	Threatened status	MPCA	Frequency	Relative frequency	Density	Relative density	Basal area	Relative basal area	IVI
1	<i>Berberis aristata</i> DC.	Vulnerable	Tonglu	2	10	2	1.08	0.002	0.273	11.348
2	<i>Celastrus paniculatus</i> Willd.	Endangered	North Sevoke	1	5	1	1.04	0.002	0.987	7.028
3	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	Vulnerable	Dhotrey	1	5	2	1.64	0.004	1.35	7.989
			Sursuti	1	10	1	1.27	0.002	0.839	12.105
4	<i>Gynocardia odorata</i> R.Br.	Endangered	North Rajabhatkhawa	1	5	1	1.15	0.006	3.242	9.39
			North Sevoke	1	5	1	1.04	0.001	0.531	6.572
			Sursuti	1	10	1	1.27	0.001	0.724	11.99
5	<i>Machilus glaucescens</i> (Nees) Wight	Critically Endangered	North Sevoke	4	20	4	4.17	0.004	2.056	26.22
			Sursuti	3	30	8	10.13	0.022	11.923	52.05
6	<i>Mesua ferrea</i> L.	Endangered	North Rajabhatkhawa	2	10	3	3.45	0.006	3.056	16.50
7	<i>Olex nana</i> Wall.	Vulnerable	Garpanchkot	7	14.58	9	2.72	0.003	0.334	17.636
8	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillwyn) Mabb.	Vulnerable	North Rajabhatkhawa	1	5	1	1.15	0.001	0.413	6.563
			North Sevoke	3	15	3	3.13	0.003	1.811	19.936
9	<i>Taxus wallichiana</i> Zucc.	Critically Endangered	Dhotrey	3	15	4	3.28	0.009	2.865	21.14
			Tonglu	1	5	1	0.54	0.004	0.625	6.162
10	<i>Toona ciliata</i> M.Roem.	Vulnerable	North Rajabhatkhawa	1	5	1	1.15	0.001	0.413	6.563
11	<i>Xylocarpus granatum</i> J.Koenig	Vulnerable	Bonnie camp	2	10	3	2.05	0.016	3.199	15.253

Table 26. Summary of population status of threatened medicinal shrubs, herbs and seedlings recorded in 1m x 1m quadrats across seven Medicinal Plants Conservation Areas (MPCAs), West Bengal

Sl.No	Species	Threatened status	MPCA	Frequency	Density
1	<i>Abelmoschus moschatus</i> Medik.	Near Threatened	North Sevoke	1	1
2	<i>Aconitum ferox</i> Wall. ex Seringe	Endangered	Tonglu	12	48
3	<i>Aconitum palmatum</i> D. Don	Endangered	Tonglu	2	2
4	<i>Aristolochia indica</i> L.	Vulnerable	Garpanchkot	7	7
			North Rajabhatkhawa	1	4
			North Sevoke	2	2
5	<i>Asparagus racemosus</i> Willd.	Endangered	Garpanchkot	6	8
			North Rajabhatkhawa	2	3
6	<i>Celastrus paniculatus</i> Willd.	Endangered	North Rajabhatkhawa	1	8
			North Sevoke	1	3
			Sursuti	1	3
7	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	Vulnerable	North Rajabhatkhawa	1	1
			North Sevoke	2	3
8	<i>Gynocardia odorata</i> R.Br.	Endangered	North Rajabhatkhawa	1	7
9	<i>Machilus glaucescens</i> (Nees) Wight	Critically Endangered	North Rajabhatkhawa	4	6
10	<i>Mesua ferrea</i> L.	Endangered	Sursuti	1	1
11	<i>Mucuna pruriens</i> (L.) DC.	Endangered	Garpanchkot	3	3

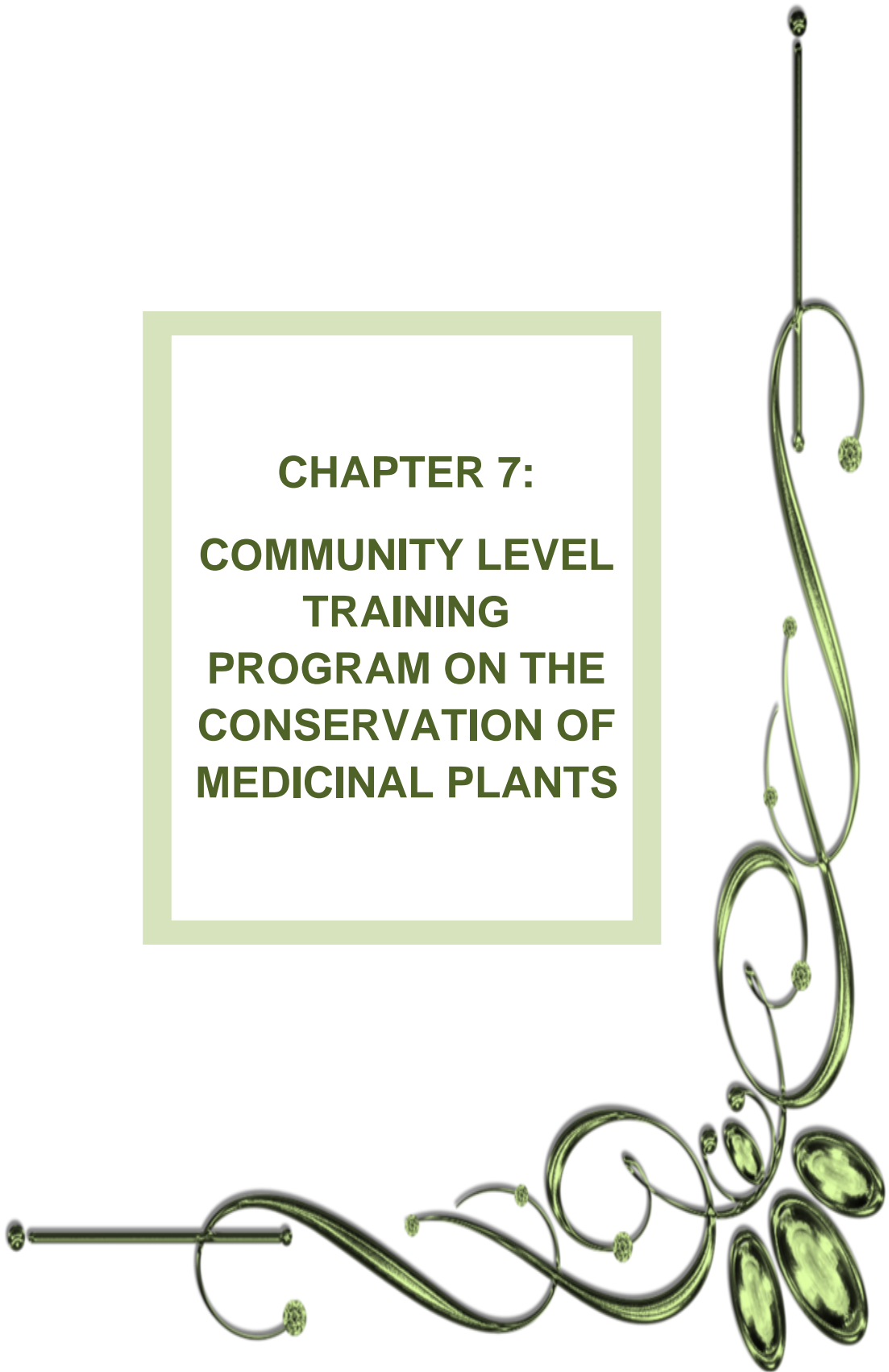
Population structure of threatened medicinal plants within MPCAs

12	<i>Olax nana</i> Wall.	Vulnerable	Garpanchkot	3	3
13	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Endangered	North Rajabhatkhawa	1	1
14	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillwyn) Mabb.	Vulnerable	North Sevoke	4	6
			Sursuti	1	1
15	<i>Swertia chirayita</i> (Roxb.) Buch.-Ham. ex C.B.Clarke	Critically Endangered	Dhotrey	1	1
			Tonglu	18	32
16	<i>Thalictrum foliolosum</i> DC.	Vulnerable	Tonglu	16	41
17	<i>Xylocarpus granatum</i> J.Koenig	Vulnerable	Bonnie camp	5	12

6.4 Conclusion

The changes in population of threatened plants are expected to occur through variation in the number of populations for a given species, the number of individuals per population, the spatial distribution of populations, and genetic differentiation within and among population. Such population assessment can aid in collecting reliable scientific information on habitat composition, structure and dynamics, and in evaluating existing management approaches and their impacts on forest ecosystems. Forest dynamics studies, conducted short term and long term, targeting threatened plants can enable us to determine not just changes in plant species diversity over a period, and also provide us data related to global climate change if weather parameters are taken into consideration. The changes in plant population of threatened plants have to be examined using information gained by counting and later recounting a defined sample and assessing survivors, losses and gains. It is important to have further studies on the threatened plants to understand their population structure and dynamics. This would give more information to take any conservation actions

**CHAPTER 7:
COMMUNITY LEVEL
TRAINING
PROGRAM ON THE
CONSERVATION OF
MEDICINAL PLANTS**





Holding discussions with community member prior to training programs

7.1 Introduction

It has been widely believed that forest-dependent communities are aware of sustainable management of forest resource especially NTFPs either for their ready use at homes or trading with local shops for petty cash. However, in the recent decades, there has been a great demand for herbal medicines among nature conscious customers that has put lot of pressure on wild collected medicinal plants. As a result, there has been increase in the collection of plant items in terms of more NTFPs and also more quantity by employing destructive practices during resource extraction. This has impacted on the plant populations especially the ones that are already threatened and endemic to landscapes as they struggle to regenerate naturally in the forests. The promising intervention would be the creation of awareness among NTFP/medicinal plant collectors in the forest neighbouring villages and human settlements and also organising regular training and capacity building programs at community level on sustainable management through implementing sustainable wild collection methods. Though they have very good knowledge of local use of these medicinal plants domestically and the importance of continuous availability of plant populations in the wild, they seemed to forego the conscious calling on employing sustainable principles during wild collection, only because of quick remuneration they receive for making large collections of plant materials.

Considering the necessity for creating awareness and capacity building on conservation and sustainable management of medicinal plants, community members in the forest fringe neighbourhoods are in need of trainings to make them understand the larger picture of conserving forest resources for their livelihood and health security too. Hence, a number of training programs were planned to be held at village level. The community level training programs are one such attempt to realise conservation and sustainable use of medicinal plants without compromising the income generated from them. Such programs organised for local community members will offer following benefits:

- ❖ Identification of challenges and threats present at local level for the conservation and sustainable use of medicinal plants both in the MPCA areas and other forest areas as well
- ❖ Imparting the knowledge of conserving and sustainably collecting wild medicinal plants, value addition, cultivation, practices, harvesting methods, marketing and know-hows of using tools and equipment

- ❖ Building the ability and capacity of community members in local institutions to develop their own workable strategies locally to field implement sustainable wild collection of medicinal plants
- ❖ Motivation among JFMC members to improve the status of medicinal plant population in the wild
- ❖ Networking of community members locally to coordinate the implementation of MPCA related activities and conservation measures for medicinal plants at large scale under the supervision of forest development agency (FDA)

7.2 Materials and methods

As part of this project, training programs titled ‘Training on the sustainable management and conservation of medicinal plants’ were organised targeting local community members residing close to the MPCAs. The first training program was organised in Sundarbans from 26th October to 28th October 2021, while the second one was in Purulia from 26th November to 28th November, 2021. The community level training program was conducted by Dr. Biswarupa Ghosh, Dr. Debabrata Saha, Dr. Datchinamoorthy and Ms. Niharika Das along with the support of forest officials and local people.

As a first step in conducting training and capacity building of community members on the bioresources and sustainable management of medicinal plants, the agenda for three-day training program was developed. This three-day training program targets forest-dependent community members, plant collectors, local agents, self-help groups (SHGs), who are involved in the various stages of medicinal plant utilisation, and represent the local participatory institutions like JFMCs and Eco-Development Committees (EDCs). It was arranged to equip the local community members on the covered topics to implement their learnings in the field.



7.3. Training proceedings

7.3.1 Bonnie Camp MPCA, Raidighi Range, South 24 Parganas, Sunderban, West Bengal.

Bonnie Camp MPCA has dense mangrove vegetation, which can be reached by waterways only. The banks of the MPCA begin with quick mud, and are not at all welcoming for researchers and other human visitors. Prominent presence of tiger pug marks close to the banks of the mangrove deters human interference in Bonnie camp MPCA and the neighbouring forests. Hence, two neighbouring villages in relatively inhabited areas were selected for community level training in Bonnie Camp MPCA:

1. Purbasridharpur village (21.92754 N, 88.47589E)
2. Ambikanagar village (21.1032N, 88.53325E)

In the present scenario of climate change and global warming the mangroves and people of Sundarbans are at higher risk of ecological disasters. The adverse impacts of climate change can be reduced by conserving the unique and sensitive mangrove ecosystems. In this regard, this training program aimed at enlightening the local community about the sustainable management of the medicinal plants within the MPCA and biodiversity conservation in its neighbourhood.

The community was further surveyed through structured interviews to get an idea on their use of medicinal plants in daily life and their association with the MPCA. Mostly elder female community members and few men had fairly good idea of the uses of medicinal plants for



therapeutic and daily uses. The younger generation experienced a loss in transfer of this traditional medicinal knowledge. It was understood that the people of the area have a very harsh and unpredictable life due to the low and high tides of the surrounding water ways. The many challenges to the well being of the people of this area are the man-animal conflicts with the presence of the Royal Bengal tiger and other wild animals, the poor livelihood opportunities, farming constraints due to salt water intrusion into the land, and threat to life while undertaking mangrove activities for sustenance. Such constrains put further pressure on the conservation of local biodiversity of the area.

The interactions of the local people with the MPCA are minimal with an exception along the edges of mangroves where they collect crabs, fishes, fire wood, logs and venture for plantation activities when employed by the forest department. Interestingly, Dr. Biswarupa Ghosh observed that the Royal Bengal tiger acts as a keystone species in maintaining the rich biodiversity of the mangroves at the Bonnie Camp MPCA. The presence of the tigers is responsible for the low disturbance index (29%) in the MPCA. The sustainable co-existence of man and nature in the MPCA and associated areas can be achieved by innovative economic upliftment of



the people of the area. One such innovation is the entrepreneurial activity at Ambikanagar village, which has developed the "Bonphool" brand of Sunderban's mangrove honey. This honey is successfully sold on Amazon and other e-commerce sites throughout India. This initiative has engaged the local people for collection of honey from plant species such as *Aegiceras corniculata* (kholshi) etc. The local community is further keen to upgrade their brand by incorporating more products through proper training. Dr. Ghosh discussed other possible innovative products using the local biodiversity such as *Soneratia apetala* (tak kewra), *Nelumbo* sp. (lotus), *Zingiber officinale* (ginger), local spices, carbs, dry fish and others for improving the livelihood status of the local people.

The training program further discussed the traditional use of medicinal plants, changes in the life style of people, innovative ideas of occupation and people's concerns for the restrictions on use of local biodiversity. The role of mangrove in securing the existence of the villages in the face of climate change was driven home. The selfless role of forest department in ensuring the safety of the inhabitants of the villages by putting forth various restrictions on their movement into the MPCA and the nearby forests was repeatedly discussed to bridge any possible gap between the forest departments and the local people. The training sessions in these villages were very successful and hopefully, people are now aware of how important it is to conserve the medicinal plants in the MPCA and its surroundings areas. The community survey also brought to light the role of the forest department in maintaining large nurseries of important mangrove species to augment the mangrove species in disturbed areas. This activity not only conserves the mangrove gene pool but also creates employment opportunities for the local people.

One success story of the forest department in Sundarbans was the 'Thakuran Char'. Here the forest department has regenerated lush green mangrove vegetation with the support of the local people on a recently formed river island. The government has been investing crores of rupees in making artificial guard walls along the villages to prevent their disappearance into the sea during disastrous cyclones. Sadly, such walls cannot face the fury of the Bay of Bengal during major cyclones and storms. Fortunately, the Thakuran Char mangrove vegetation has acted as a barrier and prevented the submergence of the nearby villages during heavy rain and storms prevalent in the area. This example has been a tool in convincing people about the importance of the mangrove vegetation in the MPCA for sustainable development of Sundarban and its people

7.3.2 Garpanchkot MPCA, Purulia, West Bengal.

At Purulia, Garpanchkot MPCA is situated on a hilly terrain and reaches a height more than 400 m asl. The picturesque setting of this MPCA with the Panchat Burumarang Buruthan (scared grove), human trail and view point makes it an attraction for researchers and visitors. The three villages surveyed in the vicinity of the Garpanchkot MPCA were:

1. Baghmara
2. Rampur
3. Shuilibari

The training on conservation of medicinal plants in the MPCA and sustainable development of the surrounding human community was received enthusiastically by the villagers and the forest officials. The main interaction of the villagers with the MPCA as recorded through the interactions was for collection of fuel wood, fruit, medicinal herbs, Sal leaf for plate making and other religious activities. The high disturbance index (54%) from the phytosociological studies at Garpanchkot MPCA was contributed by the stumping of adult trees for house making purposes. The constraints in conservation of medicinal plants in the MPCA were mostly due to the lack of awareness among the people regarding the objective of the MPCA. The training program was effective in imparting the knowledge regarding the role of the MPCA in conserving the medicinal plant gene pool and other ecosystem services. Local people were further encouraged to conserve the MPCA as a catchment area for the agricultural lands at its

foothills to resolve the difficulties in water availability for farming. The SHG's were found to be very active and could be instrumental in acting as biodiversity conservation teams in these areas. However, the need for innovative livelihood



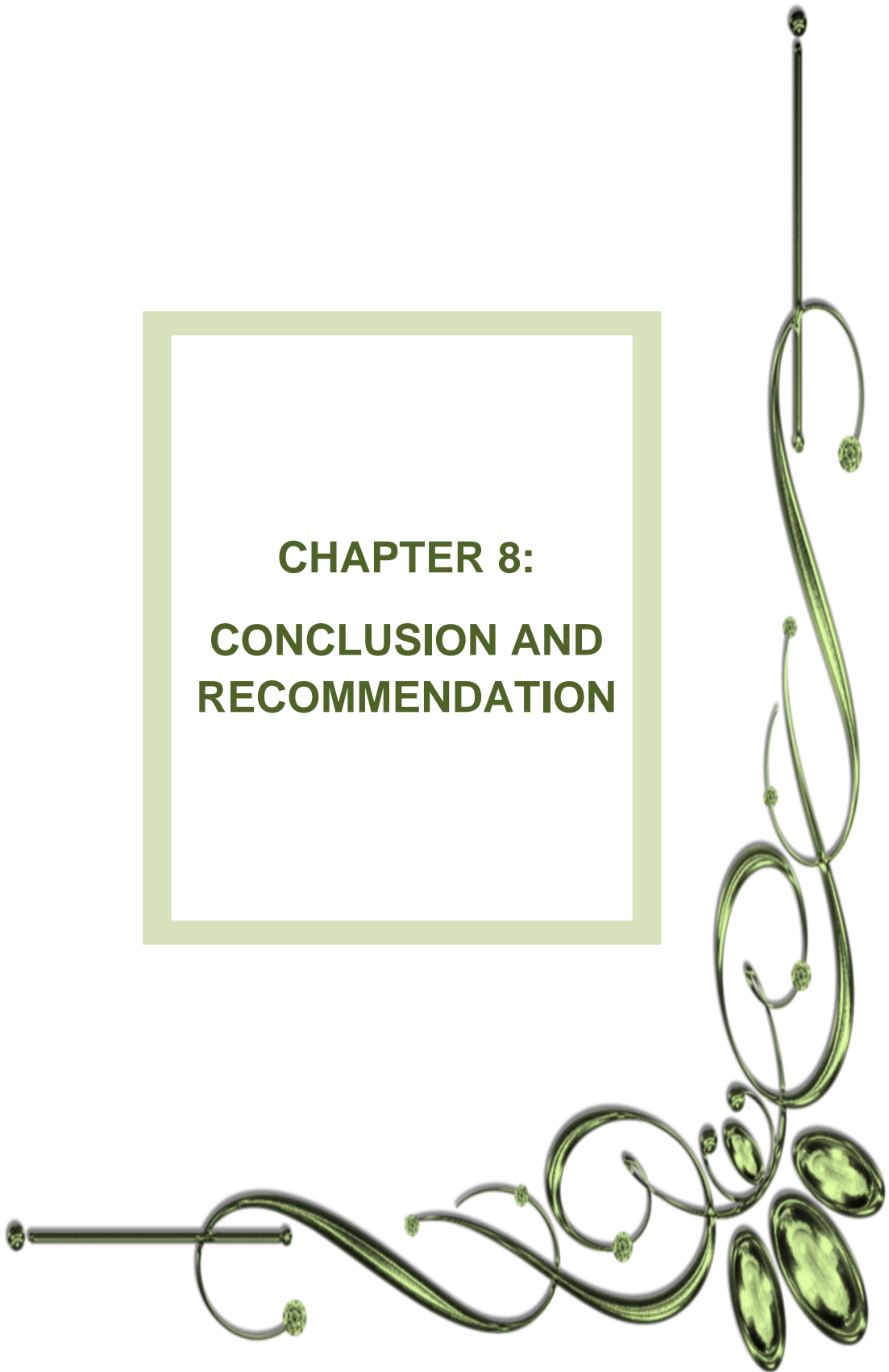
sources emerged as the key need for sustainable development of the MPCA and the human community in its surrounding. At Purulia Dr. Ghosh discussed many innovative products using the locally available resources such as *Asparagus racemosus* (satamuli), *Terminalia chebula* (haritaki), *Aegle marmelos* (bael), *Butea monosperma* (palash) and explored their

marketability. All such ideas need more detailed analysis to implement them successfully as means of livelihood sources for the sustainable development of the area.

7.4. Feedback and conclusion

In all the villages, the younger generation was unaware of the identity and use of most medicinal plants. It was interesting to note that many local people around the MPCA wanted a handout or training for identification of endangered medicinal plants. In Purulia a female fuelwood collector mentioned that she often uprooted wild seedlings during collection of fuelwood or other purposes and would restrain from this activity if she knew the medicinal importance of such plants. Hence, it is imperative that local people are made aware of the important medicinal plants in the MPCA and its vicinity; posters of endangered plants could be circulated for their effective conservation. Dr. Biswarupa Ghosh suggested that the TDU and the West Bengal Forest Department can play an important role in organising regular workshop with the younger population at village or block level. Further, a village level biodiversity conservation team can be created for monitoring the status of medicinal plant within and outside the MPCA. In the larger scheme of biodiversity conservation, the pressure on medicinal plant extraction needs to be reduced. This can be achieved by sustainable collection practices and value addition to the traditional and innovative biodiversity products in the area associated with the MPCA. The forest Department could provide training or build a network of collaborations with marketing agencies for creating a platform for selling these biodiversity products from the villages around the MPCA. Such activity could have a rippling impact on the sustainable management of the MPCA and development of its surrounding human community. The SHG's could play a key role in creating awareness for the conservation of medicinal plants in the MPCA and also generate alternate natural resource-based livelihood. Thus, the Forest Departments along with TDU can engage the villagers in conserving medicinal plants through further training and workshops on medicinal plant identification and skill development for improving local livelihood. People associated with MPCAs were urged to conserve, cultivate and value add to the medicinal plants and local biodiversity. The medicinal plant gene pool of Garpanchkot MPCA can be effectively conserved by the participation of local people in its vicinity.

**CHAPTER 8:
CONCLUSION AND
RECOMMENDATION**





Abelmoschus moschatus

8.1 Conclusion

One of the most critical issues of global, local and national agenda is the need to preserve biodiversity for future generations. Concurrently there is also a necessity to understand the biodiversity-associated indigenous knowledge base for sustainable resource management practices. The medicinal plant resources are getting depleted at an alarming rate. Around 90% of medicinal plants that are consumed domestically and exported are collected from the wild. Only 70 out of around 700 species in the trade are obtained purely from cultivated sources. The ever-increasing demand of herbal products has put the valuable plant resources under great stress and brought many medicinal plants at the verge of extinction. In this regard the establishment of MPCAs and regular botanical survey at frequent intervals would help conserving medicinal plants in general and threatened plant species in specific.

In addition to this, other threats to the medicinal plants are deforestation, destructive harvesting because of the use of plant parts like root, stem, bark, wood and whole plant in case of herb, extensive industrialization, forest fire and climate change. It is estimated that in India about 246 plants species are threatened, a bulk of which are medicinal plants (IUCN 2011). Of these, seven species are already extinct and 44 are critically endangered (IUCN 2011). Thus, there is an urgent need to conserve the wild populations of medicinal plant diversity.

This pioneering work of in-situ conservation programs initiated by the State Forest Departments across India with the support of the Foundation for Revitalisation of Local Health Traditions (FRLHT) through establishing the Medicinal Plants Conservation Areas (MPCAs) resulted in numerous significant conservation outcomes. Noteworthy among these is a notable shift in the conservation priorities of the forestry sector. After witnessing the novel conservation activities in the MPCAs, the Forest managers all over the country admit the need for broadening the conservation priorities in the forestry sector so as to cover the hitherto ignored medicinal plants. Thus, the MPCA program caused a significant change especially in the area of in-situ conservation principles in the entire forestry sector in the country. The in-situ conservation program is focused on identifying habitats, which contain viable and breeding populations of prioritised taxa. Through this MPCA program, medicinal plant taxa that are in high volume trade and belong to endemic and threatened category could be prioritised and conserved in-situ in their natural habitats. Another interesting aspect of this program is that state forest departments implement this program in collaboration with (1) research institutes, who are capable of undertaking further research works including population studies, threat

assessment, genetic and microbiome studies, etc., (2) local community institutions to develop alternate livelihood options for reducing the forest dependence of community members who dwell neighbouring MPCA areas.

Having realised the importance of conserving medicinal plants and traditional knowledge associated with them, the State Forest Department of West Bengal has been a pioneer in introducing a number of conservation activities especially making sure of conservation concern medicinal plants are well protected within their existing network of Protected Areas (PAs). As part of their conservation action initiatives, under the CF-II National Program on Promoting Conservation of Medicinal Plants and Traditional Knowledge for Enhancing Health and Livelihood Security, in the year between 2007 and 2009, the department established a network of seven Medicinal Plants Conservation Areas (MPCAs) across the state with the support of the FRLHT, Bengaluru. The selection of MPCA sites was primarily on the basis of inputs from the Conservation Assessment and Management Prioritisation (CAMP) workshop, which is an exercise to identify important medicinal plants areas for in-situ conservation of medicinal plants. Just after the establishment of MPCAs, the research institutions were involved to undertake plant taxonomical studies to develop a checklist of medicinal plants for each MPCA.

Nearly after one and a half decade, this project was taken up by the West Bengal Forest Department to revisit the seven MPCAs in the state, and evaluate the current status in terms of understanding the coverage of medicinal plants especially threatened plants within MPCA areas, and also estimating the population of plants across plant types viz. trees and climbers/lianas (adults, sapling, seedlings), shrubs and herbs. In this project, such floristic inventory with geo-referencing and diversity studies are expected to provide a greater understanding of species composition and the diversity status of forests, which also offer vital information for forest conservation. Further, geo-spatial tools would be useful in monitoring the land use and land cover changes in and around the MPCAs. MPCA areas, while ensuring the conservation of the medicinal plants, as part of contiguous forest landscapes, play a greater role in terms of ensuring overall biodiversity conservation and associated ecosystem services such as pollinator availability, recharging ground water, carbon sequestration, check soil erosion, etc.

The overarching outcome of this project is very promising in a way that the existing network of MPCAs are proving to be a gene pool of medicinal plants of the state especially a number of conservation concern species with good and viable population. Seven MPCAs representing

different forest ecosystems and landscapes of the state are found to be rich in medicinal plant diversity in terms of number of species, number of threatened species, etc. Through this project, the checklist of plant species was updated, and now a total of 1270 plant species was recorded in seven MPCA sites. This amounts to be a 42.5 percent increase in the species diversity. In the network of seven MPCAs, only a 45 percent of West Bengal state's medicinal plants diversity could be covered. That means, there are still more potential medicinal plants rich forest sites, which could be established as MPCAs.

From the perspective of hosting a number of commercially important and conservation concern medicinal plant species within MPCAs, out of 43 threatened plants, 40 were covered within seven MPCAs. The populations of these threatened plants were enumerated during the quadrat study and found to have good representation in all plant stages starting from adult (>30 cm gbh), sapling (≤ 30 cm gbh) and seedling stages (if they are trees and lianas), shrubs and herbs. It is proven that MPCAs are one such network of sites acting as refugia or natural repository of state medicinal plants being conserved in-situ. The addition of more potential forest areas would ensure the maintenance of viable population of all conservation concern medicinal plants within the MPCA network.

Local community members settled in the surroundings of MPCAs are reported to have good knowledge and understanding of medicinal plants and their uses. Besides, they have the practice of using them for their health care needs on a regular basis. Such health traditions have to be recognised, preserved from being lost, while they have to be mainstreamed for the benefit of community members. During the questionnaire survey conducted among local community members, it was understood that there has been a regular practice of fuelwood extraction, medicinal plants collection, fodder collection, wood collection for charcoal making, etc. When asked about the chances of implementing sustainable concepts for medicinal plants conservation, respondents informed about various opportunities available locally including (a) the cultivation of medicinal plants for commercial sale; (b) homestay business; (c) eco-tourism and the use of local craft skill; (d) improved agriculture with proper irrigation system as water scarcity is one of the emerging issues in the villages around MPCA areas; (e) women empowerment through involving them in decision making. It is also understood that there has been less awareness among local community members, irrespective of the distance of their settlements from MPCAs, about the importance of MPCAs in the conservation of medicinal plants. There has been no orientation given to them about the role they can play in the

sustainable management of forest resources especially medicinal plants. The involvement of local community members in the resource management has to be made necessary.

The healthy status of MPCAs is the proof of effective management of West Bengal Forest Department especially the role played by the frontline officers in making sure of protection of these forest patches. Though they are aware of the MPCAs physically, however the importance and necessity of MPCAs for medicinal plants conservation are not informed to them. It is critical that these frontline officers like watchers, guards and temporary workers in the state forest department are given proper orientation and training on the conservation of medicinal plants through establishing MPCAs across state.

8.2 Recommendations

Further, in-situ conservation program of the MPCAs can be strengthened through collaboration among important stakeholders such as i) State Forest Department, ii) Local communities residing in the vicinity of MPCAs, iii) Research institutions and persons interested in research on medicinal plants, iv) Institutions undertaking medicinal plants related conservation education programme, v) Government departments/ organisations concerned with medicinal plants conservation, vi) Organisations like medicinal plants boards engaged in the work of conservation of medicinal plants, etc. As MPCA sites are the solely protected areas envisaged as hands off areas to provide long-term conservation of medicinal plant species, designing and implementing suitable management practices is very important. Some of the management interventions such as fire management, weed control and enrichment of native vegetation, soil and water conservation, maintenance of boundaries and paths are necessary in some of these MPCAs. Limited collection or removal of resources may be allowed for research and breeding purposes but the illicit removals, grazing and commercial harvest of any produce from MPCAs should be strictly suspended. In addition, creating income generation activities for local dependent communities and educational programmes to promote conservation may help in better management of MPCAs. A definite role for local communities in management of MPCAs has to be built in the management scheme and the local communities need to be encouraged and facilitated in formation of local MPCA Management Committee. In all cases, the support of local communities for protection of Medicinal Plants Conservation Areas (MPCAs) is crucial.

Site specific Work Plan/Management Plan incorporating various management issues and prescriptions may be needed for each MPCA on simple formats for easy understanding in the field. The management of MPCAs, as per the Work Plan prescriptions, has to be the joint responsibility of the State Forest Department and the local communities through their local MPCA management committee. Watchers from the community may be engaged at some places to afford physical protection for MPCAs. The involvement of local community members has to be compensated with material benefits in terms of reasonable wages in order to keep their spirits high during the activities. This will increase the morale and trust in forest management system especially at the time of less employment opportunities in the outside world. By way of providing remuneration, they would be discouraged to exploit the forest resources by making illegal wild collection of plant materials for petty cash during the employment lean period.

The local forest-dependent communities are closely associated with forest resources for their livelihoods, health security and cultural, religious and emotional bonding. They exert a lot of pressure and influence on the resources by way of collecting plant materials for medicine, fuel, etc., collecting or hunting small animals/insects, using other ecosystem services like water, pollinators, organic soil, etc. In that case, it is ideal to make them part of forest resource management system, thereby orienting them towards sustainable utilisation of resources. The complete banning of resource extraction has not shown to be successful conservation action in any landscape. Instead, the involvement of local institutions like JFMCs to create awareness and capacity building of community members on resource specific sustainable principles and methods to field implement. While making the community members to understand the implementation of sustainable wild collection through regular field trainings, the forest department may allow activities in forest fringe areas, JFMC forest areas, and to some extent into the buffer zone forest areas. Areas can be demarcated for undertaking the collection of forest resources, so that JFMCs and its members can only be allowed for such activities. These interventions like imparting the knowledge of medicinal plants and mainstreaming sustainable resource use practices through institutional framework would ensure least anthropogenic pressures from villages neighbouring MPCAs and other protected areas.

The establishment of MPCA to conserve the medicinal plants in any natural habitats may be a new initiative for various stakeholders who get involved in this process. There is a need to sensitize different target groups to the need and approaches of conservation in general and of medicinal plants. With the proper education programmes, building the capacity to undertake conservation action programme is also very important. Some of the facilities which support

education programme at MPCA sites may include i) set of signage, ii) appropriate educational materials, iii) nature trails, iv) demonstration gardens, v) interpretation centre. These facilities may be developed according to specific user needs in respect of a particular MPCA and there may not be necessary to have all these facilities and activities at all the MPCAs. Therefore, the education programme should be site-specific and user-specific. After sensitizing the stakeholders about the conservation imperatives and their role in such initiatives through conservation education programmes, they need to be enabled to take up the responsibility of conservation action programmes. In this case, building the capacity of various stakeholders involved in the process of establishment of conservation areas and its management is important.

Beside JFMCs, the other institutions like Self Help Groups (SHGs), constituted involving local women, can act as a good institutional machinery for carrying out number of Government schemes at local level such as laying of village roads, restoration of village ponds/lakes, tree planting, subsidies for agri/horti farming exercises, food processing, handicraft making, etc. These SHGs with the involvement of local women members can be instrumental in raising nurseries for medicinal plants, and also developing a number of value added, processed/semi-processed medicinal plant-based products. Some of the alternative livelihood options that can be offered to local community members are: (i) engagement of local community resource persons as trained tourist eco-guides with good knowledge of forest landscapes and its resources including medicinal plants found in MPCA and adjoining forest areas; (ii) developing homestay as a professional hospitality business model by introducing minimal standards and infrastructure and showcasing community's traditional lifestyle and food habits. Forest trails and nature walks in the buffer zone forest areas can be part of the homestay business model to cater to nature lovers and ecotourists; (iii) forming community clusters in the settlements near MPCAs to start activities like cultivation of medicinal plants, cash crops, plantation crops like cardamomum, ginger, etc. depending on the availability of local resources like water, soil quality, etc. Prior to start cultivation practices, the chances of crop damages due to wildlife have to be checked, so that the choice of appropriate crops/plants can be made to avoid the crop losses; (iv) other livelihood options like honey beekeeping, value addition of locally available unique food items, drinks, etc.

In order to maintain the existing MPCAs and also to establish another set of MPCAs in the state, the West Bengal state forest department can avail funding from a number of sources. One of the most relevant funding bodies for MPCA related activities is the National Medicinal Plants Board (NMPB), Govt. of India. They have introduced Central Sector Scheme for

supporting projects and activities related to conservation, development and sustainable management of medicinal plants in India. The above provided recommendations are converted into activities or projects that are eligible for fundings from the NMPB through Central Sector scheme (Table 27). The projects listed in the table have to be proposed by the West Bengal State Forest Department as an implementing agency. These project proposals have to be prepared in the formats prescribed by the NMPB. The FRLHT/TDU would act as a technical partner in supporting the department in terms of preparing proposals initially and executing the project with a coordination of field offices.

Table 27. Summary of proposed medicinal plants and MPCA related activities for West Bengal state under various components given in the central sector scheme on Conservation, Development and Sustainable Management of Medicinal Plants called by the National Medicinal Plants Board (NMPB), Govt. of India. (Operational guidelines booklet is provided in Annexure 19)

Components of Central Sector Schemes	Proposed activities/projects
Conservation of medicinal plant through multi-pronged strategy	
In-situ Conservation - Medicinal Plants Conservation & Development Areas (MPCDAs)	
a. Setting up MPCDAs b. Revisiting/reviewing/documentation of existing MPCAs c. Mainstreaming medicinal plant management in management approaches	<ul style="list-style-type: none"> ➤ Organising Conservation Assessment and Management Prioritisation (CAMP) workshop for identifying threatened medicinal plants and potential sites for MPCDAs ➤ Establishing a new network of MPCDAs in West Bengal in addition to existing 7 MPCAs ➤ Improving the status of existing 7 MPCAs in terms of upgradation, improving protection, geo-referencing, removal of exotic plants, fire management, etc. ➤ Mainstreaming medicinal plant conservation in management approaches
In-situ Resource augmentation	
Assisted Natural Regeneration (ANR) or Artificial regeneration (AR)	➤ Resource augmentation of selected RET and high traded medicinal plant species in selected forest divisions in West Bengal
Ex-situ Conservation	
Plantations of medicinal plants in lands outside of forests, in private lands	➤ Formation of a cluster of cultivators to raise selected medicinal plants in the private lands through buy back arrangements (Ideal MPCA sites are North Sevoke, Sursuti, North Rajabhatkhawa, Bonnie Camp and Tonglu)
Support to JFMCs/BMCs/Van Panchayats	
a. Creation of infrastructure facilities b. Providing packaging/handling/value addition equipment c. Buyer/seller meets, marketing support	➤ Implementation of sustainable wild collection, value addition, storage and marketing of selected medicinal plants with the involvement of JFMCs located near MPCAs in West Bengal

Conclusion and recommendations

<p>d. Training & capacity building e. Exposure visits, organic certifications, etc.</p>	
Research & Development	
<p>Population assessments and conservation biology</p>	<ul style="list-style-type: none"> ➤ Population assessment of selected conservation concern medicinal plants with specific reference to intrinsic and extrinsic threats to plant survival under natural conditions ➤ Developing species recovery plans for selected medicinal plants that are critically endangered and with highly commercial value ➤ Collection of germ plasm for research and propagation (in-situ and ex-situ methods)
<p>Climate change impact studies</p>	<ul style="list-style-type: none"> ➤ Documenting and studying the impacts of different climate change scenarios on plant functional systems like phenotypic elements (leafing, flowering & fruiting), growth parameters (stem girth size), reproductive traits (germination, fruit maturity, delay/early arrival of pollinators, etc. ➤ Developing policy note on global warming and its impact plant growth and survival and various mitigation strategies for policy makers and general public
IEC & Training	
<p>Awareness Building, Exposure Visits, Education and Capacity Building of Stakeholders through Information Education and Communication (IEC) strategy:</p> <p>a. Publicity through regular participation in Exhibitions/Fairs b. Setting up of Facilitation Centres c. Organizing Workshops/Seminars/Conferences/Arogya Fair d. Training and Capacity Building initiatives</p>	<ul style="list-style-type: none"> ➤ Division level Training of Trainers (ToT) or Master Trainers training program on conservation and sustainable use of medicinal plant resources in West Bengal ➤ JFMC level community training programme on conservation and sustainable use of medicinal plant resources in West Bengal ➤ State level consultation meeting on mainstreaming the conservation and sustainable use of medicinal plant resources ➤ Short-term training on state medicinal plants to forest frontline officers ➤ Developing brochures, pamphlets, other IEC materials on medicinal plants and MPCAs to create awareness among general public

Conclusion and recommendations

	<ul style="list-style-type: none"> ➤ Establishing interpretation centres in each MPCA to explain about medicinal plant diversity of the MPCA and also to share the importance of MPCA for medicinal plants conservation
Herbal Garden	
<p>a. Home herbal garden b. School herbal garden c. Institutional garden</p>	<ul style="list-style-type: none"> ➤ Establishment of Home Herbal Gardens in the neighbourhoods of MPCA sites to improve the use of medicinal plants for daily healthcare needs at local households ➤ Establishment of School Herbal Gardens in the selected local panchayat schools that are located close to MPCA sites to create awareness about medicinal plants and its uses for daily healthcare needs at local households ➤ Establishment of institutional Gardens in the selected institution at forest division level to create general awareness about medicinal plants and its uses for daily healthcare needs
Marketing & trade	
Documenting trade practices	<ul style="list-style-type: none"> ➤ Studying the supply value chain and demand and supply of medicinal plants that are sourced from and/or passed through West Bengal focussing Siliguri and Kolkata plant markets ➤ Assessment study on the socioeconomic aspects of trade and marketing of medicinal plant materials on the livelihoods and income generation of local community members

ANNEXURES



Annexure 1. Details of 108 Medicinal Plants Conservation Areas (MPCAs) established across 13 states of India

Sl. No	Name of MPCA	Year Established	District	Forest types	Diversity of Medicinal plant species
State - Karnataka					
1	BRT Hills	1993	Mysore	Southern dry mixed deciduous forest	259
2	Talacauvery	1993	Madikeri	West coast semi-evergreen forest	255
3	Savandurga	1993	Bangalore	Dry deciduous scrub	314
4	Subramanya	1993	Mangalore	West coast semi-evergreen forest	220
5	Charmadi	1993	Mangalore	West coast semi-evergreen forest	310
6	Devrayandurga	1993	Tumkur	Southern thorn forest	140
7	Kudermukh	1993	Chikmagalur	Southern hilltop tropical evergreen forest	238
8	Kemmangundi	1993	Chikmagalur	Southern hilltop tropical evergreen forest	184
9	Agumbe	1993	Shimoga	West coast tropical evergreen forest	270
10	Devimane	1993	Karwar	West coast semi-evergreen forest	259
11	Sandur	1993	Bellary	Southern dry mixed deciduous forest	238
12	Karpakapalli	1993	Bidar	Dry deciduous scrub	150
13	Kollur	1998	Udapi		231
State - Kerala					
14	Agasthiarmalai	1993	Thiruvananthapuram	West coast semi-evergreen forest	217
15	Triveni	1993	Pathanamthitta	West coast semi-evergreen forest	208
16	Eravikulam	1993	Idukki	Southern montane wet temperate forest	83
17	Peechi	1993	Thrissur	Southern moist mixed deciduous forest	275

Sl. No	Name of MPCA	Year Established	District	Forest types	Diversity of Medicinal plant species
18	Athirapally	1993	Thrissur	Southern moist mixed deciduous forest	234
19	Silent Valley	1993	Pallakad	Southern hilltop tropical evergreen forest	205
20	Waynad	1993	Wyanaadu	West coast tropical evergreen forest	163
21	Kulamavu	1999	Idukki		182
22	Anappady	2002	Pallakad		271
State - Tamil Nadu					
23	Petchparai	1993	Nagercoil	Southern moist mixed deciduous forest	244
24	Mundanthurai	1993	Tirunelveli	Southern dry mixed deciduous forest	267
25	Kutrallum	1993	Tirunelveli	Southern moist mixed deciduous forest	288
26	Thaniparai	1993	Tirunelveli	Southern dry mixed deciduous forest	259
27	Alagarkovil	1993	Ramanathapuram	Southern dry mixed deciduous forest	227
28	Kodaikanal	1993	Madurai	Southern montane wet temperate forest	85
29	Kodikarai	1993	Nagapattinam	Tropical dry evergreen forest	288
30	Topslip	1993	Coimbatore	Southern hilltop tropical evergreen forest	189
31	Kollihills	1993	Salem	Southern dry mixed deciduous forest	231
32	Kurumbaram	1993	Kanchipuram	Tropical dry evergreen scrub	317
33	Thenmalai	1993	Tiruvannamalai	Southern dry mixed deciduous forest	320
34	Nambikoil	2001	KMTR NP		146
State - Andhra Pradesh					
35	Mallur	2001	Warangal	-	225

Sl. No	Name of MPCA	Year Establi shed	District	Forest types	Diversity of Medicinal plant species
36	Sukkumamidi	2001	Kahmmam	-	288
37	Maredumilli	2001	East Goravari	-	214
38	Lankapakalu	2001	Visakhapat nam	-	104
39	Coringa	2001	East Godawari	-	25
40	Peddacheruvu	2001	Kurnool	-	177
41	K. Kuntlapalli	2001	Anantpur	-	266
42	Talakona	2001	Chittoor	-	202
State - Maharashtra					
43	Gadmauli	2001	Gadchiroli	Dry deciduous	92
44	Nagzira	2001	Gondia	Mixed deciduous	81
45	Bhaskarachar ya	2001	Jalgoan	Thorn forest	124
46	Yedshi Ramling	2001	Osmanabad	Thorn forest	124
47	Toranmal	2001 – 2004	Nandurbar	Dry deciduous	228
48	Chichkund deo	2001	Nandurbar	Dry deciduous	NA
49	Kayare	2001	Nashik	Dry deciduous	NA
50	Amboli	2001	Sindhudurg	Semievergreen	146
51	Navaja	2001	Satara	Evergreen	152
52	SGNP Borivali	2001	Thane	Moist deciduous & Littoral & Swamp (Mangroove) forest	180
53	Gullarghat	2001	Amravati	Dry deciduous	168
54	Honya Koli	2001	Pune	Semievergreen	183
55	Amba	2001	Raigad	Mixed deciduous forest.	118

Sl. No	Name of MPCA	Year Establi shed	District	Forest types	Diversity of Medicinal plant species
State - Rajasthan					
56	Ramkunda	2008-09	Udaipur	Dry deciduous	83
57	Barkochra	2007-08	Ajmer	Dry Deciduous & thorn	49
58	Gajroop sagar	2008-09	Jaisalmer	Dry Deciduous & thorn	NA
59	Bhanwarkot	2008-09	Banswara	Dry deciduous	93
60	Bada Bhakar	2008-09	Jodhpur	Thorn	NA
61	Kumbhalgarh	2008-09	Rajsamand	Dry deciduous	NA
62	Sitamata	2008-09	Chittorgarh	Dry deciduous	106
State - Odisha					
63	Kapilash	2008-09	Dhenkanal	Semi evergreen	333
64	Tamana	2008-09	Khurda	Semi evergreen & mixed moist deciduous	374
65	Pradhanpat	2008-09	Deogarh	Semi evergreen & mixed moist deciduous	162
66	Satkosia	2008-09	Mayurbhanj	Semi evergreen & mixed moist deciduous	195
67	Gurudongar	2008-09	Nuapada	Semi evergreen & mixed moist deciduous	352
State - West Bengal					
68	Tonglu	2008-09	Tonglu	Montane wet temperate	254
69	Dhortrey	2008-09	Dhortrey	Montane wet temperate	154
70	North Rajabhatkhawa	2008-09	Buxaduar	Tropical moist deciduous	249
71	North Sevoke	2008-09	10th mile	Tropical moist deciduous	209
72	Sursuti	2008-09	Lataguri	Tropical moist deciduous	216

Sl. No	Name of MPCA	Year Established	District	Forest types	Diversity of Medicinal plant species
73	Garhpanchkot	2008-09	Raghunathpur	Tropical dry deciduous	206
74	Bonnie Camp	2008-09	Raidighi	Littoral and Swamp	30
State - Madhya Pradesh					
75	Bhundakona	2008-09	Anuppur	Dry peninsular sal	152
76	Latari Bithali	2008-09	Balaghat	Dry mixed deciduous	129
77	Chappari	2008-09	Mandla	Dry mixed deciduous	129
78	Panarpani	2008-09	Hoshangabad	Moist deciduous	143
79	Shyamgiri	2008-09	Panna	Dry deciduous teak	169
80	Kapoornala	2008-09	Chhindwara	-	NA
81	Hinota	2008-09	Panna	-	NA
82	Bhagpura	2008-09	Khandwa	-	NA
83	Pakka Paaracha	2008-09	Sehore	-	NA
84	Bhinsa- Mukunda	2008-09	Narsimpur	-	NA
85	Narayanapur	2008-09	Sagar	-	NA
86	Kupi- Jatashankri	2008-09	Chhatarpur	-	NA
87	Nawali & Sawad	2008-09	Mandsaur	-	NA
State - Arunachal Pradesh					
88	Tezu - Parsuramkund	2009	Lohit	Tropical evergreen forest	129
89	Roing- Mayodia	2009	Lower Dibang Valley	Temperate broad leaf forest	47
90	Kanubari -Wannu	2009	Tirap	Tropical wet evergreen	142
91	Bomdila	2009	West Kameng	Temperate forest	60

Sl. No	Name of MPCA	Year Established	District	Forest types	Diversity of Medicinal plant species
92	Siro Hake-Tari	2009	Lower Subansiri	Semievergreen Subtropical to temperate forest	69
93	Lumla	2009	Tawang	Wet Temperate Forest	NA
94	Laa-Dakpe	2009	Daporijo	Semi-evergreen Forest	373
State - Uttarakhand					
95	Kandara	2009	Utarkashi	Alpine meadow	40
96	Gangi	2009	Tehri Garhwal	Sub-tropical pine forest	NA
97	Jhuni	2009	Bageshwar	Moist temperate forest	57
98	Mandal	2009	Chamoli	Moist temperate forest	52
99	Khaliya	2009	Pithoragarh	Alpine and Moist Temperate Forest	38
100	Mohan	2009	Almora	Sub-tropical forest	58
101	Bastiya	2009	Champawat	Sub-tropical	100
State - Chhattisgarh					
102	Tiriya	2009	Bastar	Mixed sal forest	38
103	Bhatwa	2009	Bastar	Mixed sal forest	41
104	Jabara	2009	Dhamtari	Mixed sal forest	40
105	Bandhatola	2009	Rajnandgaon	Mixed sal forest	30
106	Amadob	2009	Bilaspur	Mixed sal forest	99
107	Ghatpendari	2009	Surguja	Mixed sal forest	30
108	Patiya	2009	Jashpur	Mixed sal forest	102

Annexure 2. GPS coordinates measured in multiple locations along the boundary of MPCAs

Sl. No	MPCA	Latitude	Longitude	Direction

Annexure 3. Details of medicinal plant species collected and recorded from Bonnie camp MPCA, Sundarbans National Park, West Bengal
Seasonal botanical surveys conducted in Bonnie camp MPCA, Sundarbans National Park, South 24 Parganas, West Bengal recorded totally 95 medicinal plant species

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
1	<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	Undershrub	Less common		New record	N 21° 50' 1" E 88° 37' 12"
2	<i>Acanthus ilicifolius</i> L.	Acanthaceae	Herb	Rare			N 21° 49' 49.17" E 88° 37' 21.22"
3	<i>Acanthus volubilis</i> Wall.	Acanthaceae	Herb	Rare			N 21° 50' 1" E 88° 37' 12"
4	<i>Acrostichum aureum</i> L.	Pteridaceae	Herb	Common		New record	N 21° 50' 1" E 88° 37' 12"
5	<i>Aegialitis rotundifolia</i> Roxb.	Plumbaginaceae	Small shrub	Abundant			N 21° 49' 49.17" E 88° 37' 20.16"
6	<i>Aegiceras corniculatum</i> (L.) Blanco	Primulaceae	Small shrub	Common			N 21° 49' 50" E 88° 37' 18"
7	<i>Ageratum conyzoides</i> (L.) L.	Asteraceae	Herb	Common	Mexico	New record	N 21° 49' 52" E 88° 37' 24"
8	<i>Alternanthera paronychioides</i> A.St.-Hil.	Amaranthaceae	Herb	Less common	W. South America to Brazil	New record	N 21° 49' 52" E 88° 37' 22"
9	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	Herb	Less common		New record	N 21° 49' 52" E 88° 37' 24"
10	<i>Avicennia alba</i> Blume	Acanthaceae	Tree	Common			N 21° 49' 49.17" E 88° 37' 20.16"
11	<i>Avicennia marina</i> (Forssk.) Vierh.	Acanthaceae	Tree	Common			N 21° 52' 8" E 88° 31' 42"
12	<i>Avicennia officinalis</i> L.	Acanthaceae	Tree	Common	Tropical Asia to N. & E. Australia		N 21° 50' 1" E 88° 37' 24"

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
13	<i>Blumea lacera</i> (Burm.f.) DC.	Asteraceae	Herb	Common		New record	N 21° 49' 52" E 88° 37' 26"
14	<i>Brachiaria reptans</i> (L.) C.A.Gardner & C.E.Hubb.	Poaceae	Herb	Common		New record	N 21° 49' 51.9" E 88° 37' 26"
15	<i>Bruguiera cylindrica</i> (L.) Blume	Rhizophoraceae	Tree	Rare			N 21° 50' 1" E 88° 37' 24"
16	<i>Bruguiera gymnorhiza</i> (L.) Lam.	Rhizophoraceae	Tree	Common	NE. Tropical & S. Africa to W. Pacific		N 21° 49' 49.17" E 88° 37' 21.22"
17	<i>Caesalpinia crista</i> L.	Caesalpinaceae	Straggling shrub	Rare		New record	N 21° 50' 1" E 88° 37' 12"
18	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Herb	Common		New record	N 21° 49' 51.8" E 88° 37' 26"
19	<i>Ceriops decandra</i> (Griff.) W.Theob.	Rhizophoraceae	Small tree	Less common			N 21° 50' 1" E 88° 37' 12"
20	<i>Ceriops tagal</i> (Perr.) C.B.Rob.	Rhizophoraceae	Tree	Common			N 21° 50' 0" E 88° 37' 9"
21	<i>Chloris barbata</i> Sw.	Poaceae	Herb	Common	Tropical & Subtropical Old World	New record	N 21° 49' 52" E 88° 37' 23"
22	<i>Clerodendrum inerme</i> (L.) Gaertn.	Verbenaceae	Shrub	Less common			N 21° 49' 52" E 88° 37' 23"
23	<i>Clerodendrum neriifolium</i> (Roxb.) Wall. ex Steud.	Verbenaceae	Shrub	Less common			N 21° 49' 51.8" E 88° 37' 26.9"
24	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Climber	Common		New record	N 21° 49' 51.8" E 88° 37' 26"
25	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Herb	Common		New record	N 21° 50' 1" E 88° 37' 12"
26	<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	Rare		New	N 21° 49' 51.8"

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
						record	E 88° 37' 26"
27	Corchorus aestuans L.	Malvaceae	Herb	Common		New record	N 21° 49' 49.17" E 88° 37' 20.16"
28	Croton bonplandianus Baill.	Euphorbiaceae	Herb	Common	S. Bolivia to Uruguay	New record	N 21° 49' 52" E 88° 37' 23"
29	Cryptocoryne ciliata (Roxb.) Schott	Araceae	Herb	Less common		New record	N 21° 49' 51.9" E 88° 37' 26"
30	Cucumis melo L.	Cucurbitaceae	Climber	Common		New record	N 21° 50' 1" E 88° 37' 24"
31	Cyanthillium cinereum (L.) H.Rob.	Asteraceae	Herb	Common	Tropical & Subtropical Old World to NW. Pacific	New record	N 21° 49' 52" E 88° 37' 23"
32	Cynodon dactylon (L.) Pers.	Poaceae	Herb	Common	Temp. & Subtropical Old World to Australia	New record	N 21° 49' 52" E 88° 37' 23"
33	Cyperus bulbosus Vahl	Cyperaceae	Herb	Rare	Africa to Australia	New record	N 21° 49' 51.8" E 88° 37' 26.9"
34	Cyperus polystachyos Rottb.	Cyperaceae	Herb	Common	Tropics & Subtropics	New record	N 21° 50' 1" E 88° 37' 24"
35	Cyperus rotundus L.	Cyperaceae	Herb	Common		New record	N 21° 49' 52" E 88° 37' 26"
36	Derris trifoliata Lour.	Fabaceae	Climber	Less common			N 21° 50' 1" E 88° 37' 24"
37	Digitaria ciliaris (Retz.) Koeler	Poaceae	Herb	Common	Tropical & Subtropical Old World	New record	N 21° 49' 52" E 88° 37' 23"

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
38	Diplazium polypodioides Blume	Aspleniaceae	Herb	Less common		New record	N 21° 49' 51.8" E 88° 37' 26"
39	Eclipta prostrata (L.) L.	Asteraceae	Herb	Common	Temp. & Subtropical America	New record	N 21° 49' 51.9" E 88° 37' 26"
40	Eleusine indica (L.) Gaertn	Poaceae	Herb	Common		New record	N 21° 49' 52" E 88° 37' 23"
41	Eriochloa procera (Retz.) C.E.Hubb.	Poaceae	Herb	Common		New record	N 21° 49' 51.8" E 88° 37' 26"
42	Euphorbia chamaesyce L.	Euphorbiaceae	Herb	Common	Macaronesia to W.Siberia	New record	N 21° 49' 52" E 88° 37' 26"
43	Euphorbia scordiifolia Jacq.	Euphorbiaceae	Herb	Common	Macaronesia to Arabian Peninsula	New record	N 21° 49' 52" E 88° 37' 23"
44	Evolvulus nummularius (L.) L.	Convolvulaceae	Herb	Common	Tropical & Subtropical America	New record	N 21° 49' 51.8" E 88° 37' 26"
45	Excoecaria agallocha L. (Female & Male flowers)	Euphorbiaceae	Tree	Common			N 21° 50' 1" E 88° 37' 12"
46	Fimbristylis cymosa R.Br.	Cyperaceae	Herb	Less common		New record	N 21° 49' 51.8" E 88° 37' 26.9"
47	Fimbristylis ferruginea (L.) Vahl	Cyperaceae	Herb	Less common	Tropical & Subtropical to Caucasus	New record	N 21° 49' 52" E 88° 37' 24"
48	Fimbristylis triflora (L.) K.Schum.	Cyperaceae	Herb	Common		New record	N 21° 49' 52" E 88° 37' 22"
49	Finlaysonia obovata Wall.	Asclepidaceae	Climber	Rare		New record	N 21° 50' 1" E 88° 37' 24"
50	Glinus oppositifolius (L.)	Molluginaceae	Herb	Rare	Tropical &	New	N 21° 50' 1" E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
	Aug.DC.				Subtropical Old World	record	88° 37' 12"
51	Hedyotis burmanniana Schult. & Schult.f.	Rubiaceae	Herb	Common		New record	N 21° 50' 1" E 88° 37' 12"
52	Heliotropium curassavicum L.	Boraginaceae	Herb	Less common	Tropical & Subtropical America		N 21° 50' 1" E 88° 37' 12"
53	Heritiera fomes Banks	Malvaceae	Tree	Rare			N 21° 49'49.17"E 88° 37' 20.17"
54	Hygrophila auriculata (Schumach.) Heine	Acanthaceae	Herb	Less common		New record	N 21° 49' 51.9" E 88° 37' 26"
55	Hygrophila ringens (L.) R. Br. ex Steud.	Acanthaceae	Herb	Less common		New record	N 21° 49' 51.8" E 88° 37' 26.5"
56	Ipomoea pes-caprae (L.) R.Br.	Convolvulaceae	Climber	Less common			N 21° 49' 51.8" E 88° 37' 26.9"
57	Ipomoea sagittata Poir.	Convolvulaceae	Climber	Rare	SE. & S. Central U.S.A. to Central America, Caribbean, Medit.	New record	N 21° 49' 51.8" E 88° 37' 26"
58	Leptochloa panicea (Retzius) Ohwi	Poaceae	Herb	Rare		New record	N 21° 50' 1" E 88° 37' 12"
59	Leptopetalum biflorum (L.) Neupane & N.Wikstr.	Rubiaceae	Herb	Rare		New record	N 21° 50' 1" E 88° 37' 12"
60	Ludwigia hyssopifolia (G.Don) Exell	Onagraceae	Herb	Less common	S. Mexico to Tropical America, N. Australia.	New record	N 21° 50' 1" E 88° 37' 12"

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
61	Lumnitzera racemosa Willd.	Combretaceae	Small tree	Less common			N 21° 49' 50" E 88° 37' 18"
62	Malachra capitata (L.) L.	Malvaceae	Undershrub	Less common	Tropical & Subtropical America.	New record	N 21° 50' 1" E 88° 37' 12"
63	Mecardonia procumbens (Mill.) Small	Scrophulariaceae	Herb	Common	Tropical & Subtropical America	New record	N 21° 49' 51.8" E 88° 37' 26"
64	Mikania cordata (Burm.f.) B.L.Rob.	Asteraceae	Climber	Common	Tropical Old World	New record	N 21° 49' 51.8" E 88° 37' 26"
65	Murdannia nudiflora (L.) Brenan	Commelinaceae	Herb	Common		New record	N 21° 49' 50" E 88° 37' 18"
66	Nypa fruticans Wurm	Arecaceae	Tree	Rare			N 21° 49' 49.17" E 88° 37' 21.22"
67	Oldenlandia attenuata (Willd.) M.R.Almeida	Rubiaceae	Herb	Rare		New record	N 21° 50' 1" E 88° 37' 12"
68	Oldenlandia corymbosa var. linearis (DC.) Verdc.	Rubiaceae	Herb	Rare		New record	N 21° 49' 51.9" E 88° 37' 26"
69	Oldenlandia sp.	Rubiaceae	Herb	Rare		New record	N 21° 49' 51.9" E 88° 37' 26"
70	Oryza coarctata Roxb.	Poaceae	Herb	Abundant			N 21° 49' 50" E 88° 37' 17"
71	Pentatropis capensis (L.f.) Bullock	Asclepidaceae	Herb	Common		New record	N 21° 49' 52" E 88° 37' 23"
72	Pergularia daemia (Forssk.) Chiov.	Apocynaceae	Climber	Less common		New record	N 21° 49' 51.9" E 88° 37' 26"
73	Phoenix paludosa Roxb.	Arecaceae	Shrub	Abundant			N 21° 50' 1" E 88° 37' 12"
74	Phyla nodiflora (L.) Greene	Verbenaceae	Herb	Less	Tropics &	New	N 21° 49' 51.9"

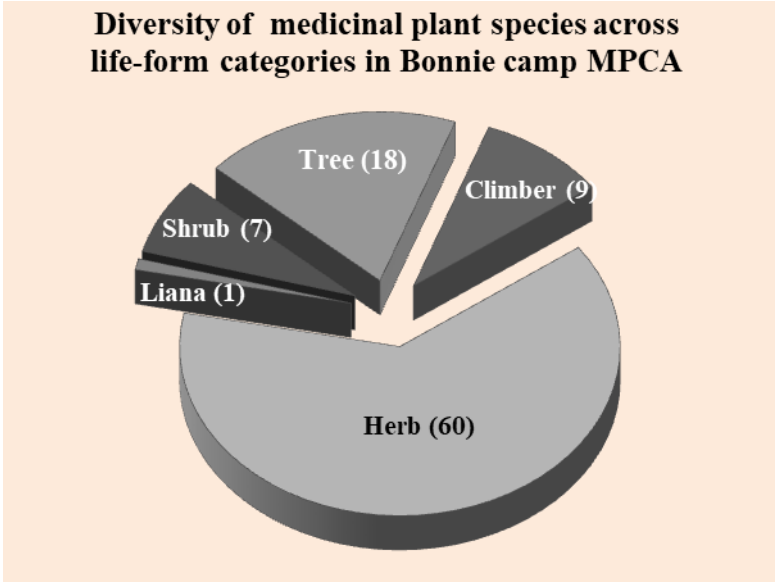
Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
				common	Subtropics	record	E 88° 37' 26"
75	Phyllanthus amarus Schumach. & Thonn.	Euphorbiaceae	Herb	Common	S. Mexico to Tropical America.	New record	N 21° 49' 51.9" E 88° 37' 26"
76	Physalis angulata L.	Solanaceae	Herb	Less common	Tropical & Subtropical America	New record	N 21° 49' 51.9" E 88° 37' 26"
77	Rhizophora apiculata Blume	Rhizophoraceae	Tree	Common		New record	N 21° 49' 51" E 88° 37' 17"
78	Rhizophora mucronata Poir.	Rhizophoraceae	Tree	Rare			N 21° 50' 1" E 88° 37' 12"
79	Rothia indica (L.) Druce	Fabaceae	Herb	Rare		New record	N 21° 50' 1" E 88° 37' 24"
80	Sarcolobus globosus Wall.	Asclepidaceae	Climber	Rare			N 21° 50' 1" E 88° 37' 24"
81	Scoparia dulcis L.	Scrophulariaceae	Herb	Common	Tropical & Subtropical America	New record	N 21° 49' 51.8" E 88° 37' 26"
82	Sesuvium portulacastrum (L.) L.	Aizoaceae	Herb	Less common	Tropics & Subtropics	New record	N 21° 50' 1" E 88° 37' 12"
83	Sonneratia alba Griff.	Lythraceae	Tree	Rare		New record	N 21° 50' 1" E 88° 37' 12"
84	Sonneratia caseolaris (L.) Engl.	Lythraceae	Tree	Rare			N 21° 49' 49.2" E 88° 37' 20.8"
85	Sonneratia griffithii Kurz	Lythraceae	Tree	Rare			N 21° 50' 1" E 88° 37' 24"
86	Sporobolus virginicus (L.) Kunth	Poaceae	Herb	Common		New record	N 21° 49' 51.8" E 88° 37' 26.9"

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Additions	GPS readings
87	<i>Suaeda maritima</i> (L.) Dumort.	Chenopodiaceae	Herb	Less common	Central & E. Canada to E. U.S.A., Europe to W. Siberia, Macaronesia, N. Africa to Japan		N 21° 50' 1" E 88° 37' 12"
88	<i>Suaeda nudiflora</i> (Willd.) Moq.	Amaranthaceae	Undershrub	Less common		New record	N 21° 49' 50" E 88° 37' 18"
89	<i>Tamarix troupii</i> Hole	Tamaricaceae	Shrub	Rare		New record	N 21° 50' 1" E 88° 37' 12"
90	<i>Thespesia populnea</i> (L.) Sol. ex Corrêa	Malvaceae	Tree	Rare			N 21° 49' 49.17" E 88° 37' 20.16"
91	<i>Torenia crustacea</i> (L.) Cham. & Schltdl.	Linderniaceae	Herb	Common	Tropics & Subtropics	New record	N 21° 50' 1" E 88° 37' 24"
92	<i>Urena lobata</i> L.	Malvaceae	Undershrub	Common	Tropics & Subtropics	New record	N 21° 49' 51.9" E 88° 37' 26"
93	<i>Viscum orientale</i> Willd.	Viscaceae	Herb	Rare		New record	N 21° 49' 50" E 88° 37' 18"
94	<i>Xylocarpus granatum</i> J.Koenig	Meliaceae	Tree	Less common			N 21° 50' 1" E 88° 37' 12"
95	<i>Xylocarpus moluccensis</i> (Lam.) M.Roem.	Meliaceae	Tree	Rare	Somalia to N. Mozambique and SW. Pacific		N 21° 50' 1" E 88° 37' 12"

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants

List of threatened plant species recorded in Bonnie camp MPCA

Sl.No	Botanical name	Threatened status
1	Lumnitzera racemosa	Vulnerable
2	Nypa fruticans	Vulnerable
3	Sonneratia caseolaris	Endangered
4	Xylocarpus granatum	Vulnerable



Annexure 4. Details of medicinal plant species collected and recorded from Dhotrey MPCA, Darjeeling district, West Bengal

Seasonal botanical surveys conducted in Dhotrey MPCA, Darjeeling district, West Bengal recorded totally 312 medicinal plant species

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
1	<i>Abies densa</i> Griffith	Pinaceae	Tree	Less common		2376	27° 2.995''N 88° 6.705''E
2	<i>Acer campbellii</i> Hook.f. & Thomson ex Hiern	Sapindaceae	Tree	Less common		2236	27° 4.553''N 88° 6.822''E
3	<i>Acer sikkimense</i> Miq. Syn. <i>Acer hookeri</i> Miq.	Sapindaceae	Tree	Rare		2376	27° 4.406''N 88° 6.998''E
4	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	Herb	Common		2376	27° 3.780''N 88° 7.328''E
5	<i>Adiantum edgeworthii</i> Hook.	Pteridaceae	Herb	Common		2236	27° 2.995''N 88° 6.705''E
6	<i>Aeschynanthus hookeri</i> C.B.Clarke	Gesneriaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
7	<i>Agapetes hookeri</i> (C. B. Cl.) Sleum.	Ericaceae	Herb	Rare		2376	27° 4.553''N 88° 6.822''E
8	<i>Agapetes serpens</i> (Wight) Sleumer	Ericaceae	Shrub	Less common		2376	27° 4.406''N 88° 6.998''E
9	<i>Ageratum houstonianum</i> Miller	Asteraceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
10	<i>Ainsliaea latifolia</i> (D. Don) Sch.Bip	Asteraceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
11	<i>Alnus nepalensis</i> D.Don	Betulaceae	Tree	Common		2236	27° 2.995''N 88° 6.705''E
12	<i>Anaphalis contorta</i> (D.Don) Hook.f.	Asteraceae	Herb	Common		2236	27° 3.780''N 88° 7.328''E
13	<i>Anaphalis margaritacea</i> (L.)	Asteraceae	Herb	Common		2236	27° 2.995''N

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
	Benth. & Hook.f.						88° 6.705"E
14	Anaphalis royleana DC.	Asteraceae	Herb	Common		2376	27° 4.553"N 88° 6.822"E
15	Anaphalis triplinervis (Sims) C.B.Clarke	Asteraceae	Herb	Less common		2376	27° 4.553"N 88° 6.822"E
16	Anemone howellii Jeffrey & W. W. Smith	Ranunculaceae	Herb	Rare		2572	27° 4.406"N 88° 6.998"E
17	Anisomeles heyneana Benth.	Lamiaceae	Herb	Rare		2376	27° 4.553"N 88° 6.822"E
18	Anthogonium gracile Wall. ex Lindl.	Orchidaceae	Herb	Less common		2572	27° 2.995"N 88° 6.705"E
19	Argentina lineata (Trevir.) Soják Syn. Potentilla lineata Trevir.	Rosaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
20	Arisaema concinnum Schott	Araceae	Herb	Rare		2572	27° 4.553"N 88° 6.822"E
21	Arisaema costatum (Wall.) Mart.	Araceae	Herb	Rare		2376	27° 4.553"N 88° 6.822"E
22	Arisaema erubescens (Wall.) Schott	Araceae	Herb	Rare		2572	27° 2.995"N 88° 6.705"E
23	Arisaema jacquemontii Blume	Araceae	Herb	Rare		2572	27° 2.995"N 88° 6.705"E
24	Arisaema speciosum (Wall.) Mart.	Araceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
25	Arisaema tortuosum (Wall.) Schott	Araceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
26	Artemisia indica Willd.	Asteraceae	Herb	Less common		2376	27° 4.406"N 88° 6.998"E
27	Artemisia vulgaris L.	Asteraceae	Herb	Common		2376	27° 4.406"N

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
							88° 6.998"E
28	<i>Arundinaria racemosa</i> Munro	Poaceae	Herb	Common		2270	27° 4.541"N 88° 6.834"E
29	<i>Arundinella nepalensis</i> Trinius	Poaceae	Herb	Common		2572	27° 4.553"N 88° 6.822"E
30	<i>Astilbe rivularis</i> Buch.-Ham. ex D.Don	Saxifragaceae	Herb	Rare		2236	27° 2.995"N 88° 6.705"E
31	<i>Begonia aconitifolia</i> A.DC.	Begoniaceae	Herb	Less common		2376	27° 4.406"N 88° 6.998"E
32	<i>Begonia josephi</i> A.DC.	Begoniaceae	Herb	Less common		2572	27° 2.995"N 88° 6.705"E
33	<i>Berberis aristata</i> DC.	Berberidaceae	Shrub	Common		2376	27° 4.406"N 88° 6.998"E
34	<i>Berberis hookeri</i> Lem.	Berberidaceae	Shrub	Less common		2572	27° 4.553"N 88° 6.822"E
35	<i>Berberis insignis</i> J. D. Hooker & Thomson	Berberidaceae	Shrub	Common		2376	27° 2.995"N 88° 6.705"E
36	<i>Berberis thomsoniana</i> C.K.Schneid.	Berberidaceae	Shrub	Rare		2660	27° 3.780"N 88° 7.328"E
37	<i>Betula alnoides</i> Buch.-Ham. ex D.Don	Betulaceae	Tree	Less common		2572	27° 2.995"N 88° 6.705"E
38	<i>Boenninghausenia albiflora</i> (Hooker) Reichenbach ex Meisner	Rutaceae	Herb	Rare		2660	27° 2.995"N 88° 6.705"E
39	<i>Bosmania membranacea</i> (D.Don) Testo Syn. <i>Microsorium membranaceum</i> (D.Don) Ching	Polypodiaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
40	<i>Calanthe puberula</i> Lindl.	Orchidaceae	Herb	Less common		2572	27° 2.995"N 88° 6.705"E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
41	<i>Calceolaria mexicana</i> Benth.	Calceolariaceae	Herb	Common	Mexico to Bolivia	2660	27° 2.995'N 88° 6.705'E
42	<i>Carex cruciata</i> Wahlenb.	Cyperaceae	Herb	Common		2660	27° 3.780'N 88° 7.328'E
43	<i>Carex filicina</i> Nees	Cyperaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
44	<i>Carpesium abrotanoides</i> L.	Asteraceae	Herb	Rare		2402	27° 4.406'N 88° 6.998'E
45	<i>Castanopsis hystrix</i> Miq.	Fagaceae	Tree	Rare		2376	27° 4.406'N 88° 6.998'E
46	<i>Cautleya gracilis</i> (Sm.) Dandy	Zingiberaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
47	<i>Cautleya gracilis</i> var. <i>robusta</i> (K.Schum.) Sanjappa	Zingiberaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
48	<i>Cautleya spicata</i> (Sm.) Baker	Zingiberaceae	Herb	Less common		2402	27° 4.406'N 88° 6.998'E
49	<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	Climber	Less common		2572	27° 4.406'N 88° 6.998'E
50	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Climber	Common		2572	27° 4.406'N 88° 6.998'E
51	<i>Chlorophytum nepalense</i> (Lindl.) Baker	Asparagaceae	Herb	Less common		2572	27° 2.995'N 88° 6.705'E
52	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	Lauraceae	Tree	Rare		2376	27° 4.406'N 88° 6.998'E
53	<i>Cirsium falconeri</i> (Hook.f.) Petr.	Asteraceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
54	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Climber	Rare		2236	27° 4.553'N 88° 6.822'E
55	<i>Clematis montana</i> Buch.-Ham.	Ranunculaceae	Climber	Rare		2236	27° 4.553'N

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
	ex DC.						88° 6.822"E
56	Clinopodium umbrosum (M. Bieb.) C. Koch	Lamiaceae	Herb	Common		2572	27° 4.406"N 88° 6.998"E
57	Commelina sikkimensis C.B. Clarke	Commelinaceae	Herb	Less common		2572	27° 2.995"N 88° 6.705"E
58	Corydalis chaerophylla DC.	Papaveraceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
59	Corydalis longipes DC.	Papaveraceae	Herb	Less common		2376	27° 2.995"N 88° 6.705"E
60	Craniotome furcata (Link) Kuntze	Lamiaceae	Herb	Common		2402	27° 4.553"N 88° 6.822"E
61	Craterostigma nummulariifolium (D. Don) Eb. Fisch., Schäferh. & Kai Müll.	Linderniaceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
62	Crawfordia speciosa Wall.	Gentianaceae	Climber	Rare		2270	27° 4.406"N 88° 6.998"E
63	Cryptomeria japonica (Thunb. ex L.f.) D. Don	Cupressaceae	Tree	Common		2236	27° 2.995"N 88° 6.705"E
64	Cyathula tomentosa (Roth) Moq.	Amaranthaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
65	Cynoglossum lanceolatum Forssk.	Boraginaceae	Herb	Rare		2572	27° 2.995"N 88° 6.705"E
66	Dactylicapnos scandens (D. Don) Hutch. Syn. Dicentra scandens (D. Don) Walp.	Papaveraceae	Climber	Less common		2376	27° 4.406"N 88° 6.998"E
67	Daphne bholua Buch.-Ham. ex D. Don	Thymelaeaceae	Shrub	Common		2236	27° 4.553"N 88° 6.822"E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
68	<i>Daphne papyracea</i> Wallich ex G. Don	Thymelaceae	Shrub	Common		2572	27° 4.553'N 88° 6.822'E
69	<i>Dendrobium chryseum</i> Rolfe	Orchidaceae	Herb	Less common		2572	27° 2.995'N 88° 6.705'E
70	<i>Dendrobium longicornu</i> Lindl.	Orchidaceae	Herb	Rare		2236	27° 4.553'N 88° 6.822'E
71	<i>Deparia japonica</i> (Thunb.) M.Kato	Aspleniaceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
72	<i>Dicentra scandens</i> (D. Don) Walp.	Fumaricaceae	Climber	Rare		2572	27° 4.553'N 88° 6.822'E
73	<i>Didymocarpus punduanus</i> var. <i>pulcher</i> (C.B.Clarke) Su.Datta & B.K.Sinha Syn. <i>Didymocarpus pulcher</i> C.B.Clarke	Gesneriaceae	Herb	Common		2236	27° 4.553'N 88° 6.822'E
74	<i>Diplazium japonicum</i> (Thunb.) Bedd.	Athyriaceae	Herb	Common		2236	27° 4.406'N 88° 6.998'E
75	<i>Diplopterygium glaucum</i> (Thunb. ex Houtt.) Nakai	Gleicheniaceae	Herb	Less common		2572	27° 2.995'N 88° 6.705'E
76	<i>Drymaria cordata</i> (L.) Willd	Caryophyllaceae	Herb	Common	Mexico to S. Tropical America, Tropical & S. Africa.	2572	27° 4.406'N 88° 6.998'E
77	<i>Dryopteris chrysocoma</i> (Christ) C. Chr.	Dryopteridaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
78	<i>Elaeocarpus sikkimensis</i> Masters	Elaeocarpaceae	Tree	Rare		2376	27° 4.406'N 88° 6.998'E
79	<i>Elatostema obtusum</i> Wedd.	Urticaceae	Herb	Common		2572	27° 2.995'N

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
							88° 6.705"E
80	Elatostema sessile J.R.Forst. & G.Forst.	Urticaceae	Herb	Common		2376	27° 4.406"N 88° 6.998"E
81	Elsholtzia blanda (Benth.) Benth.	Lamiaceae	Herb	Common		2660	27° 4.406"N 88° 6.998"E
82	Elsholtzia flava (Benth.) Benth.	Lamiaceae	Undershrub	Rare		2572	27° 2.995"N 88° 6.705"E
83	Elsholtzia fruticosa (D. Don) Rehder	Lamiaceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
84	Elsholtzia strobilifera (Benth.) Benth.	Lamiaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
85	Epilobium cylindricum D.Don	Asteraceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
86	Epilobium wallichianum Hausskn.	Onagraceae	Herb	Less common		2236	27° 4.553"N 88° 6.822"E
87	Equisetum ramosissimum Desf.	Equisetaceae	Herb	Common		2236	27° 4.553"N 88° 6.822"E
88	Eriocapitella vitifolia (Buch.-Ham. ex DC.) Nakai	Ranunculaceae	Herb	Rare		2572	27° 2.995"N 88° 6.705"E
89	Erythranthe nepalensis (Benth.) G.L.Nesom	Phrymaceae	Herb	Less common		2376	27° 4.406"N 88° 6.998"E
90	Euonymus frigidus Wall.	Celastraceae	Shrub	Less common		2376	27° 4.406"N 88° 6.998"E
91	Eurya acuminata DC.	Ericaceae	Shrub	Common		2236	27° 4.553"N 88° 6.822"E
92	Eurya cerasifolia (D.Don) Kobuski	Pentaphylacaceae	Shrub	Less common		2376	27° 4.406"N 88° 6.998"E
93	Eurya japonica Thunb.	Pentaphylacaceae	Tree	Common		2376	27° 4.406"N 88° 6.998"E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
94	<i>Evodia lunu-ankenda</i> (Gaertn.) Merr.	Rutaceae	Tree	Less common		2660	27° 3.780'N 88° 7.328'E
95	<i>Exbucklandia populnea</i> (R.Br. ex Griff.) R.W.Br.	Hamamelidaceae	Tree	Rare		2660	27° 3.780'N 88° 7.328'E
96	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaite	Rosaceae	Herb	Common		2402	27° 4.406'N 88° 6.998'E
97	<i>Galinsoga parviflora</i> Cavanilles	Asteraceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
98	<i>Galium aparine</i> L.	Rubiaceae	Herb	Abundant		2236	27° 4.553'N 88° 6.822'E
99	<i>Galium elegans</i> Wall.	Rubiaceae	Herb	Common		2270	27° 4.541'N 88° 6.834'E
100	<i>Galium hoffmeisteri</i> (Klotzsch) Ehrend. & Schönb.-Tem. ex R.R.Mill	Rubiaceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
101	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Shrub	Common		2572	27° 2.995'N 88° 6.705'E
102	<i>Gaultheria hookeri</i> C.B.Clarke	Ericaceae	Climber	Rare		2572	27° 2.995'N 88° 6.705'E
103	<i>Gaultheria nummularioides</i> D.Don	Ericaceae	Herb	Common		2236	27° 4.553'N 88° 6.822'E
104	<i>Gentiana capitata</i> Buch.-Ham. ex D. Don	Gentianaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
105	<i>Gentiana pedicellata</i> (D.Don) Griseb.	Gentianaceae	Herb	Less common		2236	27° 4.553'N 88° 6.822'E
106	<i>Geranium donianum</i> Sweet	Geraniaceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
107	<i>Geranium nepalense</i> Sweet	Geraniaceae	Herb	Less common		2236	27° 4.406'N 88° 6.998'E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
108	<i>Geranium procurrens</i> Yeo	Geraniaceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
109	<i>Girardinia diversifolia</i> (Link) Friis	Urticaceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
110	<i>Gleichenia glauca</i> (Thunb. ex Houtt.) Hook.	Gleicheniaceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
111	<i>Globba racemosa</i> Sm.	Zingiberaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
112	<i>Gonostegia triandra</i> (Blume) Miq. Syn. <i>Pouzolzia hirta</i> Hassk.	Urticaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
113	<i>Hedychium thyriforme</i> Sm.	Zingiberaceae	Herb	Rare		2376	27° 4.406'N 88° 6.998'E
114	<i>Helichrysum luteoalbum</i> (L.) Rchb	Asteraceae	Herb	Rare		2574	27° 2.995'N 88° 6.705'E
115	<i>Helwingia himalaica</i> Hook.f. & Thomson ex C.B.Clarke	Helwingiaceae	Shrub	Rare		2376	27° 4.406'N 88° 6.998'E
116	<i>Hemiphragma heterophyllum</i> Wall.	Plantaginaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
117	<i>Henckelia pumila</i> (D.Don) A.Dietr.	Gesneriaceae	Herb	Less common		2236	27° 4.541'N 88° 6.834'E
118	<i>Henckelia urticifolia</i> (Buch.-Ham. ex D.Don) A.Dietr.	Gesneriaceae	Herb	Less common		2236	27° 4.406'N 88° 6.998'E
119	<i>Heracleum wallichii</i> DC.	Apiaceae	Herb	Rare		2376	27° 4.406'N 88° 6.998'E
120	<i>Herminium clavigerum</i> (Lindl.) X.H.Jin, Schuit., Raskoti & Lu Q.Huang	Orchidaceae	Herb	Less common		2572	27° 4.406'N 88° 6.998'E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
121	<i>Herpetospermum darjeelingense</i> (C.B.Clarke) H.Schaef. & S.S.Renner	Cucurbitaceae	Climber	Less common		2376	27° 4.406''N 88° 6.998''E
122	<i>Houttuynia cordata</i> Thunb.	Saururaceae	Herb	Less common		2376	27° 4.406''N 88° 6.998''E
123	<i>Hydrangea febrifuga</i> (Lour.) Y.De Smet & Granados	Hydrangeaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
124	<i>Hydrocotyle himalaica</i> P.K.Mukh.	Araliaceae	Herb	Rare		2236	27° 4.553''N 88° 6.822''E
125	<i>Hypericum choisyanum</i> Wall. ex N.Robson	Hypericaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
126	<i>Hypericum elodeoides</i> Choisy	Hypericaceae	Herb	Rare		2376	27° 4.553''N 88° 6.822''E
127	<i>Hypericum hookerianum</i> Wight & Arn.	Hypericaceae	Shrub	Rare		2270	27° 4.541''N 88° 6.834''E
128	<i>Hypericum oblongifolium</i> Choisy	Hypericaceae	Shrub	Less common		2236	27° 4.553''N 88° 6.822''E
129	<i>Hypericum patulum</i> Thunb.	Hypericaceae	Shrub	Rare		2572	27° 2.995''N 88° 6.705''E
130	<i>Ilex dipyrena</i> Wall.	Aquifoliaceae	Shrub	Less common		2572	27° 2.995''N 88° 6.705''E
131	<i>Ilex sikkimensis</i> Kurz	Aquifoliaceae	Tree	Rare		2376	27° 4.406''N 88° 6.998''E
132	<i>Impatiens arguta</i> Hook.f. & Thomson	Balsaminaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
133	<i>Impatiens cathcartii</i> Hook.f.	Balsaminaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
134	<i>Impatiens discolor</i> DC.	Balsaminaceae	Herb	Rare			

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
135	<i>Impatiens drepanophora</i> Hook.f.	Balsaminaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
136	<i>Impatiens puberula</i> DC.	Balsaminaceae	Herb	Rare		2236	27° 4.553'N 88° 6.822'E
137	<i>Impatiens racemosa</i> D.Don	Balsaminaceae	Herb	Rare		2660	27° 3.780'N 88° 7.328'E
138	<i>Impatiens radiata</i> Hook. f	Balsaminaceae	Herb	Rare		2236	27° 4.553'N 88° 6.822'E
139	<i>Impatiens radiata</i> var. <i>graciliflora</i> (Hook.f.) S.Akiyama Syn. <i>Impatiens graciliflora</i> Hook.f.	Balsaminaceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
140	<i>Impatiens stenantha</i> Hook.f.	Balsaminaceae	Herb	Common		2660	27° 3.780'N 88° 7.328'E
141	<i>Impatiens urticifolia</i> Wall.	Balsaminaceae	Herb	Rare		2376	27° 4.406'N 88° 6.998'E
142	<i>Isachne globosa</i> (Thunb.) Kuntze	Poaceae	Herb	Common		2236	27° 4.553'N 88° 6.822'E
143	<i>Isachne sikkimensis</i> Bor	Poaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
144	<i>Isodon coetsa</i> (Buch.-Ham. ex D.Don) Kudô	Lamiaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
145	<i>Isodon lophanthoides</i> (Buch.- Ham. ex D.Don) H.Hara	Lamiaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
146	<i>Jasminum dispernum</i> Wall.	Oleaceae	Climber	Rare		2572	27° 2.995'N 88° 6.705'E
147	<i>Juglans regia</i> L.	Juglandaceae	Tree	Rare		2376	27° 4.406'N 88° 6.998'E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
148	Koenigia mollis (D.Don) T.M.Schust. & Reveal Syn. Polygonum molle D. Don	Polygonaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
149	Lactuca decipiens Hook.f. & Thomson ex C.B.Clarke	Asteraceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
150	Lactuca dissecta D.Don	Asteraceae	Herb	Less common		2572	27° 2.995''N 88° 6.705''E
151	Lasianthus sikkimensis Hook.f.	Fabaceae	Shrub	Rare		2660	27° 3.780''N 88° 7.328''E
152	Lecanthus peduncularis (Royle) Wedd.	Urticaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
153	Leucosceptrum canum Sm.	Lamiaceae	Shrub	Less common		2376	27° 4.406''N 88° 6.998''E
154	Leycesteria glaucophylla (Hook.f. & Thomson) Hook.f.	Caprifoliaceae	Undershrub	Rare		2572	27° 4.406''N 88° 6.998''E
155	Leycesteria gracilis (Kurz) Airy Shaw	Caprifoliaceae	Shrub	Rare		2660	27° 3.780''N 88° 7.328''E
156	Lindera assamica (Meisn.) Kurz	Lauraceae	Tree	Less common		2572	27° 2.995''N 88° 6.705''E
157	Liparis bootanensis Griffith	Orchidaceae	Herb	Less common		2376	27° 4.406''N 88° 6.998''E
158	Lithocarpus fenestratus (Roxb.) Rehder	Fagaceae	Tree	Rare		2376	27° 4.406''N 88° 6.998''E
159	Lithocarpus pachyphyllus (Kurz) Rehder	Fagaceae	Tree	Common		2660	27° 3.780''N 88° 7.328''E
160	Litsea albescens (Hook.f.) D.G.Long	Lauraceae	Tree	Less common		2572	27° 2.995''N 88° 6.705''E
161	Litsea elongata (Nees) Hook.f.	Lauraceae	Tree	Less common		2376	27° 4.406''N 88° 6.998''E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
162	<i>Litsea javanica</i> Blume	Lauraceae	Tree	Common		2376	27° 4.406'N 88° 6.998'E
163	<i>Lobelia montana</i> Reinw. ex Blume	Campanulaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
164	<i>Lobelia nummularia</i> Lam.	Campanulaceae	Herb	Less common		2236	27° 4.406'N 88° 6.998'E
165	<i>Lobelia seguinii</i> H.Lév. & Vaniot var. <i>doniana</i> (Skotts.) Wimmer	Campanulaceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
166	<i>Lonicera acuminata</i> Wall.	Caprifoliaceae	Climber	Common		2376	27° 4.406'N 88° 6.998'E
167	<i>Luculia gratissima</i> (Wall.) Sweet	Rubiaceae	Shrub	Common		2572	27° 2.995'N 88° 6.705'E
168	<i>Lycopodium clavatum</i> L.	Lycopodiaceae	Herb	Common	Temp. Northern Hemisphere to Tropical Mountains	2572	27° 2.995'N 88° 6.705'E
169	<i>Lyonia ovalifolia</i> (Wallich) Drude	Ericaceae	Shrub	Rare		2376	27° 4.406'N 88° 6.998'E
170	<i>Machilus edulis</i> King ex Hook.f.	Lauraceae	Tree	Common		2376	27° 4.406'N 88° 6.998'E
171	<i>Machilus kurzii</i> King ex Hook.f. Syn. <i>Persea kurzii</i> (King ex Hook.f.) Kosterm.	Lauraceae	Tree	Common		2660	27° 3.780'N 88° 7.328'E
172	<i>Magnolia campbellii</i> Hook.f. & Thomson	Magnoliaceae	Tree	Less common		2376	27° 4.406'N 88° 6.998'E
173	<i>Magnolia doltsopa</i> (Buch.-Ham. ex DC.) Figlar	Magnoliaceae	Tree	Rare		2572	27° 2.995'N 88° 6.705'E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
174	Mahonia acanthifolia Wall. ex G. Don	Berberidaceae	Shrub	Less common		2572	27° 2.995'N 88° 6.705'E
175	Mahonia japonica (Thunb.) DC.	Berberidaceae	Shrub	Rare		2660	27° 3.780'N 88° 7.328'E
176	Mahonia nepalensis DC. ex Dippel	Berberidaceae	Shrub	Less common		2660	27° 3.780'N 88° 7.328'E
177	Maianthemum fuscum (Wall.) LaFrankie	Asparagaceae	Herb	Rare		2376	27° 4.406'N 88° 6.998'E
178	Melanoseris decipiens var. multifida (Hook.f.) Ghafoor, Qaiser & Roohi Bano	Asteraceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
179	Melanoseris graciliflora (DC.) N.Kilian	Asteraceae	Herb	Rare		2376	27° 4.406'N 88° 6.998'E
180	Miscanthus nepalensis (Trin.) Hack.	Poaceae	Herb	Common		2660	27° 3.780'N 88° 7.328'E
181	Myriactis nepalensis Less.	Asteraceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
182	Myrsine semiserrata Wall.	Primulaceae	Shrub	Common		2236	27° 4.553'N 88° 6.822'E
183	Naravelia zeylanica (L.) DC.	Ranunculaceae	Climber	Less common		2572	27° 2.995'N 88° 6.705'E
184	Neanotis calycina (Wall. ex Hook.f.) W.H.Lewis	Rubiaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
185	Neillia thyrsoiflora D.Don	Rosaceae	Herb	Less common		2572	27° 4.406'N 88° 6.998'E
186	Ochna pumila Buch.-Ham. ex D.Don	Ochnaceae	Shrub	Less common		2572	27° 2.995'N 88° 6.705'E
187	Odontosoria chinensis (L.) J.Sm.	Lindsaeaceae	Herb	Common		2660	27° 3.780'N 88° 7.328'E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
188	<i>Oleandra pistillaris</i> (Sw.) C.Chr.	Polypodiaceae	Herb	Common		2660	27° 3.780'N 88° 7.328'E
189	<i>Ophiopogon intermedius</i> D.Don	Asparagaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
190	<i>Oplismenus burmanni</i> (Retz.) P.Beauv.	Poaceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
191	<i>Oplismenus compositus</i> (L.) P.Beauv.	Poaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E
192	<i>Osbeckia stellata</i> var. <i>crinita</i> (Benth. ex Naud.) C.Hansen	Melastomataceae	Shrub	Less common		2236	27° 4.553'N 88° 6.822'E
193	<i>Osmanthus suavis</i> King ex C.B.Clarke	Oleaceae	Tree	Rare		2572	27° 2.995'N 88° 6.705'E
194	<i>Osmunda claytoniana</i> L.	Osmundaceae	Herb	Less common		2376	27° 4.406'N 88° 6.998'E
195	<i>Oxalis corniculata</i> L.	Oxalidaceae	Herb	Less common		2626	27° 3.938'N 88° 7.204'E
196	<i>Panax pseudoginseng</i> Wall.	Araliaceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
197	<i>Paris polyphylla</i> Sm.	Melanthiaceae	Herb	Rare		2376	27° 4.406'N 88° 6.998'E
198	<i>Parochetus communis</i> D.Don	Fabaceae	Herb	Rare		2572	27° 2.995'N 88° 6.705'E
199	<i>Peperomia tetraphylla</i> (G.Forst.) Hook. & Arn.	Piperaceae	Herb	Less common		2376	27° 2.995'N 88° 6.705'E
200	<i>Persicaria chinensis</i> (L.) H.Gross	Polygonaceae	Herb	Common		2376	27° 4.406'N 88° 6.998'E
201	<i>Persicaria hydropiper</i> (L.) Delarbre	Polygonaceae	Herb	Common		2572	27° 2.995'N 88° 6.705'E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
202	<i>Persicaria lapathifolia</i> (L.) Delarbre	Polygonaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
203	<i>Persicaria runcinata</i> (Buch.- Ham. ex D.Don) H.Gross	Polygonaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
204	<i>Persicaria wallichii</i> Greuter & Burdet	Polygonaceae	Herb	Abundant		2572	27° 2.995''N 88° 6.705''E
205	<i>Phlomoides hamosa</i> (Benth.) Mathiesen Syn. <i>Notochaete</i> <i>hamosa</i> Benth.	Lamiaceae	Herb	Rare		2572	27° 2.995''N 88° 6.705''E
206	<i>Pieris formosa</i> (Wall.) D.Don	Ericaceae	Shrub	Less common		2572	27° 2.995''N 88° 6.705''E
207	<i>Pilea bracteosa</i> Wedd.	Urticaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
208	<i>Pilea ternifolia</i> Wedd.	Urticaceae	Herb	Common		2402	27° 4.406''N 88° 6.998''E
209	<i>Pilea umbrosa</i> Wedd. ex Blume	Urticaceae	Herb	Common		2660	27° 3.780''N 88° 7.328''E
210	<i>Pimpinella diversifolia</i> DC.	Apiaceae	Herb	Rare		2572	27° 2.995''N 88° 6.705''E
211	<i>Pinus patula</i> Schiede ex Schltdl. & Cham.	Pinaceae	Tree	Common		2660	27° 3.780''N 88° 7.328''E
212	<i>Pinus wallichiana</i> A. B. Jackson	Pinaceae	Tree	Common		2376	27° 4.406''N 88° 6.998''E
213	<i>Piper attenuatum</i> Buch.-Ham. ex Miq.	Piperaceae	Climber	Less common		2660	27° 3.780''N 88° 7.328''E
214	<i>Piper suipigua</i> Buch.-Ham. ex D.Don	Piperaceae	Climber	Less common		2572	27° 2.995''N 88° 6.705''E
215	<i>Piptanthus nepalensis</i> (Hook.) Sweet	Fabaceae	Tree	Rare		2236	27° 4.553''N 88° 6.822''E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
216	<i>Plagiogyria pycnophylla</i> (Kunze) Mett. Syn. <i>Plagiogyria scandens</i> Mett.	Cyatheaceae	Herb	Common		2236	27° 4.553''N 88° 6.822''E
217	<i>Plantago erosa</i> Wall.	Plantaginaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
218	<i>Pleione praecox</i> (Sm.) D.Don	Orchidaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
219	<i>Poa ludens</i> R.R.Stewart	Poaceae	Herb	Abundant		2376	27° 4.406''N 88° 6.998''E
220	<i>Poa mairei</i> Hack. Syn. <i>Poa ludens</i> R.R.Stewart	Poaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
221	<i>Poa rajbhandarii</i> Noltie	Poaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
222	<i>Polygonatum brevistylum</i> Baker	Asparagaceae	Herb	Rare			27° 2.995''N 88° 6.705''E
223	<i>Polygonatum oppositifolium</i> (Wall.) Royle	Asparagaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
224	<i>Polygonum runcinatum</i> Buchanan-Hamilton ex D. Don	Polygonaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
225	<i>Potentilla fruticosa</i> L.	Rosaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
226	<i>Pouzolzia zeylanica</i> (L.) Benn.	Urticaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
227	<i>Pratia montana</i> (Reinw. ex Blume) Hassk.	Campanulaceae	Herb	Rare		2572	27° 2.995''N 88° 6.705''E
228	<i>Prunella vulgaris</i> L.	Lamiaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
229	<i>Prunus cerasoides</i> D. Don.	Rosaceae	Tree	Less common		2376	27° 4.406''N 88° 6.998''E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
230	<i>Prunus napaulensis</i> (Ser.) Steud.	Rosaceae	Tree	Less common		2572	27° 2.995''N 88° 6.705''E
231	<i>Pseudognaphalium affine</i> (D.Don) Anderb.	Asteraceae	Herb	Less common		2402	27° 4.406''N 88° 6.998''E
232	<i>Pteridium revolutum</i> (Blume) Nakai Syn. <i>Pteris excelsa</i> Blume	Dennstaedtiaceae	Herb	Common		2236	27° 4.553''N 88° 6.822''E
233	<i>Pteris aspericaulis</i> Wall. ex J.Agardh	Pteridaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
234	<i>Pteris cretica</i> L.	Pteridaceae	Herb	Common		2236	27° 4.553''N 88° 6.822''E
235	<i>Pteris excelsa</i> Gaud.	Pteridaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
236	<i>Pteris quadriaurita</i> Retz.	Pteridaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
237	<i>Quercus lamellosa</i> Sm.	Fagaceae	Tree	Common		2660	27° 3.780''N 88° 7.328''E
238	<i>Quercus lineata</i> Blume	Fagaceae	Tree	Less common		2402	27° 4.406''N 88° 6.998''E
239	<i>Quercus pachyphylla</i> Kurz.	Fagaceae	Tree	Common		2236	27° 4.553''N 88° 6.822''E
240	<i>Quercus thomsoniana</i> A.DC.	Fagaceae	Tree	Common		2572	27° 2.995''N 88° 6.705''E
241	<i>Ranunculus diffusus</i> DC.	Ranunculaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
242	<i>Rhaphidophora calophylla</i> Schott	Araceae	Climber	Rare		2236	27° 4.553''N 88° 6.822''E
243	<i>Rhaphidophora glauca</i> (Wall.) Schott	Araceae	Climber	Rare		2376	27° 4.406''N 88° 6.998''E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
244	Rhododendron arboreum Sm.	Ericaceae	Tree	Common		2572	27° 2.995''N 88° 6.705''E
245	Rhododendron barbatum Wall. ex G.Don	Ericaceae	Tree	Common		2572	27° 2.995''N 88° 6.705''E
246	Rhododendron falconeri Hook.f.	Ericaceae	Tree	Rare		2572	27° 2.995''N 88° 6.705''E
247	Rhododendron grande Wight	Ericaceae	Tree	Common		2376	27° 4.406''N 88° 6.998''E
248	Rhododendron griffithianum Wight	Ericaceae	Tree	Common		2572	27° 2.995''N 88° 6.705''E
249	Rhynchospermum verticillatum Reinw.	Asteraceae	Herb	Less common		2236	27° 4.553''N 88° 6.822''E
250	Rohdea nepalensis (Raf.) N.Tanaka Syn. Tupistra aurantiaca (Baker) Wall. ex Hook.f.	Asparagaceae	Herb	Less common		2572	27° 2.995''N 88° 6.705''E
251	Rubia cordifolia L.	Rubiaceae	Climber	Less common		2236	27° 4.553''N 88° 6.822''E
252	Rubia manjith Roxb.	Rubiaceae	Climber	Common		2236	27° 4.553''N 88° 6.822''E
253	Rubia sikkimensis Kurz	Rubiaceae	Climber	Common		2376	27° 4.406''N 88° 6.998''E
254	Rubus acuminatus Sm.	Rosaceae	Herb	Common		2572	27° 2.995''N 88° 6.705''E
255	Rubus calycinus Wall. ex D.Don	Rosaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
256	Rubus ellipticus Sm.	Rosaceae	Subshrub	Less common		2376	27° 4.406''N 88° 6.998''E
257	Rubus hypargyrus - (Wall. ex	Rosaceae	Subshrub	Common		2572	27° 2.995''N

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
	D.Don.)Hara.						88° 6.705"E
258	Rubus lineatus Reinwardt	Rosaceae	Herb	Less common		2376	27° 4.406"N 88° 6.998"E
259	Rubus paniculatus Sm.	Rosaceae	Herb	Common		2376	27° 4.406"N 88° 6.998"E
260	Rubus rosifolius Sm.	Rosaceae	Subshrub	Less common		2572	27° 2.995"N 88° 6.705"E
261	Rubus rugosus Sm.	Rosaceae	Herb	Rare		2660	27° 3.780"N 88° 7.328"E
262	Rubus splendidissimus H.Hara	Rosaceae	Herb	Rare		2572	27° 2.995"N 88° 6.705"E
263	Rubus wardii Merr.	Rosaceae	Subshrub	Rare		2572	27° 2.995"N 88° 6.705"E
264	Rumex nepalensis Spreng.	Polygonaceae	Herb	Less common		2626	27° 3.938"N 88° 7.204"E
265	Sarcococca wallichii Stapf.	Euphorbiaceae	Shrub	Rare		2572	27° 2.995"N 88° 6.705"E
266	Saxifraga strigosa Wall. ex Ser.	Saxifragaceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
267	Schefflera rhododendrifolia (Griff.) Frodin Syn. Schefflera impressa (C.B.Clarke) Harms	Araliaceae	Tree	Less common		2572	27° 2.995"N 88° 6.705"E
268	Schisandra grandiflora (Wall.) Hook.f. & Thomson	Schisandraceae	Liana	Rare		2572	27° 2.995"N 88° 6.705"E
269	Scutellaria discolor Wall. ex Benth.	Lamiaceae	Herb	Rare		2376	27° 4.406"N 88° 6.998"E
270	Selliguea erythrocarpa (Mett.) X.C.Zhang & L.J.He Syn. Phymatodes erythrocarpa	Polypodiaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
	(Mett.) Ching						
271	Senecio scandens Buchanan-Hamilton ex D. Don	Asteraceae	Climber	Common		2572	27° 2.995''N 88° 6.705''E
272	Senecio wightianus DC.	Asteraceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
273	Smilax elegans Wall. ex Kunth	Smilacaceae	Climber	Less common		2572	27° 2.995''N 88° 6.705''E
274	Smilax munita S.C.Chen	Smilacaceae	Shrub	Rare		2626	27° 3.938''N 88° 7.204''E
275	Smilax myrtilus A.DC.	Smilacaceae	Climber	Rare		2572	27° 2.995''N 88° 6.705''E
276	Stellaria media (L.) Vill.	Caryophyllaceae	Herb	Less common		2572	27° 2.995''N 88° 6.705''E
277	Stellaria sikkimensis Hook. f.	Caryophyllaceae	Herb	Less common		2376	27° 4.406''N 88° 6.998''E
278	Stenosaris graciliflora (Wall. ex DC.) C.Shih	Asteraceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
279	Streptolirion volubile Edgew.	Commelinaceae	Climber	Less common		2376	27° 4.406''N 88° 6.998''E
280	Strobilanthes divaricata (Nees) T.Anderson	Acanthaceae	Herb	Common		2376	27° 4.406''N 88° 6.998''E
281	Strobilanthes pentastemonoides (Nees) T.Anderson	Acanthaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
282	Strobilanthes pentastemonoides (Nees) T.Anderson var. dalhousieana Kuntze	Acanthaceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
283	Swertia bimaculata (Siebold & Zucc.) Hook.f. & Thomson ex C.B.Clarke	Gentianaceae	Herb	Less common		2376	27° 4.406''N 88° 6.998''E
284	Swertia chirata Buch.-Ham. ex Wall.	Gentianaceae	Herb	Less common		2572	27° 2.995''N 88° 6.705''E
285	Swertia purpurascens (D.Don) C.B.Clarke Syn. Swertia ciliata (D.Don) B.L.Burt	Gentianaceae	Herb	Rare		2572	27° 2.995''N 88° 6.705''E
286	Symplocos dryophila C.B.Clarke	Symplocaceae	Tree	Less common		2660	27° 3.780''N 88° 7.328''E
287	Symplocos glomerata King ex C.B.Clarke	Symplocaceae	Tree	Common		2376	27° 4.406''N 88° 6.998''E
288	Symplocos lucida (Thunb.) Zuccarini	Symplocaceae	Tree	Rare		2376	27° 4.406''N 88° 6.998''E
289	Symplocos racemosa Roxb.	Symplocaceae	Tree	Less common		2376	27° 4.406''N 88° 6.998''E
290	Symplocos ramosissima Wallich ex G. Don	Symplocaceae	Tree	Rare		2376	27° 4.406''N 88° 6.998''E
291	Symplocos theifolia (Hayata) Hayata	Symplocaceae	Tree	Rare		2376	27° 4.406''N 88° 6.998''E
292	Synotis cappa (Buch.-Ham. ex D.Don) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Less common		2573	27° 2.995''N 88° 6.705''E
293	Synotis tetrantha (DC.) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Rare		2376	27° 4.406''N 88° 6.998''E
294	Taxus wallichiana Zucc.	Taxaceae	Tree	Common		2376	27° 4.406''N 88° 6.998''E
295	Tetradium fraxinifolium (Hook.) T.G.Hartley	Rutaceae	Tree	Rare		2572	27° 2.995''N 88° 6.705''E
296	Tetrastigma serrulatum (Roxb.)	Vitaceae	Climber	Less		2572	27° 2.995''N

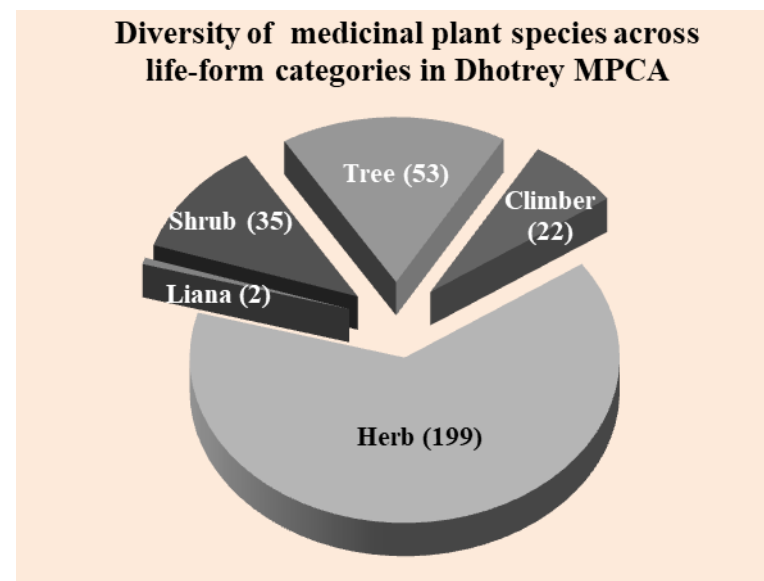
Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
	Planch.			common			88° 6.705"E
297	<i>Thalictrum chelidonii</i> DC.	Ranunculaceae	Herb	Less common		2376	27° 4.406"N 88° 6.998"E
298	<i>Thelypteris arida</i> (D.Don) Morton	Aspleniaceae	Herb	Common		2376	27° 4.406"N 88° 6.998"E
299	<i>Thunbergia lutea</i> T.Anderson	Acanthaceae	Climber	Rare		2660	27° 3.780"N 88° 7.328"E
300	<i>Trifolium pratense</i> L.	Fagaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
301	<i>Tripterospermum volubile</i> (D. Don) H. Hara	Gentianaceae	Climber	Rare		2376	27° 4.406"N 88° 6.998"E
302	<i>Tsuga dumosa</i> (D. Don) Eichler	Pinaceae	Tree	Rare		2376	27° 4.406"N 88° 6.998"E
303	<i>Uria lagopus</i> var. <i>neglecta</i> (Prain) H.Ohashi	Fabaceae	Herb	Rare		2572	27° 4.406"N 88° 6.998"E
304	<i>Urtica dioica</i> L.	Urticaceae	Herb	Abundant		2376	27° 4.406"N 88° 6.998"E
305	<i>Valeriana hardwickei</i> Wall.	Rubiaceae	Herb	Common		2376	27° 4.406"N 88° 6.998"E
306	<i>Viburnum erubescens</i> Wall. ex DC.	Viburnaceae	Tree	Common		2376	27° 4.406"N 88° 6.998"E
307	<i>Viola pilosa</i> Blume	Violaceae	Herb	Common		2572	27° 2.995"N 88° 6.705"E
308	<i>Viola sikkimensis</i> W.Becker	Violaceae	Herb	Common		2626	27° 3.938"N 88° 7.204"E
309	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Poaceae	Shrub	Common		2572	27° 2.995"N 88° 6.705"E
310	<i>Zanthoxylum armatum</i> DC	Rutaceae	Tree	Rare		2572	27° 2.995"N 88° 6.705"E

Sl.No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS
311	Zanthoxylum oxyphyllum Edgew.	Rutaceae	Shrub	Less common		2376	27° 4.406''N 88° 6.998''E
312	Zeuxine goodyeroides Lindl.	Orchidaceae	Herb	Rare		2572	27° 2.995''N 88° 6.705''E

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants

List of threatened medicinal plant species recorded in Dhotrey MPCA

Sl.No	Botanical name	Threatened status
1	Berberis aristata	Vulnerable
2	Cinnamomum bejolghota	Vulnerable
3	Panax pseudoginseng	Critically Endangered
4	Swertia chirayita	Critically Endangered
5	Taxus wallichiana	Critically Endangered



Annexure 5. Details of medicinal plant species collected and recorded from Garpanchkot MPCA, Purulia district, West Bengal

Seasonal botanical surveys conducted in Garpanchkot MPCA, Purulia district, West Bengal recorded totally 325 medicinal plant species

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
1	<i>Abrus precatorius</i> L.	Fabaceae	Climber	Lees common	
2	<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	Herb	Common	
3	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Common	
4	<i>Acilepis dendigulensis</i> (DC.) H.Rob. Syn. <i>Vernonia indica</i> Wall. ex C.B.Clarke	Asteraceae	Undershrub	Common	
5	<i>Acmella paniculata</i> (Wall. ex DC.) R.K.Jansen	Asteraceae	Herb	Common	Mexico to NW. Venezuela and Bolivia, Caribbean
6	<i>Acmella radicans</i> (Jacq.) R.K.Jansen	Asteraceae	Herb	Common	Tropical America
7	<i>Acmella uliginosa</i> (Sw.) Cass.	Asteraceae	Herb	Common	
8	<i>Adiantum lunulatum</i> Houtt.	Polypodiaceae	Herb	Common	
9	<i>Adina cordifolia</i> (Roxb.) Brandis Syn. <i>Haldina cordifolia</i> (Roxb.) Ridsdale	Rubiaceae	Tree	Common	
10	<i>Aegle marmelos</i> (L.) Corrêa	Rutaaceae	Tree	Common	
11	<i>Aerva lanata</i> (L.) Juss. ex Schult.	Amaranthaceae	Herb	Common	
12	<i>Afrohybanthus enneaspermus</i> (L.) Flicker Syn. <i>Hybanthus enneaspermus</i> (L.) F.Muell.	Violaceae	Herb	Less common	
13	<i>Ageratum conyzoides</i> L.	Asteraceae	Herb	Less common	
14	<i>Ailanthus excelsa</i> Roxb.	Rutaaceae	Tree	In MPCA boundry	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
15	<i>Alangium salviifolium</i> (L.f.) Wangerin	Cornaceae	Tree	Common	
16	<i>Albizia lebeck</i> (L.) Benth.	Fabaceae	Tree	In MPCA boundry	
17	<i>Albizia odoratissima</i> (L.f.) Benth.	Fabaceae	Tree	Rare	
18	<i>Alocasia macrorrhizos</i> (L.) G.Don	Araceae	Herb	Common	
19	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Amaranthaceae	Herb	Common	
20	<i>Alysicarpus monilifer</i> (L.) DC.	Fabaceae	Herb	Common	
21	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Herb	Common	
22	<i>Amaranthus viridis</i> L.	Amaranthaceae	Herb	Common	SE. Mexico to Tropical America
23	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Herb	In MPCA boundry	
24	<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Vitaceae	Climber	Rare	
25	<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	Herb	Common	
26	<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	Herb	Less common	
27	<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Climber	Less common	
28	<i>Apluda mutica</i> L.	Poaceae	Herb	Less common	
29	<i>Aristolochia indica</i> L.	Aristolochiaceae	Climber	Less common	
30	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Climber	Common	
31	<i>Ayenia herbacea</i> (Roxb.) ined.	Malvaceae	Herb	Rare in MPCA boundry	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
32	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Tree	Less common	
33	<i>Azanza lampas</i> (Cav.) Alef. Syn. <i>Thespesia lampas</i> (Cav.) Dalzell	Malvaceae	Shrub	Less common	
34	<i>Barleria prionitis</i> L.	Acanthaceae	Herb		
35	<i>Bidens pilosa</i> L.	Asteraceae	Herb	Common	
36	<i>Biophytum sensitivum</i> (L.) DC.	Oxalidaceae	Herb	Rare	Tropical & Subtropical America
37	<i>Blumea axillaris</i> (Lam.) DC.	Asteraceae	Herb	Common	
38	<i>Blumea bifoliata</i> (L.) DC.	Asteraceae	Herb	Less common	
39	<i>Blumea lacera</i> (Burm.f.) DC.	Asteraceae	Herb	Common	
40	<i>Bombax ceiba</i> L.	Malvaceae	Tree	Rare	
41	<i>Bonnaya ciliata</i> (Colsm.) Spreng.	Linderniaceae	Herb	Less common	
42	<i>Borassus flabellifer</i> L.	Arecaceae	Tree	In MPCA boundry	
43	<i>Bothriochloa pertusa</i> (L.) A.Camus	Poaceae	Herb	Common	
44	<i>Botrychium daucifolium</i> Wall. ex Hook. & Grev.	Ophioglossaceae	Herb	Less common	
45	<i>Breynia vitis-idaea</i> (Burm.f.) C.E.C.Fisch.	Phyllanthaceae	Shrub	Rare	
46	<i>Bridelia glauca</i> Blume	Phyllanthaceae	Tree	Common	
47	<i>Bridelia retusa</i> (L.) A.Juss.	Phyllanthaceae	Tree	Common	
48	<i>Bridelia stipularis</i> (L.) Blume	Phyllanthaceae	Tree	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
49	Buchanania lanzan Spreng.	Anacardiaceae	Tree	Less common	
50	Butea monosperma (Lam.) Kuntze	Fabaceae	Tree	Common	
51	Butea monosperma (Lam.) Taub. var. lutea (Witt.) Maheshwari	Fabaceae	Liana	Rare	
52	Butea superba Roxb. ex Willd.	Fabaceae	Liana	Rare	
53	Cajanus scarabaeoides (L.) Thouars	Fabaceae	Climber	Common	
54	Canscora diffusa (Vahl) R.Br. ex Roem. & Schult.	Gentianaceae	Herb	Less common	
55	Canthium coromandelicum (Burm.f.) Alston	Rubiaceae	Shrub	Less common	
56	Capparis spinosa L.	Capparaceae	Shrub	Rare	
57	Capsicum annuum L.	Solanaceae	Herb	Common	
58	Careya arborea Roxb.	Lecythidaceae	Tree	Less common	
59	Carissa spinarum L.	Apocynaceae	Shrub	Common	
60	Casearia vareca Roxb.	Salicaceae	Shrub	Less common	
61	Cassia fistula L.	Fabaceae	Tree	Common	
62	Catunaregam brandisii Kottaim. Syn. Randia brandisii Gamble	Rubiaceae	Shrub	Less common	
63	Cayratia pedata (Lam.) Gagnep.	Vitaceae	Climber	Rare	
64	Cayratia trifolia (L.) Domin	Vitaceae	Climber	Common	
65	Ceiba pentandra (L.) Gaertn.	Malvaceae	Tree	In MPCA boundry	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
66	<i>Cenchrus pedicellatus</i> (Trin.) Morrone	Poaceae	Herb	Common	
67	<i>Cenchrus setosus</i> Sw.	Poaceae	Herb	Common	
68	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Herb	Common	Central America
69	<i>Chloris barbata</i> Sw.	Poaceae	Herb	Common	
70	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Asteraceae	Herb	Common	
71	<i>Chrozophora rottleri</i> (Geiseler) Spreng.	Euphorbiaceae	Herb	Common	
72	<i>Chrysopogon aciculatus</i> (Retz.) Trin. Syn. <i>Andropogon aciculatus</i> Retz.	Poaceae	Herb	Common	
73	<i>Chrysopogon gryllus</i> (L.) Trin. Syn. <i>Andropogon paniculatus</i> Lam.	Poaceae	Herb	Common	
74	<i>Chukrasia tabularis</i> A.Juss.	Meliaceae	Tree	Rare	
75	<i>Cissampelos pareira</i> L.	Menispermaceae	Climber	Lees common	
76	<i>Cissus adnata</i> Roxb.	Vitaceae	Climber	Common	
77	<i>Clausena lansium</i> (Lour.) Skeels	Rutaaceae	Shrub	Common	
78	<i>Cleistanthus collinus</i> (Roxb.) Benth. ex Hook.f.	Phyllanthaceae	Tree	Common	
79	<i>Cleome viscosa</i> L.	Cleomaceae	Herb	Common	
80	<i>Clerodendrum phlomidis</i> L.f.	Verbenaceae	Shrub	Rare	
81	<i>Clerodendrum viscosum</i> Vent.	Lamiaceae	Shrub	Common	
82	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Climber	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
83	<i>Cochlospermum religiosum</i> (L.) Alston	Bixaceae	Tree	Less common	
84	<i>Combretum roxburghii</i> Spreng.	Combretaceae	Liana	Common	
85	<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	Common	
86	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Herb	Common	
87	<i>Commelina maculata</i> Edgew.	Commelinaceae	Herb	Common	
88	<i>Corchorus aestuans</i> L.	Malvaceae	Herb	Common	
89	<i>Crinum asiaticum</i> L.	Amaryllidaceae	Herb	Less common	
90	<i>Crotalaria albida</i> B.Heyne ex Roth	Fabaceae	Herb	Rare	
91	<i>Croton bonplandianus</i> Baill.	Euphorbiaceae	Herb	Common	
92	<i>Croton persimilis</i> Müll.Arg. Syn. <i>Croton roxburghii</i> N.P.Balacr.	Euphorbiaceae	Tree	Less common	
93	<i>Cryptolepis buchananii</i> R.Br. ex Roem. & Schult.	Apocynaceae	Climber	Common	
94	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Herb	Common	
95	<i>Curcuma amada</i> Roxb.	Zingiberaceae	Herb	In MPCA boundry	
96	<i>Curcuma aromatica</i> Salisb.	Zingiberaceae	Herb	In MPCA boundry	
97	<i>Curcuma zedoaria</i> (Christm.) Roscoe	Zingiberaceae	Herb	Less common	
98	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	Commelinaceae	Herb	Less common	
99	<i>Cyanthillium cinereum</i> (L.) H.Rob.	Asteraceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
100	Cyathula prostrata (L.) Blume	Amaranthaceae	Herb	Common	
101	Cynodon dactylon (L.) Pers.	Poaceae	Herb	Common	
102	Cyperus iria L.	Cyperaceae	Herb	Common	
103	Cyperus rotundus L.	Cyperaceae	Herb	Common	
104	Dactyloctenium aegyptium (L.) Willd.	Poaceae	Herb	Common	
105	Dalbergia lanceolaria Moon	Fabaceae	Tree	Common	
106	Dalbergia latifolia Roxb.	Fabaceae	Tree	Common	
107	Dendrophthoe falcata (L.f.) Ettingsh.	Loranthaceae	Stem parasite	Common	
108	Desmodium heterophyllum (Willd.) DC.	Fabaceae	Herb	Common	
109	Desmodium motorium	Fabaceae	Herb	Less common	
110	Desmodium triflorum (L.) DC.	Fabaceae	Herb	Common	
111	Desmodium volubile (Schindl.) B.G.Schub. & McVaugh	Fabaceae	Herb	Rare	
112	Dichanthium annulatum (Forssk.) Stapf	Poaceae	Herb	Common	
113	Dicliptera paniculata (Forssk.) I.Darbysh.	Acanthaceae	Herb	Common	
114	Digitaria sanguinalis (L.) Scop.	Poaceae	Herb	Less common	
115	Dillenia pentagyna Roxb.	Dilleniaceae	Tree	Rare	
116	Dioscorea alata L.	Dioscoreaceae	Climber	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
117	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Climber	Less common	
118	<i>Dioscorea floribunda</i> M.Martens & Galeotti	Dioscoreaceae	Climber	Less common	
119	<i>Diospyros ebenum</i> J.Koenig ex Retz.	Euphorbiaceae	Tree	Less common	
120	<i>Diospyros melanoxylon</i> Roxb.	Ebenaceae	Tree	Less common	
121	<i>Diospyros montana</i> Roxb.	Ebenaceae	Tree	Less common	
122	<i>Diospyros ovalifolia</i> Wight	Euphorbiaceae	Tree	Less common	
123	<i>Diplocyclos palmatus</i> (L.) C.Jeffrey	Cucurbitaceae	Climber	Common	
124	<i>Distimake aegyptius</i> (L.) A.R.Simões & Staples Syn. <i>Merremia aegyptia</i> (L.) Urb.	Convolvulaceae	Climber	Less common	Tropical & Subtropical America, Tropical Africa.
125	<i>Distimake quinquefolius</i> (L.) A.R.Simões & Staples Syn. <i>Merremia quinquefolia</i> (L.) Hallier f.	Convolvulaceae	Climber	Common	Mexico to Tropical America
126	<i>Duranta erecta</i> L.	Verbenaceae	Shrub	In MPCA boundry	
127	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Herb	Common	
128	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	Common	S. Tropical America
129	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Herb	Common	
130	<i>Emilia sonchifolia</i> (L.) DC.	Asteraceae	Herb	Common	
131	<i>Eragrostis tenella</i> (L.) P.Beauv. ex Roem. & Schult.	Poaceae	Herb	Common	
132	<i>Eragrostis unioides</i> (Retz.) Nees ex Steud.	Poaceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
133	<i>Eranthemum purpurascens</i> Wight ex Nees	Acanthaceae	Herb	Less common	
134	<i>Erycibe paniculata</i> Roxb.	Convolvulaceae	Climber	Rare	
135	<i>Erythrina stricta</i> Roxb.	Fabaceae	Tree	Less common	
136	<i>Euphorbia heyneana</i> Spreng. Syn. <i>Euphorbia microphylla</i> B.Heyne ex Roth	Euphorbiaceae	Herb	Common	
137	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Herb	Common	
138	<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	Herb	Common	
139	<i>Evolvulus alsinoides</i> (L.) L.	Convolvulaceae	Herb	Common	
140	<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae	Herb	Common	
141	<i>Ficus hispida</i> L.f.	Moraceae	Small tree	Rare	
142	<i>Ficus racemosa</i> L.	Moraceae	Tree	Less common	
143	<i>Fimbristylis dichotoma</i> (L.) Vahl	Cyperaceae	Herb	Common	
144	<i>Fimbristylis tristachya</i> var. <i>subbispicata</i> (Nees) T.Koyama Syn. <i>Fimbristylis japonica</i> Siebold & Zucc. ex Steud.	Cyperaceae	Herb	Common	
145	<i>Flacourtia indica</i> (Burm.f.) Merr.	Salicaceae	Shrub	Less common	
146	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Salicaceae	Small tree	Less common	
147	<i>Gardenia gummifera</i> L.f.	Rubiaceae	Shrub	Less common	Tropical & Subtropical America
148	<i>Gardenia latifolia</i> Aiton	Rubiaceae	Shrub	Less common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
149	Globba marantina L. Syn. Globba bulbifera Roxb.	Zingiberaceae	Herb	Rare	
150	Gloriosa superba L.	Colchicaceae	Climber	Rare	
151	Glycosmis sp.	Rutaaceae	Shrub	Less common	
152	Grewia rhamnifolia B.Heyne ex Dunn	Malvaceae	Shrub	Rare	
153	Guilandina bonduc L. Syn. Caesalpinia bonducella (L.) Fleming	Fabaceae	Shrub	Less common	
154	Gymnema sylvestre (Retz.) R.Br. ex Sm.	Apocynaceae	Climber	Common	
155	Habenaria diphylla (Nimmo) Dalzell	Orchidaceae	Herb	Rare	
156	Helicteres isora L.	Malvaceae	Small tree	Common	
157	Heliotropium indicum L.	Boraginaceae	Herb	Less common	
158	Hemidesmus indicus (L.) R.Br.	Apocynaceae	Climber	Common	
159	Hemidesmus pubescens Wight & Arn.	Apocynaceae	Climber	Common	
160	Heteropogon contortus (L.) P.Beauv. ex Roem. & Schult.	Poaceae	Herb	Common	
161	Holarrhena pubescens Wall. ex G.Don	Apocynaceae	Tree	Common	
162	Huberantha cerasoides (Roxb.) Chaowasku Syn. Polyalthia cerasoides (Roxb.) Bedd.	Annonaceae	Tree	Less common	
163	Hydrilla verticillata (L.f.) Royle	Hydrocharitaceae	Herb	Common	
164	Hydrocharis spongia Bosc Syn. Limnobium spongia (Bosc) Steud.	Hydrocharitaceae	Herb	Rare	
165	Hygrophila auriculata (Schumach.) Heine	Acanthaceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
166	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Rubiaceae	Tree	Rare	
167	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Apocynaceae	Climber	Common	
168	<i>Imperata cylindrica</i> (L.) P.Beauv.	Poaceae	Herb	Common	
169	<i>Indigofera articulata</i> Gouan	Fabaceae	Herb		
170	<i>Indigofera linnaei</i> Ali	Fabaceae	Herb	Common	
171	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	Climber	Common	
172	<i>Ipomoea biflora</i> (L.) Pers.	Convolvulaceae	Climber	Rare	
173	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	Climber	Less common	
174	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Climber	Less common	Mexico to S. Tropical America
175	<i>Ipomoea marginata</i> (Desr.) Manitz	Convolvulaceae	Climber	Less common	
176	<i>Ipomoea obscura</i> (L.) Ker Gawl.	Convolvulaceae	Climber	Less common	
177	<i>Ipomoea triloba</i> L.	Convolvulaceae	Climber	Less common	Mexico to Brazil, Caribbean.
178	<i>Ixora arborea</i> Roxb. ex Sm.	Rubiaceae	Tree	Common	
179	<i>Jacquemontia paniculata</i> (Burm.f.) Hallier f.	Convolvulaceae	Climber	Rare	
180	<i>Jatropha curcas</i> L.	Euphorbiaceae	Shrub	Less common	
181	<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	Shrub	Common	
182	<i>Justicia prostrata</i> (Roxb. ex C.B.Clarke) Gamble	Acanthaceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
183	<i>Kalanchoe pinnata</i> (Lam.) Pers.	Crassulaceae	Herb	Less common	
184	<i>Kyllinga monocephala</i> Nees	Fabaceae	Herb	Common	
185	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	Tree	Common	
186	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Tree	Common	
187	<i>Lantana camara</i> L.	Verbenaceae	Shrub	Common	
188	<i>Launaea intybacea</i> (Jacq.) Beauverd	Asteraceae	Herb	Less common	
189	<i>Leucas decemdentata</i> (Willd.) Sm.	Lamiaceae	Herb	Common	
190	<i>Limnophila chinensis</i> (Osbeck) Merr.	Plantaginaceae	Herb	Common	
191	<i>Lippia javanica</i> (Burm.f.) Spreng.	Verbenaceae	Small shrub	Less common	
192	<i>Litsea glutinosa</i> (Lour.) C.B.Rob.	Ebenaceae	Tree	Rare	
193	<i>Lygodium japonicum</i> (Thunb.) Sw.	Schizaeaceae	Herb	Common	
194	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev. Syn. <i>Madhuca indica</i> J.F.Gmel.	Sapotaceae	Tree	Common	
195	<i>Mallotus repandus</i> (Rottler) Müll.Arg.	Euphorbiaceae	Tree	Rare	
196	<i>Martynia annua</i> L.	Martyniaceae	Herb	Common	
197	<i>Melochia corchorifolia</i> L.	Malvaceae	Herb	Less common	
198	<i>Merremia emarginata</i> (Burm.f.) Hallier f.	Convolvulaceae	Climber	Less common	
199	<i>Merremia hederacea</i> (Burm.f.) Hallier f.	Convolvulaceae	Climber	Less common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
200	Mesosphaerum suaveolens (L.) Kuntze	Lamiaceae	Herb	Common	Mexico to Tropical America
201	Milium velutinum (DC.) Hook.f. & Thomson	Annonaceae	Tree	Rare	
202	Mimosa pudica L.	Fabaceae	Herb	Common	Mexico to Guatemala
203	Mimosa rubicaulis Lam.	Fabaceae	Shrub	Less common	
204	Mitragyna parvifolia (Roxb.) Korth.	Rubiaceae	Tree	Common	
205	Morinda citrifolia L.	Rubiaceae	Tree	Common	
206	Mucuna atropurpurea (Roxb.) DC. ex Wight	Fabaceae	Climber	Less common	
207	Mucuna pruriens (L.) DC.	Fabaceae	Climber	Common	
208	Murdannia nudiflora (L.) Brenan	Commelinaceae	Herb	Less common	
209	Nicotiana plumbaginifolia Viv.	Solanaceae	Herb	Rare	
210	Nyctanthes arbor-tristis L.	Oleaceae	Tree	Common	
211	Ochlandra sp.	Poaceae	Shrub	Common	
212	Ochna pumila Buch.-Ham. ex DC.	Ochnaceae	Shrub	Rare	
213	Ocimum tenuiflorum L.	Lamiaceae	Herb	Common	
214	Olax nano	Olacaceae	Shrub	Less common	
215	Olax scandens Roxb.	Olacaceae	Shrub	Common	
216	Oldenlandia corymbosa L.	Rubiaceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
217	<i>Ophioglossum reticulatum</i> L.	Ophioglossaceae	Herb	Common	
218	<i>Oplismenus compositus</i> (L.) P.Beauv.	Poaceae	Herb	Common	
219	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Tree	Rare	
220	<i>Ougeinia oojeinensis</i> (Roxb.) Hochr.	Fabaceae		Common	
221	<i>Panicum repens</i> L.	Poaceae	Herb	Common	
222	<i>Parthenium hysterophorus</i> L.	Asteraceae	Herb	Common	
223	<i>Paspalum scrobiculatum</i> L.	Poaceae	Herb	Common	Tropical & Subtropical America
224	<i>Passiflora foetida</i> L.	Passifloraceae	Climber	Common	
225	<i>Pavetta indica</i> L.	Rubiaceae	Shrub	Common	
226	<i>Perotis indica</i> (L.) Kuntze	Poaceae	Herb	Common	
227	<i>Phanera vahlii</i> (Wight & Arn.) Benth. Syn. <i>Bauhinia vahlii</i> Wight & Arn.	Fabaceae	Liana	Common	
228	<i>Phoenix sylvestris</i> (L.) Roxb.	Arecaceae	Tree	Common	
229	<i>Phyllanthus amarus</i> Schumach. & Thonn.	Phyllanthaceae	Herb	Common	
230	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Tree	Less common	
231	<i>Phyllanthus niruri</i> L.	Phyllanthaceae	Herb	Common	
232	<i>Phyllanthus rheedei</i> Wight	Phyllanthaceae	Herb	Common	
233	<i>Phyllanthus virgatus</i> G.Forst.	Phyllanthaceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
234	<i>Phyllodium pulchellum</i> (L.) Desv.	Fabaceae	Undershrub	Less common	
235	<i>Pistia stratiotes</i> L.	Araceae	Herb	Common	
236	<i>Pleurolobus gangeticus</i> (L.) J.St.-Hil. ex H.Ohashi & K.Ohashi Syn. <i>Desmodium gangeticum</i> (L.) DC.	Fabaceae	Herb	Common	
237	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Herb	Less common	
238	<i>Polhillides velutina</i> (Willd.) H.Ohashi & K.Ohashi	Fabaceae	Herb	Common	
239	<i>Polygala crotalarioides</i> Buch.-Ham. ex DC.	Polygalaceae	Herb	Common	
240	<i>Pontederia crassipes</i> Mart.	Pontederiaceae	Herb	Common	
241	<i>Portulaca suffruticosa</i> Wight	Portulacaceae	Herb	Rare	
242	<i>Portulaca tuberosa</i> Roxb.	Portulacaceae	Herb	Rare	
243	<i>Pothos scandens</i> L.	Arecaceae	Climber	Common	
244	<i>Pseudarthria viscida</i> (L.) Wight & Arn.	Fabaceae	Herb	Less common	
245	<i>Psydrax dicoccos</i> Gaertn.	Rubiaceae	Tree	Less common	
246	<i>Pteris venusta</i> Kunze	Pteridaceae	Herb	Common	
247	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Tree	Less common	
248	<i>Rauvolfia tetraphylla</i> L.	Apocynaceae	Shrub	Less common	
249	<i>Rhynchospora colorata</i> (L.) H.Pfeiff. Syn. <i>Cyperus kyllingia</i> Endl.	Cyperaceae	Herb	Rare	
250	<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	Less common	Mexico to Tropical America

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
251	<i>Rivea hypocrateriformis</i> (Desr.) Choisy	Convolvulaceae	Climber	Common	
252	<i>Rotala rosea</i> (Poir.) C.D.K.Cook	Lythraceae	Herb	Rare	
253	<i>Ruellia prostrata</i> Poir.	Asteraceae	Herb	Common	
254	<i>Rungia pectinata</i> (L.) Nees	Acanthaceae	Herb	Common	
255	<i>Santalum album</i> L.	Santalaceae	Tree	Rare	
256	<i>Sauropus compressus</i> Müll.Arg.	Phyllanthaceae	Herb	Rare	
257	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Tree	Rare	
258	<i>Scoparia dulcis</i> L.	Plantaginaceae	Herb	Common	
259	<i>Semecarpus anacardium</i> L.f.	Anacardiaceae	Tree	Common	
260	<i>Senegalia chundra</i> (Roxb. ex Rottler) Maslin Syn. <i>Acacia chundra</i> (Roxb. ex Rottler) Willd.	Fabaceae	Tree	Rare	
261	<i>Senna obtusifolia</i> (L.) H.S.Irwin & Barneby	Fabaceae	Herb	Common	
262	<i>Senna occidentalis</i> (L.) Link	Fabaceae	Herb	Common	Tropical & Subtropical America
263	<i>Senna sophera</i> (L.) Roxb.	Fabaceae	Shrub	Common	
264	<i>Senna tora</i> (L.) Roxb.	Fabaceae	Herb	Common	Tropical & Subtropical America
265	<i>Setaria flavida</i> (Retz.) Veldkamp Syn. <i>Paspalidium flavidum</i> (Retz.) A.Camus	Poaceae	Herb	Common	
266	<i>Setaria glauca</i> (L.) P.Beauv.	Poaceae	Herb	Common	Tropical & Subtropical America

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
267	<i>Shorea robusta</i> C.F.Gaertn.	Dipterocarpaceae	Tree	Common	
268	<i>Sida acuta</i> Burm.f.	Malvaceae	Herb	Common	
269	<i>Sida cordata</i> (Burm.f.) Borss.Waalk.	Malvaceae	Herb	Common	
270	<i>Sida cordifolia</i> L.	Malvaceae	Herb	Common	
271	<i>Sida rhombifolia</i> subsp. <i>alnifolia</i> (L.) Ugbor.	Malvaceae	Herb	Less common	
272	<i>Sida rhomboidea</i> Roxb.	Malvaceae	Herb	Common	
273	<i>Smilax ovalifolia</i> Roxb. ex D.Don Syn. <i>Smilax macrophylla</i> Roxb.	Smilacaceae	Climber	Common	
274	<i>Smilax zeylanica</i> L.	Smilacaceae	Climber	Less common	
275	<i>Solanum melongena</i> L.	Solanaceae	Herb	Common	Mexico to N. South America, Caribbean, E. Brazil
276	<i>Solanum nigrum</i> L.	Solanaceae	Herb	Less common	
277	<i>Solanum sisymbriifolium</i> Lam.	Solanaceae	Herb	Common	
278	<i>Solanum torvum</i> Sw.	Solanaceae	Shrub	In MPCA boundry	
279	<i>Soymida febrifuga</i> (Roxb.) A.Juss.	Meliaceae	Tree	Less common	
280	<i>Spatholobus parviflorus</i> (Roxb. ex G.Don) Kuntze	Fabaceae	Liana	Less common	
281	<i>Spermacoce articularis</i> L.f.	Rubiaceae	Herb	Common	
282	<i>Spermacoce hispida</i> L.	Rubiaceae	Herb	Common	
283	<i>Sporobolus diandrus</i> (Retz.) P.Beauv.	Poaceae	Herb	Common	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
284	<i>Stephania japonica</i> (Thunb.) Miers	Menispermaceae	Climber	Less common	
285	<i>Sterculia villosa</i> Roxb. ex Sm.	Malvaceae	Tree	Rare	
286	<i>Stereospermum suaveolens</i> (Roxb.) DC.	Bignoniaceae	Tree	Less common	
287	<i>Streblus asper</i> Lour.	Moraceae	Tree	Common	
288	<i>Suregada multiflora</i> (A.Juss.) Baill.	Euphorbiaceae	Small tree	Rare	
289	<i>Symplocos racemosa</i> Roxb.	Symplocaceae	Tree	Rare	
290	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Tree	Common	
291	<i>Syzygium jambos</i> (L.) Alston	Myrtaceae	Tree	Less common	
292	<i>Syzygium nervosum</i> A.Cunn. ex DC. Syn. <i>Syzygium operculatum</i> (Roxb.) Nied.	Myrtaceae	Tree	Less common	
293	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Herb	Common	
294	<i>Teramnus labialis</i> (L.f.) Spreng.	Fabaceae	Climber	Less common	
295	<i>Terminalia alata</i> B.Heyne ex Roth	Combretaceae	Tree	Less common	
296	<i>Terminalia anogeissiana</i> Gere & Boatwr. Syn. <i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr.	Combretaceae	Tree	Common	
297	<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	Common	
298	<i>Terminalia elliptica</i> Willd.	Combretaceae	Tree	Less common	
299	<i>Thunbergia alata</i> Bojer ex Sims	Acanthaceae	Climber	Common	
300	<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	Menispermaceae	Climber	Less common	

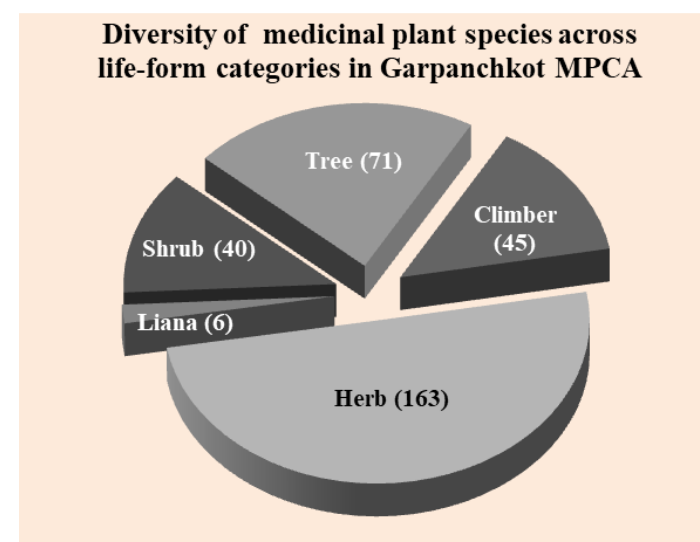
Sl. No	Botanical name	Family	Habit	Status	Exotic plants
301	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Climber	Less common	
302	<i>Torenia crustacea</i> (L.) Cham. & Schltdl.	Linderniaceae	Herb	Less common	
303	<i>Trema orientale</i> (L.) Blume	Cannabaceae	Tree	Less common	
304	<i>Trichuriella monsoniae</i> (L.f.) Bennet	Amaranthaceae	Herb	Rare	
305	<i>Tridax procumbens</i> L.	Asteraceae	Herb	Common	
306	<i>Trigastrotheca pentaphylla</i> (L.) Thulin Syn. <i>Mollugo pentaphylla</i> L.	Molluginaceae	Herb	Common	
307	<i>Triumfetta annua</i> L.	Malvaceae	Herb	Less common	
308	<i>Triumfetta pentandra</i> A.Rich.	Malvaceae	Herb	Common	
309	<i>Triumfetta rhomboidea</i> Jacq.	Malvaceae	Herb	Common	
310	<i>Urena lobata</i> L.	Malvaceae	Herb	Common	
311	<i>Vangueria spinosa</i> (Roxb. ex Link) Roxb. Syn. <i>Meyna spinosa</i> Roxb. ex Link	Rubiaceae	Shrub	Less common	
312	<i>Ventilago madraspatana</i> Gaertn.	Rhamnaceae	Liana	Common	S. Tropical America
313	<i>Vernonia albicans</i> DC.	Asteraceae	Herb	Common	
314	<i>Viscum orientale</i> Willd.	Santalaceae	Stem parasite	Rare	
315	<i>Vitex altissima</i> L.f.	Lamiaceae	Tree	Rare	
316	<i>Vitex negundo</i> L.	Lamiaceae	Tree	Less common	
317	<i>Wissadula periplocifolia</i> (L.) Thwaites	Malvaceae	Herb	Rare	

Sl. No	Botanical name	Family	Habit	Status	Exotic plants
318	Woodfordia fruticosa (L.) Kurz	Lythraceae	Small tree	Less common	
319	Xanthium indicum J.Koenig ex Roxb.	Asteraceae	Herb	Common	
320	Xenostegia tridentata (L.) D.F.Austin & Staples	Convolvulaceae	Herb	Less common	
321	Ziziphus horrida Roth	Rhamnaceae	Shrub	Less common	
322	Ziziphus jujuba Mill.	Rhamnaceae	Shrub	Less common	
323	Ziziphus oenopolia (L.) Mill.	Rhamnaceae	Shrub	Common	
324	Ziziphus rugosa Lam.	Rhamnaceae	Shrub	Rare	
325	Zornia diphylla (L.) Pers.	Fabaceae	Herb	Common	

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants

List of threatened medicinal plants recorded in Garpanchkot MPCA

Sl.No	Botanical name	Threatened status
1	Aristolochia indica	Vulnerable
2	Asparagus racemosus	Endangered
3	Desmodium motorium	Vulnerable
4	Gloriosa superba	Vulnerable
5	Gymnema sylvestre	Vulnerable
6	Morinda citrifolia	Vulnerable
7	Mucuna pruriens	Endangered
8	Olax nano	Vulnerable
9	Ophioglossum reticulatum	Endangered
10	Pterocarpus marsupium	Endangered



Annexure 6. Details of medicinal plant species collected and recorded from North Rajabhatkhawa MPCA, Buxa tiger reserve, Jalpaiguri district, West Bengal

Seasonal botanical surveys conducted in North Rajabhatkhawa MPCA, Buxa tiger reserve, Jalpaiguri district, West Bengal recorded totally 339 medicinal plant species

SI. No	Botanical Name	Family	Habit	Status
1	<i>Abrus pulchellus</i> Wallich ex Thwaites	Fabaceae	Climber	Common
2	<i>Acampe papillosa</i> (Lindl.) Lindl.	Orchidaceae	Herb	Less common
3	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Common
4	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	Herb	Common
5	<i>Achyrospermum densiflorum</i> Blume	Lamiaceae	Herb	Common
6	<i>Acmella uliginosa</i> (Sw.) Cass.	Asteraceae	Herb	Common
7	<i>Actinodaphne obovata</i> (Nees) Blume	Lauraceae	Tree	Less common
8	<i>Aerides multiflorum</i> Roxb.	Orchidaceae	Herb	Less common
9	<i>Aeschynanthus micranthus</i> C.B.Clarke	Gesneriaceae	Herb	Abundant
10	<i>Ageratum conyzoides</i> L.	Asteraceae	Herb	Common
11	<i>Ageratum houstonianum</i> Mill.	Asteraceae	Herb	Common
12	<i>Aglaia perviridis</i> Hiern	Meliaceae	Tree	Common
13	<i>Aglaia spectabilis</i> (Miq.) S.S. Jain & Bennet	Meliaceae	Tree	Common
14	<i>Ailanthus integrifolia</i> Lam.	Simaroubaceae	Tree	Common
15	<i>Alangium chinense</i> (Lour.) Harms	Alangiaceae	Shrub	Less common
16	<i>Allophylus cobbe</i> (L.) Raeusch.	Sapindaceae	Shrub	Common

SI. No	Botanical Name	Family	Habit	Status
17	<i>Alocasia fallax</i> Schott	Araceae	Herb	Common
18	<i>Alpinia calcarata</i> (Andrews) Roscoe	Zingiberaceae	Herb	Less common
19	<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	Tree	Common
20	<i>Alysicarpus monilifer</i> (L.) DC.	Fabaceae	Herb	Common
21	<i>Amischotolype hookeri</i> (Hassk.) H.Hara	Commelinaceae	Herb	Less common
22	<i>Ampelocissus barbata</i> (Wall.) Planch.	Vitaceae	Climber	Common
23	<i>Ampelocissus sikkimensis</i> (M.A.Lawson) Planch.	Vitaceae	Climber	Common
24	<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	Herb	Less common
25	<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	Herb	Common
26	<i>Antidesma montanum</i> var. <i>montanum</i>	Phyllanthaceae	Tree	Less common
27	<i>Aphanamixis polystachya</i> (Wall.) R.Parker	Meliaceae	Tree	Common
28	<i>Ardisia elliptica</i> Thunb.	Myrsinaceae	Shrub	Less common
29	<i>Ardisia solanacea</i> Roxb.	Primulaceae	Shrub	Common
30	<i>Argyrea roxburghii</i> (Sweet) Choisy	Convolvulaceae	Climber	Less common
31	<i>Aristolochia indica</i> L.	Aristolochiaceae	Climber	Rare
32	<i>Aristolochia tagala</i> Cham.	Aristolochiaceae	Climber	Rare
33	<i>Artocarpus chama</i> Buch.-Ham.	Moraceae	Tree	Less common
34	<i>Ascocentrum ampullaceum</i> (Roxb.) Schltr.	Orchidaceae	Herb	Less common
35	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Climber	Less common
36	<i>Aspidopterys nutans</i> (Roxb. ex DC.) A.Juss.	Malpighiaceae	Climber	Rare

SI. No	Botanical Name	Family	Habit	Status
37	<i>Asplenium erectum</i> Bory ex Willd.	Aspleniaceae	Herb	Abundant
38	<i>Athyrium biserrulatum</i> Christ	Aspleniaceae	Herb	Common
39	<i>Axonopus compressus</i> (Sw.) P.Beauv.	Poaceae	Herb	Common
40	<i>Ayenia grandifolia</i> (DC.) Christenh. & Byng	Malvaceae	Climber	Less common
41	<i>Baccaurea ramiflora</i> Lour.	Phyllanthaceae	Tree	Less common
42	<i>Balakata baccata</i> (Roxb.) Esser	Euphorbiaceae	Tree	Rare
43	<i>Baliospermum montanum</i> (Willd.) Müll.Arg.	Euphorbiaceae	Shrub	Common
44	<i>Barleria cristata</i> L.	Acanthaceae	Herb	Common
45	<i>Barleria strigosa</i> Willd.	Acanthaceae	Herb	Abundant
46	<i>Bauhinia acuminata</i> Vell.	Fabaceae	Shrub	Rare
47	<i>Bauhinia vahlii</i> Wight & Arn.	Fabaceae	Liana	Rare
48	<i>Bauhinia variegata</i> L.	Fabaceae	Tree	Common
49	<i>Benkara fasciculata</i> (Roxb.) Ridsdale	Rubiaceae	Shrub	Less common
50	<i>Berchemia floribunda</i> (Wall.) Brongn.	Rhamnaceae	Shrub	Less common
51	<i>Bidens pilosa</i> L.	Asteraceae	Herb	Common
52	<i>Bischofia javanica</i> Blume	Euphorbiaceae	Tree	Common
53	<i>Bombax ceiba</i> L.	Malvaceae	Tree	Less common
54	<i>Brachiaria eruciformis</i> (Sm.) Griseb.	Poaceae	Herb	Less common
55	<i>Bridelia retusa</i> (L.) A.Juss.	Phyllanthaceae	Shrub	Less common
56	<i>Bridelia scandens</i> (Roxb.) Willd.	Phyllanthaceae	Shrub	Less common

SI. No	Botanical Name	Family	Habit	Status
57	<i>Bulbophyllum roxburghii</i> (Lindl.) Reichb	Orchidaceae	Herb	Common
58	<i>Bulbophyllum sarcophyllum</i> (King & Pantl.) J.J.Sm.	Orchidaceae	Herb	Abundant
59	<i>Caesalpinia crista</i> L.	Fabaceae	Straggler	Common
60	<i>Callicarpa arborea</i> Roxb.	Lamiaceae	Tree	Less common
61	<i>Callicarpa tomentosa</i> (L.) Murr.	Lamiaceae	Tree	Common
62	<i>Canarium sikkimense</i> King	Burseraceae	Tree	Rare
63	<i>Canthium rheedei</i> DC.	Rubiaceae	Shrub	Common
64	<i>Capparis acutifolia</i> Sweet	Capparaceae	Shrub	Less common
65	<i>Capparis olacifolia</i> Hook.f. & Thomson	Cappariaceae	Shrub	Rare
66	<i>Capparis tenera</i> Dalz.	Capparaceae	Shrub	Rare
67	<i>Carex inanis</i> Kunth	Cyperaceae	Herb	Abundant
68	<i>Careya arborea</i> Roxb.	Lecythidaceae	Tree	Common
69	<i>Casearia graveolens</i> Dalzell	Salicaceae	Shrub	Rare
70	<i>Casearia vareca</i> Roxb.	Salicaceae	Shrub	Less common
71	<i>Cassia fistula</i> L.	Fabaceae	Tree	Less common
72	<i>Castanopsis argentea</i> (Blume) A.DC.	Fagaceae	Tree	Rare
73	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Fagaceae	Tree	Less common
74	<i>Catunaregam longispina</i> (Link) Tirveng.	Rubiaceae	Shrub	Less common
75	<i>Cayratia pedata</i> (Lam.) Gagnep.	Vitaceae	Climber	Less common
76	<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	Climber	Less common

SI. No	Botanical Name	Family	Habit	Status
77	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Climbing shrub	Less common
78	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Herb	Common
79	<i>Cephalanthus tetrandra</i> (Roxb.) Ridsdale & Bakh.f.	Rubiaceae	Tree	Less common
80	<i>Chisocheton cumingianus</i> (C.DC.) Harms	Meliaceae	Tree	Rare
81	<i>Chloranthus elatior</i> R. Br.	Chloranthaceae	Herb	Less common
82	<i>Chonemorpha fragrans</i> (Moon) Alston	Apocynaceae	Liana	Common
83	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Asteraceae	Herb	Abundant
84	<i>Chukrasia tabularis</i> A.Juss.	Meliaceae	Tree	Common
85	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	Lauraceae	Tree	Common
86	<i>Cinnamomum camphora</i> (L.) J.Presl	Lauraceae	Tree	Less common
87	<i>Cissus pallida</i> (Wight & Arn.) Steud.	Vitaceae	Climber	Rare
88	<i>Cissus woodrowii</i> (Stapf ex T. Cooke) Santapau	Vitaceae	Climber	Common
89	<i>Claoxylon longipetiolatum</i> Kurz	Euphorbiaceae	Shrub	Rare
90	<i>Clausena excavata</i> Burm.f.	Meliaceae	Tree	Less common
91	<i>Clerodendrum viscosum</i> Vent.	Verbenaceae	Shrub	Common
92	<i>Clinopodium gracile</i> (Bentham) Matsumur	Lamiaceae	Herb	Common
93	<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	Common
94	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Herb	Common
95	<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	Common
96	<i>Corallocarpus epigaeus</i> (Rottler) Hook.f.	Cucurbitaceae	Climber	Common

SI. No	Botanical Name	Family	Habit	Status
97	<i>Costus speciosus</i> (J.Koenig) Sm.	Zingiberaceae	Herb	Common
98	<i>Crinum viviparum</i> (Lam.) R.Ansari & V.J.Nair	Amaryllidaceae	Herb	Rare
99	<i>Croton caudatus</i> Geiseler	Euphorbiaceae	Shrub	Common
100	<i>Croton roxburghii</i> Wall.	Euphorbiaceae	Tree	Less common
101	<i>Cryptolepis sinensis</i> (Lour.) Merr.	Apocynaceae	Climber	Rare
102	<i>Cucumis callosus</i> (Rottler) Cogn.	Cucurbitaceae	Climber	Less common
103	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Herb	Abundant
104	<i>Curculigo trichocarpa</i> (Wight) Bennet & Raizada	Hypoxidaceae	Herb	Less common
105	<i>Curcuma zedoaria</i> (Christm.) Roscoe	Zingiberaceae	Herb	Less common
106	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	Commelinaceae	Herb	Less common
107	<i>Cyanotis cristata</i> (L.) D. Don	Commelinaceae	Herb	Common
108	<i>Cyathula prostrata</i> (L.) Blume	Amaranthaceae	Herb	Abundant
109	<i>Cyclea bicristata</i> (Griff.) Diels	Menispermaceae	Climber	Common
110	<i>Cyperus pangorei</i> Rottb.	Cyperaceae	Herb	Common
111	<i>Dalbergia pinnata</i> (Lour.) Prain	Fabaceae	Tree	Less common
112	<i>Dalbergia stipulacea</i> Roxb.	Fabaceae	Shrub	Less common
113	<i>Deeringia amaranthoides</i> (Lam.) Merr.	Amaranthaceae	Herb	Common
114	<i>Dendrobium anceps</i> Sw.	Orchidaceae	Herb	Less Common
115	<i>Dendrobium cathcartii</i> Hook. f.	Orchidaceae	Herb	Less common
116	<i>Dendrobium densiflorum</i> Lindl.	Orchidaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
117	<i>Dendrobium stuposum</i> Lindl.	Orchidaceae	Herb	Common
118	<i>Dendrocide sinuata</i> (Blume) Chew	Urticaceae	Shrub	Common
119	<i>Desmodium heterocarpon</i> var. <i>strigosum</i> Meeuwen	Fabaceae	Herb	Less common
120	<i>Desmodium heterocarpon</i> (L.) DC.	Fabaceae	Herb	Less common
121	<i>Desmodium laxiflorum</i> DC.	Fabaceae	Herb	Common
122	<i>Desmodium oblongum</i> Wallich ex Bentham	Fabaceae	Herb	Less common
123	<i>Desmodium triangulare</i> (Retz.) Merr.	Fabaceae	Shrub	Less common
124	<i>Desmodium triflorum</i> (L.) DC.	Fabaceae	Herb	Common
125	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	Herb	Abundant
126	<i>Dichanthium aristatum</i> (Poir.) C.E.Hubb.	Poaceae	Herb	Common
127	<i>Dicliptera bupleuroides</i> Nees	Acanthaceae	Herb	Common
128	<i>Dicliptera paniculata</i> var. <i>subaequibracteata</i> (Bennet) Karthik. & Moorthy	Acanthaceae	Herb	Common
129	<i>Dictyospermum montanum</i> Wight	Commelinaceae	Herb	Less common
130	<i>Dictyospermum ovalifolium</i> Wight	Orachidaceae	Herb	Common
131	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	Herb	Common
132	<i>Dillenia indica</i> L.	Dilleniaceae	Tree	Less common
133	<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Tree	Common
134	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Climber	Common
135	<i>Dioscorea prazeri</i> Prain & Burkill	Dioscoreaceae	Climber	Less common
136	<i>Diospyros montana</i> Roxb.	Dioscoreaceae	Climber	Less common

SI. No	Botanical Name	Family	Habit	Status
137	<i>Diplazium esculentum</i> (Retz.) Sw.	Aspleniaceae	Herb	Common
138	<i>Dracaena angustifolia</i> (Medik.) Roxb.	Asparagaceae	Habit	Common
139	<i>Dregea volubilis</i> (L. f.) Benth. ex Hook. f.	Apocynaceae	Climber	Less common
140	<i>Drosera burmanni</i> Vahl	Droseraceae	Herb	Less common
141	<i>Drymaria cordata</i> (L.) Willd	Caryophyllaceae	Herb	Common
142	<i>Drymaria diandra</i> Blume	Caryophyllaceae	Herb	Common
143	<i>Drynaria crassifolia</i> (L.) J. Sm.	Polypodiaceae	Herb	Abundant
144	<i>Dryopteris sikkimensis</i> (Bedd.) Kuntze	Polypodiaceae	Herb	Common
145	<i>Duabanga grandiflora</i> (DC.) Walp.	Lythraceae	Tree	Abundant
146	<i>Dysoxylum reticulatum</i> King	Meliaceae	Tree	Less common
147	<i>Elaeagnus conferta</i> Roxb.	Elaeagnaceae	Shrub	Less common
148	<i>Elatostema monandrum</i> (Buch.-Ham. ex D.Don) H.Hara	Urticaceae	Herb	Common
149	<i>Elatostema platyphyllum</i> Wedd.	Urticaceae	Herb	Less common
150	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	Common
151	<i>Embelia tsjeriam-cottam</i> (Roem. & Schult.) A.DC.	Myrsinaceae	Shrub	Common
152	<i>Equisetum ramosissimum</i> Desf.	Equisetaceae	Herb	Common
153	<i>Eragrostis gangetica</i> (Roxb.) Steud.	Poaceae	Herb	Common
154	<i>Eragrostis tenella</i> (A. Rich.) Hochst. ex Steud.	Poaceae	Herb	Abundant
155	<i>Eranthemum pulchellum</i> Andrews	Acanthaceae	Shrub	Common
156	<i>Eranthemum roseum</i> (Vahl.) R. Br.	Acanthaceae	Herb	Less common

SI. No	Botanical Name	Family	Habit	Status
157	<i>Eria pumila</i> Lindl.	Orchidaceae	Herb	Less common
158	<i>Euonymus laxiflorus</i> Champ. ex Benth.	Celastraceae	Tree	Rare
159	<i>Eurya acuminata</i> DC.	Theaceae	Tree	Rare
160	<i>Evodia fraxinifolia</i> (Hook.) Benth.	Rutaceae	Tree	Less common
161	<i>Ficus cordata</i> Thunb.	Moraceae	Tree	Rare
162	<i>Ficus curtipes</i> Corner	Moraceae	Tree	Rare
163	<i>Ficus hederacea</i> Roxb.	Moraceae	Tree	Less common
164	<i>Ficus hispida</i> L.f.	Moraceae	Tree	Less common
165	<i>Ficus pumila</i> L.	Moraceae	Climber	Less common
166	<i>Flacourtia indica</i> (Burm.) Merr.	Flacourtiaceae	Shrub	Rare
167	<i>Floscopa scandens</i> Lour.	Commelinaceae	Herb	Common
168	<i>Garcinia</i> sp.	Clusiaceae	Tree	Rare
169	<i>Gastrochilus obliquus</i> (Lindl.) Kuntze	Orchidaceae	Herb	Rare
170	<i>Geophila repens</i> (L.) I.M.Johnst.	Rubiaceae	Herb	Common
171	<i>Girardinia diversifolia</i> (Link) Friis	Urticaceae	Herb	Common
172	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Shrub	Less common
173	<i>Gmelina arborea</i> Roxb.	Lamiaceae	Tree	Common
174	<i>Gnetum</i> sp.	Gnetaceae	Liana	Less common
175	<i>Gomphostemma lucidum</i> var. <i>intermedium</i> (Craib) C.Y.Wu	Acanthaceae	Subshrub	Rare
176	<i>Gomphostemma ovatum</i> Wall. ex Benth.	Lamiaceae	Herb	Less common

SI. No	Botanical Name	Family	Habit	Status
177	<i>Gomphostemma parviflorum</i> Wall. ex Benth.	Acanthaceae	Subshrub	rare
178	<i>Gouania leptostachya</i> DC.	Rhamnaceae	Climbing shrub	Less common
179	<i>Grewia serrulata</i> DC.	Malvaceae	Shrub	Common
180	<i>Grewia tenax</i> (Forssk.) Fiori	Malvaceae	Shrub	Less common
181	<i>Grewia umbellata</i> Roxb. ex DC	Malvaceae	Shrub	Common
182	<i>Gynocardia odorata</i> R.Br.	Achariaceae	Tree	rare
183	<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Rubiaceae	Tree	Common
184	<i>Hedyotis scandens</i> Roxb.	Rubiaceae	Herb	Common
185	<i>Helminthostachys zeylanica</i> (L.) Hook.	Ophioglossaceae	Herb	Less common
186	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult.	Apocynaceae	Climber	Common
187	<i>Hiptage benghalensis</i> (L.) Kurz	Malpighiaceae	Shrub	Rare
188	<i>Hodgsonia macrocarpa</i> (Blume) Cogn.	Cucurbitaceae	Climber	Common
189	<i>Holarrhena pubescens</i> (Buch.-Ham) Wall. ex Don	Apocynaceae	Tree	Common
190	<i>Homalium zeylanicum</i> Benth.	Flacourtiaceae	Tree	Less common
191	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Rubiaceae	Tree	Less common
192	<i>Hyptis suaveolens</i> (L.) Poit	Lamiaceae	Herb	Common
193	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Apocynaceae	Climber	Common
194	<i>Impatiens trilobata</i> Colebr.	Balsminaceae	Herb	Rare
195	<i>Ixora anthroantha</i> Bremek.	Rubiaceae	Shrub	Rare
196	<i>Jasminum flexile</i> Vahl	Oleaceae	Climber	Common

SI. No	Botanical Name	Family	Habit	Status
197	<i>Lagerstroemia flos-reginae</i> Retz.	Lythraceae	Tree	Common
198	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	Tree	Common
199	<i>Lantana camara</i> L.	Verbenaceae	Shrub	Common
200	<i>Laportea crenulata</i> Gaudich.	Urticaceae	Shrub	Common
201	<i>Leea asiatica</i> (L.) Ridsdale	Vitaceae	Shrub	Common
202	<i>Leea guineensis</i> G.Don	Vitaceae	Shrub	Less common
203	<i>Leea indica</i> (Burm. f.) Merr.	Vitaceae	Shrub	Common
204	<i>Lepidagathis incurva</i> Buch.-Ham. ex D. Don Var. <i>incurva</i>	Acanthaceae	Herb	Less common
205	<i>Lepisanthes deficiens</i> Radlk.	Sapindaceae	Tree	Common
206	<i>Lindenbergia grandiflora</i> Benth.	Orobanchaceae	Herb	Common
207	<i>Litsea lancifolia</i> (Roxb. ex Nees) Fern.-Vill.	Lauraceae	Tree	Common
208	<i>Lygodium microphyllum</i> (Cav.) R.Br	Lydiaceae	Herb	Common
209	<i>Macaranga denticulata</i> (Blume) Mull.	Euphorbiaceae	Tree	Rare
210	<i>Machilus glaucescens</i> (Nees) Wight	Lauraceae	Tree	Less common
211	<i>Maesa indica</i> (Roxb.) A. DC.	Myrsinaceae	Shrub	Less common
212	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Magnoliaceae	Tree	Common
213	<i>Memecylon cerasiforme</i> Kurz	Melastomataceae	Shrub	Common
214	<i>Mesua ferrea</i> L.	Caryophyllaceae	Tree	Less common
215	<i>Meyna spinosa</i> Roxb. ex Link	Rubiaceae	Shrub	Rare
216	<i>Mezoneuron cucullatum</i> (Roxb.) Wight & Arn.	Fabaceae	Stragglng	Less common

SI. No	Botanical Name	Family	Habit	Status
			shrub	
217	<i>Micromelum integerrimum</i> (Roxb. ex DC.) Wight & Arn. ex M.Roem.	Rutaceae	Tree	Rare
218	<i>Micromelum minutum</i> (G.Forst.) Wight & Arn.	Rutaceae	Shrub	Less common
219	<i>Micropera obtusa</i> (Lindl.) T. Tang & F.T. Wang	Orchidaceae	Herb	Less common
220	<i>Mikania cordata</i> (Burm.f.) B.L.Rob.	Asteraceae	Climber	Abundant
221	<i>Millettia pachycarpa</i> Benth.	Fabaceae	Liana	Rare
222	<i>Mimosa pudica</i> L.	Fabaceae	Herb	Less common
223	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	Tree	Less common
224	<i>Momordica charantia</i> subsp. <i>abbreviata</i> (Ser.) Greb.	Cucurbitaceae	Climber	Rare
225	<i>Morinda angustifolia</i> Roxb.	Rubiaceae	Shrub	Common
226	<i>Morinda citrifolia</i> L.	Rubiaceae	Shrub	Common
227	<i>Mucuna sempervirens</i> Hemsl.	Fabaceae	Climber	Common
228	<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	Tree	Common
229	<i>Murraya paniculata</i> (L.) Jack	Rutaceae	Shrub	Common
230	<i>Mussaenda</i> sp.	Rubiaceae	Shrub	Less common
231	<i>Naravelia zeylanica</i> DC.	Ranunculaceae	Climber	Common
232	<i>Nelsonia canescens</i> (Lam.) Spreng.	Acanthaceae	Herb	Less common
233	<i>Oberonia recurva</i> Lindl.	Orchidaceae	Herb	Less common
234	<i>Oplismenus burmanni</i> (Retz.) P.Beauv.	Poaceae	Herb	Abundant
235	<i>Oplismenus compositus</i> (L.) P.Beauv.	Poaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
236	Otochilus fuscus Lindl.	Orchidaceae	Herb	Rare
237	Paederia foetida L.	Rubiaceae	Climber	Rare
238	Panicum nodatum Hitchc. & Chase	Poaceae	Herb	Common
239	Panicum psilopodium Trin.	Poaceae	Herb	abundant
240	Papilionanthe teres (Roxb.) Schltr.	Orchidaceae	Herb	Less common
241	Passiflora suberosa L.	Passifloraceae	Climber	Rare
242	Pelatantheria insectifer (Rchb. f.) Rolfe	Orchidaceae	Hereb	Less common
243	Phaius mishmensis (Lindl. & Paxton) Rchb. f.	Orchidaceae	Herb	Less common
244	Phaulopsis imbricata (Forssk.) Sweet	Acanthaceae	Herb	Herb
245	Phlogacanthus thyrsoiflorus Nees	Acanthaceae	Shrub	Common
246	Phyllanthus emblica L.	Phyllanthaceae	Tree	Less common
247	Phyllanthus praetervisus Müll.Arg.	Phyllanthaceae	Herb	Common
248	Phyllanthus reticulatus Poir.	Phyllanthaceae	Shrub	Less common
249	Phyllanthus sikkimensis Müll.Arg.	Phyllanthaceae	Subshrub	Less common
250	Phyllanthus urinaria L.	Phyllanthaceae	Herb	Common
251	Piper attenuatum Buch.-Ham. ex Miq.	Piperaceae	Climber	Common
252	Piper longum L.	Piperaceae	Climber	Less common
253	Piper retrofractum Vahl	Piperaceae	Climber	Less common
254	Piper sylvaticum Roxb.	Piperaceae	Climber	Common
255	Pitardella sikkimensis (Hook.f.) Tirveng.	Rubiaceae	Shrub	Common

SI. No	Botanical Name	Family	Habit	Status
256	<i>Pogostemon benghalensis</i> (Burm.f.) Kuntze	Lamiaceae	Herb	Common
257	<i>Pogostemon purpurascens</i> Dalzell	Lamiaceae	Herb	Less common
258	<i>Polyalthia simiarum</i> (Buch.-Ham. ex Hook. f. & Thomson) Benth. ex Hook. f. & Thomson	Annonaceae	Tree	Common
259	<i>Polyathia cerasoides</i> (Robx.) Beddome	Annonaceae	Tree	Common
260	<i>Potentilla indica</i> (Andrews) Th.Wolf	Rosaceae	Herb	Common
261	<i>Pothas scandens</i> L.	Araceae	Climber	Common
262	<i>Pouzolzia zeylanica</i> (L.) Benn.	Urticaceae	Habit	Common
263	<i>Premna mollissima</i> Roth	Lamiaceae	Shrub	Less common
264	<i>Pteris semipinnata</i> L.	Pteridaceae	Herb	Common
265	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Tree	Less common
266	<i>Pterospermum acerifolium</i> (L.) Willd.	Malvaceae	Tree	Common
267	<i>Pterygota alata</i> (Roxb.) R.Br.	Malvaceae	Tree	Less common
268	<i>Pueraria sikkimensis</i> Prain	Fabaceae	Climber	Less common
269	<i>Pupalia lappacea</i> (L.) Juss.	Amaranthaceae	Herb	Less common
270	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Herb	Rare
271	<i>Rauvolfia tetraphylla</i> L.	Apocynaceae	Shrub	Rare
272	<i>Rhaphidophora</i> sp.	Araceae	Climber	Common
273	<i>Rhynchostylis retusa</i> (L.) Bl.	Orchidaceae	Herb	Less common
274	<i>Richardia scabra</i> L.	Rubiaceae	Herb	Common
275	<i>Rungia pectinata</i> (L.) Nees.	Acanthaceae	Herb	Common

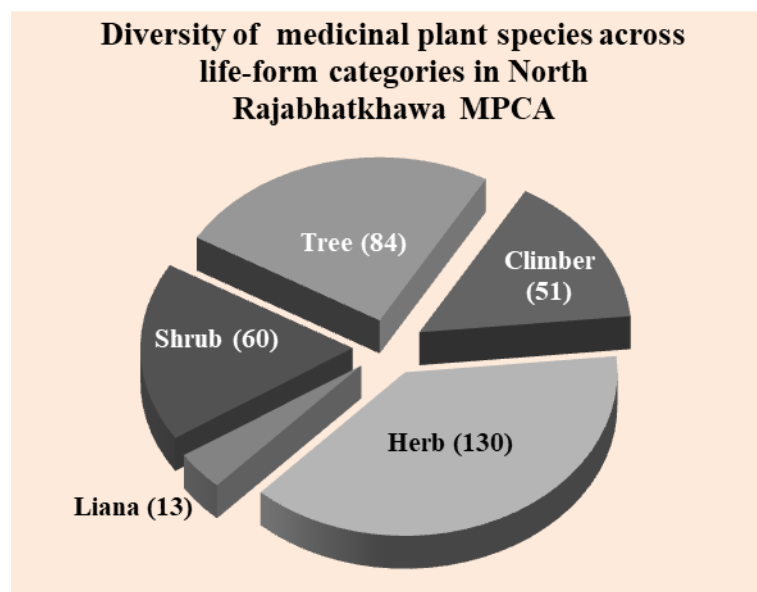
SI. No	Botanical Name	Family	Habit	Status
276	<i>Saccolabiopsis pussila</i> (Lindl.) Seidenfaden & Garay	Orchidaceae	Herb	Less common
277	<i>Salacia</i> sp.	Celastraceae	Shrub	Rare
278	<i>Sauropus androgynus</i> (L.) Merr.	Phyllanthaceae	Shrub	Less common
279	<i>Sauropus compressus</i> var. <i>puberulus</i> (Kurz) Chakrab. & M.Gangop.	Phyllanthaceae	Herb	Rare
280	<i>Schima wallichii</i> (DC.) Korth.	Theaceae	Tree	Less common
281	<i>Senegalia pennata</i> (L.) Maslin	Fabaceae	Straggling shrub	Common
282	<i>Senna tora</i> (L.) Roxb.	Fabaceae	Herb	Common
283	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Tree	Abundant
284	<i>Sida alnifolia</i> L.	Malvaceae	Herb	Common
285	<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	Malvaceae	Herb	Abundant
286	<i>Sida rhombifolia</i> subsp. <i>alnifolia</i> (L.) Ugbor.	Malvaceae	Herb	Common
287	<i>Sloanea sterculiacea</i> (Benth.) Rehder & E.H.Wilson	Elaeocarpaceae	Tree	Less common
288	<i>Smilax ovalifolia</i> Roxb. ex D.Don	Smilacaceae	Climber	Rare
289	<i>Smilax zeylanica</i> L.	Smilacaceae	Climber	Less common
290	<i>Solanum khasianum</i> var. <i>chatterjeeanum</i> Sengupta	Solanaceae	Undershrub	Common
291	<i>Solanum torvum</i> Sm.	Solanaceae	Shrub	Common
292	<i>Solena heterophylla</i> Lour.	Cucurbitaceae	Climber	Common
293	<i>Spatholobus</i> sp.	Fabaceae	Liana	Common
294	<i>Spermacoce alata</i> Aubl.	Rubiaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
295	<i>Spermacoce latifolia</i> Aubl.	Rubiaceae	Herb	Rare
296	<i>Stephania japonica</i> var. <i>discolor</i> (Blume) Forman	Menispermaceae	Climber	Rare
297	<i>Sterculia guttata</i> Roxb. ex G.Don	Malvaceae	Tree	Less common
298	<i>Sterculia villosa</i> Roxb.	Malvaceae	Tree	Common
299	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillwyn) Mabb.	Bignoniaceae	Tree	Less common
300	<i>Syzygium formosum</i> (Wall.) Mason	Myrtaceae	Tree	Common
301	<i>Syzygium praecox</i> (Roxb.) Rathakr. & N.C.Nair	Myrtaceae	Tree	Less common
302	<i>Tabernaemontana alternifolia</i> L.	Apocynaceae	Shrub	Common
303	<i>Tephrosia candida</i> (Roxb.) DC.	Fabaceae	Shrub	Abundant
304	<i>Terminalia alata</i> Wall.	Combretaceae	Tree	Less common
305	<i>Terminalia belirica</i> Wall.	Combretaceae	Tree	Common
306	<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	Rare
307	<i>Terminalia crenulata</i> Roth	Combretaceae	Tree	Common
308	<i>Terminalia myriocarpa</i> Van Heurck & Müll. Arg.	Combretaceae	Tree	Less common
309	<i>Tetrameles nudiflora</i> R.Br.	Tetramelaceae	Tree	Common
310	<i>Tetrastigma campylocarpum</i> (Kurz) Planch.	Vitaceae	Climber	Common
311	<i>Thladiantha cordifolia</i> (Blume) Cogn.	Cucurbitaceae	Climber	Less common
312	<i>Toddalia asiatica</i> (L.) Lam.	Rutaceae	Shrub	Common
313	<i>Toona ciliata</i> M.Roem.	Meliaceae	Tree	Less common
314	<i>Torenia diffusa</i> D.Don	Linderniaceae	Herb	Less common

SI. No	Botanical Name	Family	Habit	Status
315	<i>Trewia nudiflora</i> L.	Euphorbiaceae	Tree	Common
316	<i>Trichosanthes bracteata</i> (Lam.) Voigt	Cucurbitaceae	Climber	Less common
317	<i>Trichosanthes lepiniana</i> Cogn.	Cucurbitaceae	Climber	Less common
318	<i>Tropidia angulosa</i> (Lindl.) Blume	Orchidaceae	Herb	Common
319	<i>Uncaria sessilifructus</i> Roxb.	Rubiaceae	Liana	Less common
320	<i>Uraria lagopodoides</i> (L.) DC.	Fabaceae	Herb	Rare
321	<i>Uraria rufescens</i> (DC.) Schindl.	Fabaceae	Herb	Common
322	<i>Urena lobata</i> L.	Malvaceae	Herb	Common
323	<i>Uvaria hamiltonii</i> Hook.f. & Thomson	Annonaceae	Tree	Rare
324	<i>Vallaris solanacea</i> (Roth) Kuntze	Apocynaceae	Climber	Common
325	<i>Vatica lanceifolia</i> (Roxburgh) Blume	Dipterocarpaceae	Tree	Rare
326	<i>Vernonia albicans</i> DC.	Asteraceae	Herb	Common
327	<i>Vernonia cinerea</i> (L.) Less.	Asteraceae	Herb	Common
328	<i>Vernonia clivorum</i> Hance	Asteraceae	Herb	Common
329	<i>Vigna</i> sp.	Fabaceae	Climber	Rare
330	<i>Wrightia arborea</i> (Dennst.) Mabb.	Apocynaceae	Tree	Common
331	<i>Xylia xylocarpa</i> (Roxb.) Taub.	Fabaceae	Tree	Less common
332	<i>Zanonia indica</i> L.	Cucurbitaceae	Climber	Less common
333	<i>Zanthoxylum nitidum</i> (Roxb.) DC.	Rutaceae	Liana	Less common
334	<i>Zanthoxylum rhetsa</i> DC.	Rutaceae	Climber	Rare

SI. No	Botanical Name	Family	Habit	Status
335	Zehneria sp.	Cucurbitaceae	Climber	Rare
336	Zehneria umbellata (Klein ex Willd.) Thwaites	Cucurbitaceae	Climber	Common
337	Zingiber rubens Roxb.	Zingiberaceae	Herb	Common
338	Ziziphus mauritiana Lam.	Rhamnaceae	Shrub	Less common
339	Ziziphus nummularia (Burm. f.) Wight & Arn.	Rhmanaceae	Shrub	Less common

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants



List of threatened medicinal plants recorded in North Rajabhatkhawa MPCA

Sl.No	Botanical name	Threatened status
1	<i>Alpinia calcarata</i>	Endangered
2	<i>Ampelocissus barbata</i>	Endangered
3	<i>Aristolochia indica</i>	Vulnerable
4	<i>Asparagus racemosus</i>	Endangered
5	<i>Celastrus paniculatus</i>	Endangered
6	<i>Cinnamomum bejolghota</i>	Vulnerable
7	<i>Dioscorea prazeri</i>	Endangered
8	<i>Drosera burmanni</i>	Endangered
9	<i>Gynocardia odorata</i>	Endangered
10	<i>Helminthostachys zeylanica</i>	Endangered
11	<i>Machilus glaucescens</i>	Critically Endangered
12	<i>Mesua ferrea</i>	Endangered
13	<i>Morinda citrifolia</i>	Vulnerable
14	<i>Pterocarpus marsupium</i>	Endangered
15	<i>Rauvolfia serpentina</i>	Endangered
16	<i>Stereospermum colais</i>	Vulnerable
17	<i>Toona ciliata</i>	Vulnerable

Annexure 7. Details of medicinal plant species collected and recorded from North Sevoke MPCA, Darjeeling district, West Bengal

Seasonal botanical surveys conducted in North Sevoke MPCA, Darjeeling district, West Bengal recorded totally 343 medicinal plant species

SI. No.	Botanical name	Family	Habit	Status
1	<i>Abelmoschus moschatus</i> Medik	Malvaceae	Herb	Rare
2	<i>Abrus pulchellus</i> Wallich ex Thwaites	Fabaceae	Climber	Less common
3	<i>Acacia pennata</i> (L.) Willd.	Fabaceae	Straggler	Less common
4	<i>Acampe papillosa</i> (Lindl.) Lindl.	Orchidaceae	Herb	Less common
5	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Common
6	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	Herb	Common
7	<i>Achyrospermum densiflorum</i> Blume	Lamiaceae	Herb	Common
8	<i>Acmella paniculata</i> (Wall. ex DC.) R.K.Jansen	Asteraceae	Herb	Less common
9	<i>Acmella uliginosa</i> (Sw.) Cass.	Asteraceae	Herb	Common
10	<i>Actinodaphne obovata</i> (Nees) Blume	Lauraceae	Tree	Less common
11	<i>Actinodaphne</i> sp.	Lauraceae	Tree	Common
12	<i>Adenostemma lavenia</i> (L.) Kuntze	Asteraceae	Herb	Less common
13	<i>Aerides multiflorum</i> Roxb.	Orchidaceae	Herb	Less common
14	<i>Aerva sanguinolenta</i> (L.) Blume	Amaranthaceae	Herb	Less common
15	<i>Ageratum houstonianum</i> Mill.	Asteraceae	Herb	Common
16	<i>Aglaia perviridis</i> Hiern	Meliaceae	Tree	Common
17	<i>Ailanthus integrifolia</i> Lam.	Simaroubaceae	Tree	Common
18	<i>Alangium chinense</i> (Lour.) Harms	Alangiaceae	Shrub	Rare

19	<i>Allophylus simplicifolius</i> Radlk.	Sapindaceae	Shrub	Rare
20	<i>Alocasia fallax</i> Schott	Araceae	Herb	Common
21	<i>Alpinia calcarata</i> (Andrews) Roscoe	Zingiberaceae	Herb	Less common
22	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	Tree	Less common
23	<i>Amischotolype hookerii</i> (Hassk.) H.Hara	Commelinaceae	Herb	Rare
24	<i>Ampelocissus barbata</i> (Wall.) Planch.	Vitaceae	Climber	Common
25	<i>Ampelocissus sikkimensis</i> (M.A.Lawson) Planch.	Vitaceae	Climber	Common
26	<i>Anisomeles heyneana</i> Benth.	Lamiaceae	Herb	Rare
27	<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	Herb	Common
28	<i>Antidesma montanum</i> Blume var. <i>montanum</i>	Phyllanthaceae	Tree	Less common
29	<i>Aphanamixis polystachya</i> (Wall.) R.Parker	Meliaceae	Tree	Less common
30	<i>Aporosa lindleyana</i> (Wight) Bail.	Euphorbiaceae	Tree	Common
31	<i>Ardisia elliptica</i> Thunb.	Myrsinaceae	Shrub	Less common
32	<i>Ardisia solanacea</i> (Poir.) Roxb.	Myrsinaceae	Shrub	Less common
33	<i>Argyreia roxburghii</i> (Sweet) Choisy	Convolvulaceae	Climber	Less common
34	<i>Aristolochia indica</i> L.	Aristolochiaceae	Climber	Less common
35	<i>Aristolochia tagala</i> Cham.	Aristolochiaceae	Climber	Rare
36	<i>Artocarpus chama</i> Buch.-Ham.	Moraceae	Tree	Less common
37	<i>Artocarpus chaplasha</i> Roxb.	Moraceae	Tree	Common
38	<i>Ascocentrum ampullaceum</i> (Roxb.) Schltr.	Orchidaceae	Herb	Less common
39	<i>Asplenium erectum</i> Bory ex Willd.	Aspleniaceae	Herb	Abundant

40	<i>Athyrium biserrulatum</i> Christ	Aspleniaceae	Herb	Common
41	<i>Axonopus compressus</i> (Sw.) P.Beauv.	Poaceae	Herb	Common
42	<i>Ayenia grandifolia</i> (DC.) Christenh. & Byng	Malvaceae	Climber	Less common
43	<i>Baccaurea ramiflora</i> Lour.	Phyllanthaceae	Tree	Less common
44	<i>Balakata baccata</i> (Roxb.) Esser	Euphorbiaceae	Tree	Rare
45	<i>Barleria strigosa</i> Willd.	Acanthaceae	Herb	Abundant
46	<i>Bauhinia acuminata</i> Vell.	Fabaceae	Shrub	Rare
47	<i>Bauhinia vahlii</i> Wight & Arn.	Fabaceae	Liana	Rare
48	<i>Bauhinia variegata</i> L.	Fabaceae	tREE	Common
49	<i>Benkara fasciculata</i> (Roxb.) Ridsdale	Rubiaceae	Shrub	Less common
50	<i>Berchemia floribunda</i> (Wall.) Brongn.	Rhamnaceae	Shrub	Less common
51	<i>Boehmeria macrophylla</i> Hornem var. <i>macrophylla</i>	Urticaceae	Herb	Common
52	<i>Boehmeria macrophylla</i> var. <i>scabrella</i> (Roxb.) D.G.Long	Urticaceae	Herb	Common
53	<i>Boehmeria platyphylla</i> D.Don	Urticaceae	Herb	Common
54	<i>Bombax ceiba</i> L.	Malvaceae	Tree	Less common
55	<i>Brachiaria eruciformis</i> (Sm.) Griseb.	Poaceae	Herb	Less common
56	<i>Brachypterum scandens</i> (Roxb.) Miq.	Fabaceae	Liana	Rare
57	<i>Bridelia retusa</i> (L.) A.Juss.	Phyllanthaceae	Shrub	Less common
58	<i>Bridelia scandens</i> (Roxb) Willd	Phyllanthaceae	Shrub	Less common
59	<i>Bulbophyllum cauliflorum</i> Hook. f.	Orchidaceae	Herb	Common
60	<i>Bulbophyllum gamblei</i> (Hook. f.) Hook. f.	Orchidaceae	Herb	Common

61	<i>Bulbophyllum hymenanthum</i> Hook. f.	Orchidaceae	Herb	Less common
62	<i>Bulbophyllum leopardinum</i> Lindl.	Orchidaceae	Herb	Abundant
63	<i>Bulbophyllum sarcophyllum</i> (King & Pantling) J.J. Smith	Orchidaceae	Herb	Common
64	<i>Bulbophyllum</i> sp.	Orchidaceae	Herb	Abundant
65	<i>Bulbophyllum umbellatum</i> Lindl.	Orchidaceae	Herb	Abundant
66	<i>Bulbophyllum wallichii</i> (Lindl.) Rchb. f.	Orchidaceae	Herb	Abundant
67	<i>Caesalpinia crista</i> L.	Fabaceae	Straggling shrub	Less common
68	<i>Calanthe brevicornu</i> Lindl.	Orchidaceae	Herb	Less common
69	<i>Callicarpa arborea</i> Roxb.	Lamiaceae	Tree	Less common
70	<i>Callicarpa tomentosa</i> (L.) Murr.	Lamiaceae	Tree	Less common
71	<i>Canarium sikkimense</i> King	Burseraceae	Tree	Rare
72	<i>Canarium strictum</i> Roxb.	Burseraceae	Tree	Rare
73	<i>Canthium rheedei</i> DC.	Rubiaceae	Shrub	Common
74	<i>Capparis acutifolia</i> Sweet	Capparaceae	Climber	Rare
75	<i>Capparis acutifolia</i> subsp. <i>sabiifolia</i> (Hook.f. & Thomson) M.Jacobs	Capparaceae	Shrub	Rare
76	<i>Capparis olacifolia</i> Hook.f. & Thomson	Cappariaceae	Shrub	Rare
77	<i>Careya arborea</i> Roxb.	Lecythidaceae	Tree	Common
78	<i>Casearia graveolens</i> Dalzell	Salicaceae	Shrub	Rare
79	<i>Casearia vareca</i> Roxb.	Salicaceae	Shrub	Common
80	<i>Castanopsis argentea</i> (Blume) A.DC.	Fagaceae	Tree	Rare

81	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Fagaceae	Tree	Less common
82	<i>Catunaregam longispina</i> (Link) Tirveng.	Rubiaceae	Shrub	Less common
83	<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	Climber	Less common
84	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Climbing shrub	Less common
85	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Herb	Common
86	<i>Cephalanthus tetrandra</i> (Roxb.) Ridsdale & Bakh.f.	Rubiaceae	Tree	Less common
87	<i>Chisocheton cumingianus</i> (C.DC.) Harms	Meliaceae	Tree	Rare
88	<i>Chlorophytum tuberosum</i> (Roxb.) Baker	Asparagaceae	Herb	Less common
89	<i>Chonemorpha fragrans</i> (Moon) Alston.	Apocynaceae	Liana	Common
90	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Asteraceae	Herb	Abundant
91	<i>Chukrasia tabularis</i> A.Juss.	Meliaceae	Tree	Common
92	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	Lauraceae	Tree	Rare
93	<i>Cinnamomum cecidodaphne</i> Meisn.	Lauraceae	Tree	Less common
94	<i>Cissampelospareira</i> var. <i>hirsuta</i> (Buch.-Ham. ex DC.) Forman	Menispermaceae	Climber	Common
95	<i>Cissus pallida</i> (Wight & Arn.) Steud.	Vitaceae	Climber	Rare
96	<i>Clausena excavata</i> Burm.f.	Meliaceae	Tree	Less common
97	<i>Clerodendrum indicum</i> (L.) Kuntze	Verbenaceae	Shrub	Rare
98	<i>Clerodendrum viscosum</i> Vent.	Verbenaceae	Shrub	Abundant
99	<i>Clinopodium umbrosum</i> (M.Bieb.) Kuntze	Lamiaceae	Herb	Rare
100	<i>Coffea benghalensis</i> B.Heyne ex Schult.	Rubiaceae	Herb	Common
101	<i>Cola nitida</i> (Vent.) Schott & Endl.	Malvaceae	Tree	Rare

102	<i>Colebrookea oppositifolia</i> Sm.	Lamiaceae	Shrub	Common
103	<i>Combretum roxburghii</i> Sprengel	Combretaceae	Liana	Less common
104	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Herb	Common
105	<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	Common
106	<i>Costus speciosus</i> (J.Koenig) Sm.	Zingiberaceae	Herb	Common
107	<i>Crinum viviparum</i> (Lam.) R.Ansari & V.J.Nair	Amaryllidaceae	Herb	Rare
108	<i>Crotalaria alata</i> D.Don	Fabaceae	Herb	Rare
109	<i>Crotalaria epunctata</i> Dalzell	Fabaceae	Herb	Rare
110	<i>Crotalaria montana</i> Heyne ex Roth	Fabaceae	Herb	Rare
111	<i>Croton caudatus</i> Geiseler	Euphorbiaceae	Shrub	Common
112	<i>Croton roxburghii</i> Wall.	Phyllanthaceae	Tree	Less common
113	<i>Cryptolepis sinensis</i> (Lour.) Merr.	Apocynaceae	Climber	Rare
114	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Herb	Abundant
115	<i>Curculigo trichocarpa</i> (Wight) Bennet & Raizada	Hypoxidaceae	Herb	Less common
116	<i>Curcuma zedoaria</i> (Christm.) Roscoe	Zingiberaceae	Herb	Less common
117	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	Commelinaceae	Herb	Less common
118	<i>Cyanotis cristata</i> (L.) D. Don	Commelinaceae	Herb	Common
119	<i>Cyathula prostrata</i> (L.) Blume	Amaranthaceae	Herb	Abundant
120	<i>Cyclea bicristata</i> (Griff.) Diels	Menispermaceae	Climber	Common
121	<i>Cyclea peltata</i> (Lam.) Hook.f. & Thomson	Fabaceae	Climber	Rare
122	<i>Cyperus pangorei</i> Rottb.	Cyperaceae	Herb	Common

123	<i>Dalbergia pinnata</i> (Lour.) Prain	Fabaceae	Tree	Less common
124	<i>Dalbergia stipulacea</i> Roxb.	Fabaceae	Shrub	Less common
125	<i>Decaspermum fruticosum</i> J.R.Forst. & G.Forst.	Myrtaceae	Shrub	Rare
126	<i>Deeringia amaranthoides</i> (Lam.) Merr.	Amaranthaceae	Herb	Common
127	<i>Dendrobium anceps</i> Sw.	Orchidaceae	Herb	Less Common
128	<i>Dendrobium cathcartii</i> Hook. f.	Orchidaceae	Herb	Less common
129	<i>Dendrocnide sinuata</i> (Blume) Chew	Urticaceae	Shrub	Common
130	<i>Desmodium heterocarpon</i> (L.) DC.	Fabaceae	Herb	Common
131	<i>Desmodium heterocarpon</i> var. <i>strigosum</i> Meeuwen	Fabaceae	Herb	Rare
132	<i>Desmodium oblongum</i> Wallich ex Bentham	Fabaceae	Herb	Less common
133	<i>Desmodium triangulare</i> (Retz.) Merr.	Fabaceae	Shrub	Less common
134	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	Herb	Abundant
135	<i>Dichanthium aristatum</i> (Poir.) C.E.Hubb.	Poaceae	Herb	Common
136	<i>Dicliptera bupleuroides</i> Nees	Acanthaceae	Herb	Common
137	<i>Dicliptera paniculata</i> var. <i>subaequibracteata</i> (Bennet) Karthik. & Moorthy	Acanthaceae	Herb	Common
138	<i>Dictyospermum montanum</i> Wight	Commelinaceae	Herb	Less common
139	<i>Dictyospermum ovalifolium</i> Wight	Orachidaceae	Herb	Common
140	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	Herb	Common
141	<i>Dillenia indica</i> L.	Dilleniaceae	Tree	Less common
142	<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Tree	Common
143	<i>Dioscorea prazeri</i> Prain & Burkill	Dioscoreaceae	Climber	Less common

144	<i>Dioscorea tomentosa</i> J.Koenig ex Spreng.	Dioscoreaceae	Climber	Common
145	<i>Diospyros montana</i> Roxb.	Dioscoreaceae	Climber	Less common
146	<i>Diplazium esculentum</i> (Retz.) Sw.	Aspleniaceae	Herb	Common
147	<i>Dregea volubilis</i> (L. f.) Benth. ex Hook. f.	Apocynaceae	Climber	Less common
148	<i>Drosera burmanni</i> Vahl	Droseraceae	Herb	Less common
149	<i>Drymaria cordata</i> (L.) Willd	Caryophyllaceae	Herb	Common
150	<i>Drymaria diandra</i> Blume	Caryophyllaceae	Herb	Common
151	<i>Drynaria quercifolia</i> (L.) J. Sm.	Polypodiaceae	Herb	Abundant
152	<i>Dryopteris sikkimensis</i> (Bedd.) Kuntze	Polypodiaceae	Herb	Common
153	<i>Duabanga grandiflora</i> (DC.) Walp.	Lythraceae	Tree	Abundant
154	<i>Dysoxylum binectariferum</i> (Roxb.) Hook.f. ex Bedd.	Meliaceae	Tree	Less common
155	<i>Elatostema monandrum</i> (Buch.-Ham. ex D.Don) H.Hara	Urticaceae	Herb	Common
156	<i>Elatostema platyphyllum</i> Wedd.	Urticaceae	Herb	Less common
157	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	Common
158	<i>Embelia tsjeriam-cottam</i> (Roem. &Schult.) A. DC.	Myrsinaceae	Shrub	Common
159	<i>Equisetum ramosissimum</i> Desf.	Equisetaceae	Herb	Common
160	<i>Eragrostis gangetica</i> (Roxb.) Steud.	Poaceae	Herb	Common
161	<i>Eragrostis tenella</i> (A. Rich.) Hochst. ex Steud.	Poaceae	Herb	Abundant
162	<i>Eranthemum pulchellum</i> Andrews	Acanthaceae	Herb	Rare
163	<i>Eria discolor</i> Lindl.	Orchidaceae	Herb	Less common

164	<i>Eria lasiopetala</i> (Willd.) Ormerod	Orchidaceae	Herb	Less common
165	<i>Eria pumila</i> Lindl.	Orchidaceae	Herb	Less common
166	<i>Ficus curtipes</i> Corner	Moraceae	Tree	Rare
167	<i>Ficus fistulosa</i> Reinw.	Moraceae	Tree	Rare
168	<i>Ficus hederacea</i> Roxb.	Moraceae	Tree	Less common
169	<i>Ficus hispida</i> L.f.	Moraceae	Tree	Less common
170	<i>Ficus mysorensis</i> var. <i>subrepanda</i> Wall. ex King	Moraceae	Tree	Rare
171	<i>Flacourtia indica</i> (Burm.f.) Merr.	Flacourtiaceae	Tree	Common
172	<i>Flickingeria</i> sp.	Orchidaceae	Herb	Common
173	<i>Floscopa scandens</i> Lour.	Commelinaceae	Herb	Common
174	<i>Gastrochilus obliquus</i> (Lindl.) Kuntze	Orchidaceae	Herb	Rare
175	<i>Gmelina arborea</i> Roxb.	Lamiaceae	Tree	Common
176	<i>Gnetum</i> sp.	Gnetaceae	Liana	Rare
177	<i>Gomphostemma lucidum</i> var. <i>intermedium</i> (Craib) C.Y.Wu	Acanthaceae	Subshrub	Rare
178	<i>Gomphostemma ovatum</i> Wall. ex Benth.	Lamiaceae	Herb	Less common
179	<i>Gomphostemma parviflorum</i> Wall. ex Benth.	Acanthaceae	Subshrub	Common
180	<i>Gouania leptostachya</i> DC.	Rhamnaceae	Climbing shrub	Less common
181	<i>Gracinia</i> sp.	Clusiaceae	Tree	Common
182	<i>Grewia serrulata</i> DC.	Malvaceae	Shrub	Common
183	<i>Grewia tenax</i> (Forssk.) Fiori	Malvaceae	Shrub	Rare
184	<i>Gynocardia odorata</i> R.Br.	Achariaceae	Tree	Rare

185	<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Rubiaceae	Tree	Less common
186	<i>Hedyotis scandens</i> Roxb.	Rubiaceae	Herb	Common
187	<i>Helminthostachys zeylanica</i> (L.) Hook.	Ophioglossaceae	Herb	Less common
188	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult.	Apocynaceae	Climber	Common
189	<i>Hiptage benghalensis</i> (L.) Kurz	Malpighiaceae	Shrub	Rare
190	<i>Hodgsonia macrocarpa</i> (Blume) Cogn.	Cucurbitaceae	Climber	Common
191	<i>Holarrhena pubescens</i> (Buch.-Ham) Wall. ex Don	Apocynaceae	Tree	Common
192	<i>Homalium zeylanicum</i> Benth.	Flacourtiaceae	Tree	Less common
193	<i>Hydnocarpus</i> sp.	Flacourtiaceae	Tree	Less common
194	<i>Hymenodictyon excelsum</i> (Roxb.) Wall.	Rubiaceae	Tree	Less common
195	<i>Ichnocarpus frutescens</i> (L.) W. T. Aiton	Apocynaceae	Climber	Common
196	<i>Impatiens trilobata</i> Colebr.	Balsminaceae	Herb	Rare
197	<i>Ixora anthroantha</i> Bremek.	Rubiaceae	Shrub	Rare
198	<i>Jasminum flexile</i> Vahl	Oleaceae	Climber	Common
199	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	Tree	Common
200	<i>Lasia spinosa</i> (L.) Thwaites	Araceae	Herb	Rare
201	<i>Leea indica</i> (Burm. f.) Merr.	Vitaceae	Shrub	Common
202	<i>Lepidagathis incurva</i> Buch.-Ham. ex D. Don var. <i>incurva</i>	Acanthaceae	Herb	Less common
203	<i>Lindenbergia grandiflora</i> Benth.	Orobanchaceae	Herb	Common
204	<i>Lindernia oppositifolia</i> (L.) Mukerjee	Scrophulariaceae	Herb	Common
205	<i>Ludwigia perennis</i> L.	Onagraceae	Herb	Common

206	<i>Lygodium microphyllum</i> (Cav.) R.Br	Lydiaceae	Herb	Common
207	<i>Macaranga peltata</i> (Roxb.) Mueller	Euphorbiaceae	Tree	Rare
208	<i>Machilus glaucescens</i> (Nees) Wight	Lauraceae	Tree	Less common
209	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Magnoliaceae	Tree	Less common
210	<i>Magnolia hodgsonii</i> (Hooker.f. & Thomson) Keng	Magnoliaceae	Tree	Rare
211	<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	Euphorbiaceae	Tree	Less common
212	<i>Mangifera indica</i> L.	Anacardiaceae	Tree	Less Common
213	<i>Marattia fraxinea</i> Sm.	Marattiaceae	Shrub	Less common
214	<i>Melastoma malabathricum</i> L.	Melstomataceae	Shrub	Less common
215	<i>Melia composite</i> Willd.	Meliaceae	Tree	Less common
216	<i>Mesua ferrea</i> L.	Caryophyllaceae	Tree	Less common
217	<i>Meyna spinosa</i> Roxb. ex Link	Rubiaceae	Shrub	Rare
218	<i>Mezoneuron cucullatum</i> (Roxb.) Wight & Arn.	Fabaceae	Straggling shrub	Less common
219	<i>Micromelum integerrimum</i> (Roxb. ex DC.) Wight & Arn. ex M.Roem.	Rutaceae	Tree	Rare
220	<i>Micromelum minutum</i> Wight & Arn.	Rutaceae	Shrub	Less common
221	<i>Micropera obtusa</i> (Lindl.) T. Tang & F.T. Wang	Orchidaceae	Herb	Common
222	<i>Mikania cordata</i> (Burm.f.) B.L.Rob.	Asteraceae	Climber	abundant
223	<i>Millettia pachycarpa</i> Benth.	Fabaceae	Liana	Rare
224	<i>Millettia</i> sp.	Fabaceae	Climber	Less common
225	<i>Mimosa pudica</i> L.	Fabaceae	Herb	Less common
226	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	Tree	Less common

227	<i>Morinda angustifolia</i> Roxb.	Rubiaceae	Shrub	Rare
228	<i>Morinda citrifolia</i> L.	Rubiaceae	Shrub	Common
229	<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	Tree	Less common
230	<i>Murraya paniculata</i> (L.) Jack	Rutaceae	Tree	Less common
231	<i>Mussaenda</i> sp.	Rubiaceae	Shrub	Less common
232	<i>Naravelia zeylanica</i> DC.	Ranunculaceae	Climber	Common
233	<i>Oberonia recurva</i> Lindl.	Orchidaceae	Herb	Common
234	<i>Ochlandra</i> sp.	Zingiberaceae	Herb	Less common
235	<i>Oplismenus burmanni</i> (Retz.) P.Beauv.	Poaceae	Herb	Abundant
236	<i>Oplismenus compositus</i> (L.) P.Beauv.	Poaceae	Herb	Common
237	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Tree	Rare
238	<i>Otochilus fuscus</i> Lindl.	Orchidaceae	Herb	Rare
239	<i>Panicum nodatum</i> Hitchc. & Chase	Poaceae	Herb	Common
240	<i>Panicum psilopodium</i> Trin.	Poaceae	Herb	abundant
241	<i>Papilionanthe teres</i> (Roxb.) Schltr.	Orchidaceae	Herb	Less common
242	<i>Paramignya monophylla</i> Wight	Rutaceae	Climbing shrub	Rare
243	<i>Pavetta indica</i> L.	Rubiaceae	Shrub	Common
244	<i>Pelatantheria insectifer</i> (Rchb. f.) Rolfe	Orchidaceae	Herb	Common
245	<i>Peliosanthes violacea</i> var. <i>minor</i> Baker	Asparagaceae	Herb	Rare
246	<i>Pericampylus glaucus</i> (Lam.) Merr.	Menispermaceae	Climber	Rare
247	<i>Pericampylus incanus</i> (Colebr.) Miers ex Hook. f. & Thomson	Menispermaceae	Climber	Rare

248	<i>Persicaria hydropiperoides</i> (Michx.) Small	Menispermaceae	Climber	Rare
249	<i>Phaius mishmensis</i> (Lindl. & Paxton) Rchb. f.	Orchidaceae	Herb	Less common
250	<i>Phaulopsis imbricata</i> (Foresst.) Sweet	Acanthaceae	Herb	Common
251	<i>Phlogacanthus thyriformis</i> (Roxb. ex Hadrw.) Mabb.	Acanthaceae	Shrub	Common
252	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Tree	Common
253	<i>Phyllanthus reticulatus</i> Poir.	Euphorbiaceae	Shrub	Less common
254	<i>Phyllanthus sikkimensis</i> Müll.Arg.	Phyllanthaceae	Subshrub	Less common
255	<i>Phyllanthus urinaria</i> L.	Phyllanthaceae	Herb	Common
256	<i>Piper attenuatum</i> Buch.-Ham. ex Miq.	Piperaceae	Climber	Common
257	<i>Piper betleoides</i> DC.	Piperaceae	Climber	Common
258	<i>Piper locnchites</i> Roem. & Sch.	Piperaceae	Climber	Rare
259	<i>Piper longum</i> L.	Piperaceae	Climber	Less common
260	<i>Piper retrofractum</i> Vahl	Piperaceae	Climber	Less common
261	<i>Piper sylvaticum</i> Roxb.	Piperaceae	Climber	Less common
262	<i>Pitardella sikkimensis</i> (Hook.f.) Tirveng.	Rubiaceae	Shrub	Common
263	<i>Pogostemon benghalensis</i> (Burm.f.) Kuntze	Lamiaceae	Herb	Rare
264	<i>Pogostemon purpurescens</i> Dalzell	Lamiaceae	Herb	Rare
265	<i>Polygonum capitatum</i> Buch.-Ham. ex D.Don	Lamiaceae	Herb	Less common
266	<i>Polygonum chinense</i> L.	Polygonaceae	Herb	Less common
267	<i>Polygonum hydropiper</i> L.	Polygonaceae	Herb	Abundant
268	<i>Polygonum plebeium</i> R.Br.	Polygonaceae	Herb	Common

269	<i>Porana paniculata</i> Roxb.	Convolvulaceae	Climber	Less common
270	<i>Potentilla indica</i> (Andrews) Th.Wolf	Rosaceae	Herb	Common
271	<i>Pothas scandens</i> L.	Araceae	Climber	Common
272	<i>Premna mollissima</i> Roth	Lamiaceae	Shrub	Less common
273	<i>Pseuderanthemum latifolium</i> B. Hansen	Acanthaceae	Herb	Rare
274	<i>Pseuderanthemum malabaricum</i> Gamble	Acanthaceae	Herb	Rare
275	<i>Psychotria erratica</i> var. <i>pedunculata</i> hook.f.	Rubiaceae	Herb	Rare
276	<i>Pteris semipinnata</i> L.	Pteridaceae	Herb	Common
277	<i>Pterospermum acerifolium</i> L.	Malvaceae	Tree	Less common
278	<i>Pterygota alata</i> (Roxb.) R.Br.	Malvaceae	Tree	Common
279	<i>Pueraria sikkimensis</i> Prain	Malvaceae	Climber	Less common
280	<i>Pupalia lappacea</i> (L.) Juss.	Amaranthaceae	Herb	Less common
281	<i>Rhaphidophora decursiva</i> (Roxb.) Schott	Araceae	Climber	Common
282	<i>Rhynchostylis retusa</i> (L.) Bl.	Orchidaceae	Herb	Less common
283	<i>Saccolabiopsis pussila</i> (Lindl.) Seidenfaden & Garay	Orchidaceae	Herb	Less common
284	<i>Saccolabium</i> sp.	Orchidaceae	Climber	Common
285	<i>Sauropus compressus</i> var. <i>puberulus</i> (Kurz) Chakrab. & M.Gangop.	Phyllanthaceae	Herb	Less common
286	<i>Schima wallichii</i> (DC.) Korth.	Theaceae	Tree	Less common
287	<i>Senegalia pennata</i> (L.) Maslin	Fabaceae	Straggling shrub	Common
288	<i>Senna occidentalis</i> L.	Fabaceae	Herb	Less common

289	<i>Senna tora</i> (L.) Roxb.	Fabaceae	Herb	Common
290	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Tree	Less common
291	<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	Malvaceae	Herb	Abundant
292	<i>Sloanea sterculiacea</i> (Benth.) Rehder & E.H.Wilson	Elaeocarpaceae	Tree	Less common
293	<i>Smilax griffithii</i> A.DC.	Smilacaceae	Climber	Common
294	<i>Smilax ovalifolia</i> Roxb. ex D.Don	Smilacaceae	Climber	Rare
295	<i>Smilax</i> sp.	Smilacaceae	Climber	Rare
296	<i>Smilax zeylanica</i> L.	Smilacaceae	Climber	Less common
297	<i>Smitinandia micrantha</i> (Lindl.) Holttum	Orchidaceae	Herb	Less common
298	<i>Solena heterophylla</i> Lour.	Cucurbitaceae	Climber	Common
299	<i>Spatholobus</i> sp.	Fabaceae	Climber	Common
300	<i>Spermacoce alata</i> Aubl.	Rubiaceae	Herb	Common
301	<i>Spermacoce latifolia</i> Aubl.	Rubiaceae	Herb	Common
302	<i>Spermacoce prostrata</i> Aubl.	Rubiaceae	Liana	Less common
303	<i>Spermacoce pusilla</i> Wall.	Rubiaceae	Herb	Common
304	<i>Spilanthes acmella</i> (L.) L.	Asteraceae	Herb	Less common
305	<i>Spilanthes paniculata</i> Wall. ex DC.	Asteraceae	Herb	Common
306	<i>Spilanthes uliginosa</i> Sw.	Asteraceae	Herb	Common
307	<i>Stephania japonica</i> var. <i>discolor</i> (Blume) Forman	Menispermaceae	Climber	Rare
308	<i>Sterculia villosa</i> Roxb.	Malvaceae	Tree	Rare
309	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillwyn)	Bignoniaceae	Tree	Common

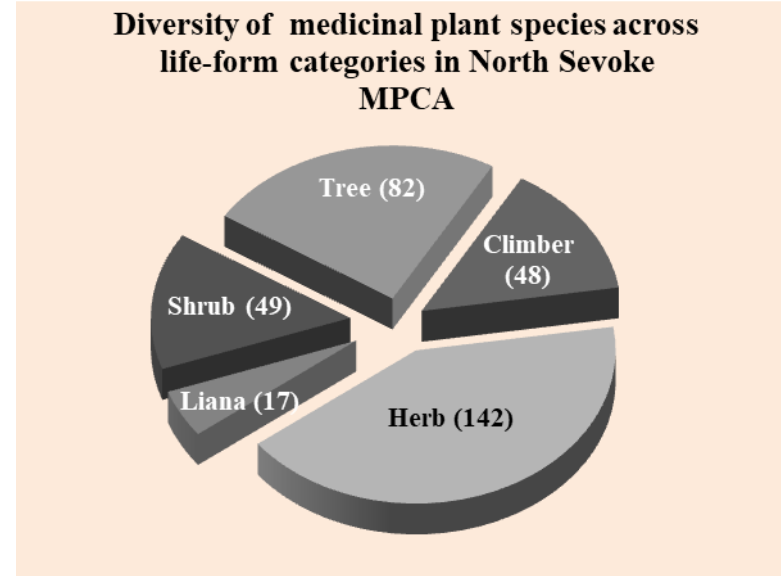
Mabb.				
310	<i>Streblus asper</i> Lour.	Moraceae	Tree	Common
311	<i>Strobilanthes</i> sp.	Acanthaceae	Herb	Less common
312	<i>Suregada multiflora</i> (A. Juss.) Baill.	Euphorbiaceae	Tree	Less common
313	<i>Syzygium formosum</i> (Wall.) Mason	Myrtaceae	Tree	Common
314	<i>Syzygium praecox</i> (Roxb.) Rathakr. & N.C.Nair	Myrtaceae	Tree	Less common
315	<i>Tabernaemontana alternifolia</i> L.	Apocynaceae	Shrub	Common
316	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult.	Apocynaceae	Shrub	Common
317	<i>Tectona grandis</i> L.f.	Lamiaceae	Tree	Common
318	<i>Tephrosia candida</i> (Roxb.) DC.	Fabaceae	Shrub	Abundant
319	<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	Rare
320	<i>Terminalia crenulata</i> Roth	Combretaceae	Tree	Common
321	<i>Terminalia myriocarpa</i> Van Heurck & Müll. Arg.	Combretaceae	Tree	Less common
322	<i>Tetrameles nudiflora</i> R.Br.	Combretaceae	Tree	Common
323	<i>Tetrastigma campylocarpum</i> (Kurz) Planch.	Vitaceae	Climber	Common
324	<i>Tetrastigma serrulatum</i> (Roxb.) Planch.	Vitaceae	Climber	Less common
325	<i>Thladiantha cordifolia</i> (Blume) Cogn.	Cucurbitaceae	Climber	Less common
326	<i>Thunbergia coccinea</i> Wall.	Acanthaceae	Climber	Common
327	<i>Thunbergia fragrans</i> Roxb.	Acanthaceae	Climber	Common
328	<i>Toddalia asiatica</i> (L.) Lam.	Rutaceae	Shrub	Common
329	<i>Torenia diffusa</i> D.Don	Linderniaceae	Herb	Less common

330	<i>Trewia nudiflora</i> L.	Euphorbiaceae	Tree	Common
331	<i>Trichosanthes lepiniana</i> Cogn.	Cucurbitaceae	Climber	Less common
332	<i>Triumfetta pentandra</i> A.Rich.	Malvaceae	Tree	Less common
333	<i>Tropidia angulosa</i> (Lindl.) Blume	Orchidaceae	Herb	Common
334	<i>Uncaria sessilifructus</i> Roxb.	Rubiaceae	Liana	Common
335	<i>Uraria lagopodoides</i> (L.) DC.	Fabaceae	Herb	Rare
336	<i>Uraria rufescens</i> (DC.) Schindl.	Fabaceae	Herb	Common
337	<i>Uvaria hamiltonii</i> Hook.f. & Thomson	Annonaceae	Tree	Rare
338	<i>Vallaris solanacea</i> (Roth) Kuntze.	Apocynaceae	Liana	Rare
339	<i>Vatica lanceifolia</i> (Roxburgh) Blume	Dipterocarpaceae	Tree	Rare
340	<i>Vernonia albicans</i> DC.	Asteraceae	Herb	Common
341	<i>Vernonia clivorum</i> Hance	Asteraceae	Herb	Common
342	<i>Zanonia indica</i> L.	Cucurbitaceae	Climber	Less common
343	<i>Zingiber rubens</i> Roxb.	Zingiberaceae	Herb	Common

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants

List of threatened medicinal plants recorded in North Sevoke MPCA

Sl.No	Botanical name	Threatened status
1	Abelmoschus moschatus	Near Threatened
2	Alpinia calcarata	Endangered
3	Ampelocissus barbata	Endangered
4	Aristolochia indica	Vulnerable
5	Celastrus paniculatus	Endangered
6	Cinnamomum bejolghota	Vulnerable
7	Cinnamomum cecidodaphne	Endangered
8	Dioscorea prazeri	Endangered
9	Drosera burmanni	Endangered
10	Gynocardia odorata	Endangered
11	Helminthostachys zeylanica	Endangered
12	Machilus glaucescens	Critically Endangered
13	Mesua ferrea	Endangered
14	Morinda citrifolia	Vulnerable
15	Pericampylus glaucus	Vulnerable
16	Stereospermum colais	Vulnerable



Annexure 8. Details of medicinal plant species collected and recorded from Sursuti MPCA, Jalpaiguri district, West Bengal

Seasonal botanical surveys conducted in Sursuti MPCA, Jalpaiguri district, West Bengal recorded totally 377 medicinal plant species

SI. No	Botanical Name	Family	Habit	Status
1	<i>Abrus pulchellus</i> Wallich ex Thwaites	Fabaceae	Climber	Common
2	<i>Acacia caesia</i> L.	Fabaceae	Straggler	Less common
3	<i>Acacia pennata</i> (L.) Willd.	Fabaceae	Straggler	Less common
4	<i>Acampe papillosa</i> (Lindl.) Lindl.	Orchidaceae	Herb	Less common
5	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	Common
6	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	Herb	Common
7	<i>Achyrospermum densiflorum</i> Blume	Lamiaceae	Herb	Common
8	<i>Acmella paniculata</i> (Wall. ex DC.) R.K.Jansen	Asteraceae	Herb	Less common
9	<i>Acmella uliginosa</i> (Sw.) Cass.	Asteraceae	Herb	Less common
10	<i>Actinodaphne obovata</i> (Nees) Blume	Lauraceae	Tree	Less common
11	<i>Adenostemma lavenia</i> (L.) Kuntze	Asteraceae	Herb	Less common
12	<i>Aerva sanguinolenta</i> (L.) Blume	Amaranthaceae	Herb	Less common
13	<i>Aeschynanthus micranthus</i> C.B.Clarke	Gesneriaceae	Herb	Abundant
14	<i>Aeschynanthus parviflorus</i> (D.Don) Spreng.	Gesneriaceae	Herb	Common
15	<i>Ageratum conyzoides</i> L.	Asteraceae	Herb	Common
16	<i>Ageratum houstonianum</i> Mill.	Asteraceae	Herb	Common
17	<i>Aglaia perviridis</i> Hiern	Meliaceae	Tree	Common

SI. No	Botanical Name	Family	Habit	Status
18	<i>Ailanthus integrifolia</i> Lam.	Simaroubaceae	Tree	Common
19	<i>Alangium chinense</i> (Lour.) Harms	Alangiaceae	Shrub	Rare
20	<i>Allophylus simplicifolius</i> Radlk.	Sapindaceae	Shrub	Rare
21	<i>Alocasia fallax</i> Schott	Araceae	Herb	Common
22	<i>Alocasia macrorrhizos</i> (L.) G.Don	Araceae	Herb	Common
23	<i>Alpinia calcarata</i> (Andrews) Roscoe	Zingiberaceae	Herb	Less common
24	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	Tree	Less common
25	<i>Amischotolype hookeri</i> (Hassk.) H.Hara	Commelinaceae	Herb	Less common
26	<i>Amoora wallichii</i> King	Meliaceae	Tree	Common
27	<i>Ampelocissus barbata</i> (Wall.) Planch.	Vitaceae	Climber	Common
28	<i>Ampelocissus sikkimensis</i> (M.A.Lawson) Planch.	Vitaceae	Climber	Common
29	<i>Angiopteris evecta</i> Desv.	Marattiaceae	Herb	Abundant
30	<i>Anisomeles heyneana</i> Benth.	Lamiaceae	Herb	Less common
31	<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	Herb	Common
32	<i>Antidesma montanum</i> Blume var. <i>montanum</i>	Phyllanthaceae	Tree	Less common
33	<i>Antidesma acidum</i> Retz.	Phyllanthaceae	Shrub	Less common
34	<i>Aphanamixis polystachya</i> (Wall.) R.Parker	Meliaceae	Tree	Common
35	<i>Ardisia elliptica</i> Thunb.	Myrsinaceae	ShRUB	Less common
36	<i>Ardisia solanacea</i> (Poir.) Roxb.	Myrsinaceae	Shrub	Less common
37	<i>Argyreia roxburghii</i> (Sweet) Choisy	Convolvulaceae	Climber	Less common

SI. No	Botanical Name	Family	Habit	Status
38	<i>Arisaema cuspidatum</i> Engl.	Araceae	Herb	Less common
39	<i>Aristolochia indica</i> L.	Aristolochiaceae	Climber	Less common
40	<i>Aristolochia tagala</i> Cham.	Aristolochiaceae	Climber	Rare
41	<i>Artocarpus chama</i> Buch.-Ham.	Moraceae	Tree	Less common
42	<i>Artocarpus chaplasha</i> Roxb.	Moraceae	Tree	Common
43	<i>Asplenium erectum</i> Bory ex Willd.	Aspleniaceae	Herb	Abundant
44	<i>Athyrium biserrulatum</i> Christ	Aspleniaceae	Herb	Common
45	<i>Axonopus compressus</i> (Sw.) P.Beauv.	Poaceae	Herb	Common
46	<i>Ayenia grandifolia</i> (DC.) Christenh. & Byng	Malvaceae	Climber	Less common
47	<i>Baccaurea ramiflora</i> Lour.	Phyllanthaceae	Tree	Less common
48	<i>Balakata baccata</i> (Roxb.) Esser	Euphorbiaceae	Tree	Rare
49	<i>Barleria strigosa</i> Willd.	Acanthaceae	Herb	Abundant
50	<i>Bauhinia acuminata</i> Vell.	Fabaceae	Shrub	Rare
51	<i>Bauhinia vahlii</i> Wight & Arn.	Fabaceae	Liana	Rare
52	<i>Bauhinia variegata</i> L.	Fabaceae	tREE	Common
53	<i>Benkara fasciculata</i> (Roxb.) Ridsdale	Rubiaceae	Shrub	Less common
54	<i>Berchemia floribunda</i> (Wall.) Brongn.	Rhamnaceae	Shrub	Less common
55	<i>Bidens pilosa</i> L.	Asteraceae	Herb	Common
56	<i>Boehmeria macrophylla</i> Hornem var. <i>macrophylla</i>	Urticaceae	Herb	Common
57	<i>Boehmeria macrophylla</i> var. <i>scabrella</i> (Roxb.) D.G.Long	Urticaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
58	<i>Bombax ceiba</i> L.	Malvaceae	Tree	Less common
59	<i>Brachiaria eruciformis</i> (Sm.) Griseb.	Poaceae	Herb	Less common
60	<i>Bridelia retusa</i> (L.) A.Juss.	Phyllanthaceae	Shrub	Less common
61	<i>Bridelia scandens</i> (Roxb) Willd	Phyllanthaceae	Shrub	Less common
62	<i>Bulbophyllum roxburghii</i> (Lindl.) Reichb	Orchidaceae	Herb	Common
63	<i>Bulbophyllum sarcophyllum</i> (King & Pantl.) J.J.Sm.	Orchidaceae	Herb	Abundant
64	<i>Caesalpinia crista</i> L.	Fabaceae	Straggling shrub	Less common
65	<i>Callicarpa arborea</i> Roxb.	Lamiaceae	Tree	Less common
66	<i>Callicarpa tomentosa</i> (L.) Murr.	Verbenaceae	Tree	Common
67	<i>Canarium sikkimense</i> King	Burseraceae	Tree	Rare
68	<i>Canthium rheedei</i> DC.	Rubiaceae	Shrub	Common
69	<i>Capparis acutifolia</i> Sweet	Capparaceae	Shrub	Less common
70	<i>Capparis tenera</i> Dalz.	Capparaceae	Shrub	Rare
71	<i>Carex inanis</i> Kunth	Cyperaceae	Herb	Abundant
72	<i>Careya arborea</i> Roxb.	Lecythidaceae	Tree	Common
73	<i>Caryota urens</i> L.	Areaceae	Tree	Common
74	<i>Casearia graveolens</i> Dalzell	Salicaceae	Shrub	Rare
75	<i>Casearia vareca</i> Roxb.	Salicaceae	Shrub	Common
76	<i>Cassia hirsuta</i> L.	Fabaceae	Herb	Common
77	<i>Castanopsis argentea</i> (Blume) A.DC.	Fagaceae	Tree	Rare

SI. No	Botanical Name	Family	Habit	Status
78	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Fagaceae	Tree	Less common
79	<i>Catunaregam longispina</i> (Link) Tirveng.	Rubiaceae	Shrub	Less common
80	<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	Climber	Rare
81	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Climbing shrub	Less common
82	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Herb	Common
83	<i>Cephalanthus tetrandra</i> (Roxb.) Ridsdale & Bakh.f.	Rubiaceae	Tree	Less common
84	<i>Chisocheton cumingianus</i> (C.DC.) Harms	Meliaceae	Tree	Rare
85	<i>Chloranthus elatior</i> R. Br.	Chloranthaceae	Herb	Less common
86	<i>Chlorophytum tuberosum</i> (Roxb.) Baker	Asparagaceae	Herb	Less common
87	<i>Chonemorpha fragrans</i> (Moon) Alston.	Apocynaceae	Liana	Common
88	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Asteraceae	Herb	Abundant
89	<i>Chukrasia tabularis</i> A.Juss.	Meliaceae	Tree	Common
90	<i>Cinnamomum bejolghota</i> (Buch.-Ham.) Sweet	Lauraceae	Tree	Common
91	<i>Cissampelos pareira</i> var. <i>hirsuta</i> (Buch.-Ham. ex DC.) Forman	Menispermaceae	Climber	Common
92	<i>Cissus pallida</i> (Wight & Arn.) Steud.	Vitaceae	Climber	Rare
93	<i>Cissus woodrowii</i> (Stapf ex T. Cooke) Santapau	Vitaceae	Climber	Common
94	<i>Clausena excavata</i> Burm.f.	Meliaceae	Tree	Less common
95	<i>Cleome rutidosperma</i> DC.	Cleomaceae	Herb	Less common
96	<i>Clerodendrum viscosum</i> Vent.	Verbenaceae	Shrub	Abundant

SI. No	Botanical Name	Family	Habit	Status
97	<i>Clinopodium gracile</i> (Bentham) Matsumur	Lamiaceae	Herb	Common
98	<i>Clinopodium umbrosum</i> (M.Bieb.) Kuntze	Lamiaceae	Herb	Rare
99	<i>Coffea benghalensis</i> B.Heyne ex Schult.	Rubiaceae	Herb	Common
100	<i>Coix lacryma-jobi</i> L.	Poaceae	Herb	Less common
101	<i>Colebrookea oppositifolia</i> Sm.	Lamiaceae	Shrub	Common
102	<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	Common
103	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Herb	Common
104	<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	Common
105	<i>Costus speciosus</i> (J.Koenig) Sm.	Zingiberaceae	Herb	Common
106	<i>Crinum asiaticum</i> L.	Amaryllidaceae	Herb	Common
107	<i>Crinum viviparum</i> (Lam.) R.Ansari & V.J.Nair	Amaryllidaceae	Herb	Rare
108	<i>Crotalaria montana</i> Heyne ex Roth	Fabaceae	Herb	Rare
109	<i>Croton caudatus</i> Geiseler	Euphorbiaceae	Shrub	Common
110	<i>Croton roxburghii</i> Wall.	Phyllanthaceae	Tree	Less common
111	<i>Cryptolepis sinensis</i> (Lour.) Merr.	Apocynaceae	Climber	Rare
112	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Herb	Abundant
113	<i>Curculigo trichocarpa</i> (Wight) Bennet & Raizada	Hypoxidaceae	Herb	Less common
114	<i>Curcuma zedoaria</i> (Christm.) Roscoe	Zingiberaceae	Herb	Less common
115	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	Commelinaceae	Herb	Less common
116	<i>Cyanotis cristata</i> (L.) D. Don	Commelinaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
117	<i>Cyathula prostrata</i> (L.) Blume	Amaranthaceae	Herb	Abundant
118	<i>Cyclea bicristata</i> (Griff.) Diels	Menispermaceae	Climber	Common
119	<i>Cyclea peltata</i> (Lam.) Hook.f. & Thomson	Menispermaceae	Climber	Common
120	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Herb	Common
121	<i>Cyperus castaneus</i> Willd.	Cyperaceae	Herb	Lesscommon
122	<i>Cyperus compressus</i> L.	Cyperaceae	Herb	Rare
123	<i>Cyperus pangorei</i> Rottb.	Cyperaceae	Herb	Common
124	<i>Dalbergia pinnata</i> (Lour.) Prain	Fabaceae	Tree	Less common
125	<i>Dalbergia stipulacea</i> Roxb.	Fabaceae	Shrub	Less common
126	<i>Decaspermum fruticosum</i> J.R.Forst. & G.Forst.	Myrtaceae	Shrub	Rare
127	<i>Deeringia amaranthoides</i> (Lam.) Merr.	Amaranthaceae	Herb	Common
128	<i>Dendrobium densiflorum</i> Lindl.	Orchidaceae	Herb	Common
129	<i>Dendrobium stuposum</i> Lindl.	Orchidaceae	Herb	Common
130	<i>Dendrocnide sinuata</i> (Blume) Chew	Urticaceae	Shrub	Common
131	<i>Desmodium gangeticum</i> (L.) DC.	Fabaceae	Herb	Less common
132	<i>Desmodium heterocarpon</i> var. <i>strigosum</i> Meeuwen	Fabaceae	Herb	Rare
133	<i>Desmodium heterocarpon</i> (L.) DC.	Fabaceae	Herb	Less common
134	<i>Desmodium laxiflorum</i> DC.	Fabaceae	Herb	Common
135	<i>Desmodium oblongum</i> Wallich ex Bentham	Fabaceae	Herb	Less common
136	<i>Desmodium triangulare</i> (Retz.) Merr.	Fabaceae	Shrub	Less common

SI. No	Botanical Name	Family	Habit	Status
137	<i>Desmodium triflorum</i> (L.) DC.	Fabaceae	Herb	Common
138	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	Herb	Abundant
139	<i>Dichanthium aristatum</i> (Poir.) C.E.Hubb.	Poaceae	Herb	Common
140	<i>Dicliptera bupleuroides</i> Nees	Acanthaceae	Herb	Common
141	<i>Dicliptera paniculata</i> var. <i>subaequibracteata</i> (Bennet) Karthik. & Moorthy	Acanthaceae	Herb	Common
142	<i>Dictyospermum montanum</i> Wight	Commelinaceae	Herb	Less common
143	<i>Dictyospermum ovalifolium</i> Wight	Orachidaceae	Herb	Common
144	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	Herb	Common
145	<i>Dillenia indica</i> L.	Dilleniaceae	Tree	Less common
146	<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Tree	Common
147	<i>Dioscorea oppositifolia</i> L.	Dioscoreaceae	Climber	Common
148	<i>Dioscorea prazeri</i> Prain & Burkill	Dioscoreaceae	Climber	Less common
149	<i>Dioscorea tomentosa</i> J.König ex Spreng.	Dioscoreaceae	climber	Common
150	<i>Diospyros montana</i> Roxb.	Dioscoreaceae	Climber	Less common
151	<i>Diplazium esculentum</i> (Retz.) Sw.	Aspleniaceae	Herb	Common
152	<i>Dracaena angustifolia</i> (Medik.) Roxb.	Asparagaceae	Habit	Common
153	<i>Drosera burmanni</i> Vahl	Droseraceae	Herb	Less common
154	<i>Drymaria cordata</i> (L.) Willd	Caryophyllaceae	Herb	Common
155	<i>Drymaria diandra</i> Blume	Caryophyllaceae	Herb	Common
156	<i>Drynaria crassifolia</i> (L.) J. Sm.	Polypodiaceae	Herb	Abundant

SI. No	Botanical Name	Family	Habit	Status
157	<i>Dryopteris sikkimensis</i> (Bedd.) Kuntze	Polypodiaceae	Herb	Common
158	<i>Duabanga grandiflora</i> (DC.) Walp.	Lythraceae	Tree	Abundant
159	<i>Dysoxylum binectariferum</i> (Roxb.) Hook.f. ex Bedd.	Meliaceae	Tree	Less common
160	<i>Dysoxylum reticulatum</i> King	Meliaceae	Tree	Less common
161	<i>Elatostema monandrum</i> (Buch.-Ham. ex D.Don) H.Hara	Urticaceae	Herb	Common
162	<i>Elatostema platyphyllum</i> Wedd.	Urticaceae	Herb	Less common
163	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	Common
164	<i>Embelia tsjeriam-cottam</i> (Roem. & Schult.) A.DC.	Myrsinaceae	Shrub	Common
165	<i>Emilia sonchifolia</i> (L.) DC. ex DC.	Asteraceae	Herb	Less common
166	<i>Equisetum ramosissimum</i> Desf.	Equisetaceae	Herb	Common
167	<i>Eragrostis gangetica</i> (Roxb.) Steud.	Poaceae	Herb	Common
168	<i>Eragrostis tenella</i> (A. Rich.) Hochst. ex Steud.	Poaceae	Herb	Abundant
169	<i>Eranthemum pulchellum</i> Andrews	Acanthaceae	Herb	Rare
170	<i>Euonymus laxiflorus</i> Champ. ex Benth.	Clestraceae	Tree	Rare
171	<i>Eurya acuminata</i> DC.	Theaceae	Tree	Rare
172	<i>Evodia fraxinifolia</i> (Hook.) Benth.	Rutaceae	Tree	Less common
173	<i>Ficus cordata</i> Thunb.	Moraceae	Tree	Rare
174	<i>Ficus curtipes</i> Corner	Moraceae	Tree	Rare
175	<i>Ficus fistulosa</i> Reinw.	Moraceae	Tree	Rare
176	<i>Ficus hederacea</i> Roxb.	Moraceae	Tree	Less common

SI. No	Botanical Name	Family	Habit	Status
177	<i>Ficus hispida</i> L.f.	Moraceae	Tree	Less common
178	<i>Ficus mysorensis</i> var. <i>subrepanda</i> Wall. ex King	Moraceae	Tree	Rare
179	<i>Flacourtia indica</i> (Burm.f.) Merr.	Flacourtiaceae	Tree	Common
180	<i>Flemingia macrophylla</i> (Willd.) Merr.	Fabaceae	Shrub	Less common
181	<i>Flickengeria macraei</i> (Lindl.)	Orchidaceae	Herb	Common
182	<i>Floscopa scandens</i> Lour.	Commelinaceae	Herb	Common
183	<i>Gastrochilus obliquus</i> (Lindl.) Kuntze	Orchidaceae	Herb	Rare
184	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Shrub	Less common
185	<i>Gmelina arborea</i> Roxb.	Verbenaceae	Tree	Common
186	<i>Gnetum montanum</i> .	Gnetaceae	Liana	Rare
187	<i>Gomphostemma lucidum</i> Wall. ex Benth.	Lamiaceae	Herb	Rare
188	<i>Gomphostemma ovatum</i> Wall. ex Benth.	Lamiaceae	Herb	Less common
189	<i>Gomphostemma parviflorum</i> Wall. ex Benth.	Acanthaceae	Subshrub	Common
190	<i>Gouania leptostachya</i> DC.	Rhamnaceae	Climbing shrub	Less common
191	<i>Garcinia</i> sp.	Clusiaceae	Tree	Common
192	<i>Grewia serrulata</i> DC.	Malvaceae	Shrub	Less common
193	<i>Grewia tenax</i> (Forssk.) Fiori	Malvaceae	Shrub	Rare
194	<i>Gynocardia odorata</i> R.Br.	Achariaceae	Tree	Rare
195	<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Rubiaceae	Tree	Less common
196	<i>Hedychium wardii</i> C.E.C.Fisch.	Zingiberaceae	Herb	Rare

SI. No	Botanical Name	Family	Habit	Status
197	<i>Hedyotis scandens</i> Roxb.	Rubiaceae	Habit	Common
198	<i>Helminthostachys zeylanica</i> (L.) Hook.	Ophioglossaceae	Herb	Less common
199	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult.	Apocynaceae	Climber	Common
200	<i>Hibiscus sabdariffa</i> L.	Malvaceae	Herb	Common
201	<i>Hiptage benghalensis</i> (L.) Kurz	Malpighiaceae	Shrub	Common
202	<i>Hodgsonia macrocarpa</i> (Blume) Cogn.	Cucurbitaceae	Climber	Common
203	<i>Holarrhena pubescens</i> (Buch.-Ham) Wall. ex Don	Apocynaceae	Tree	Common
204	<i>Holmskioldia sanguinea</i> Retz.	Lamiaceae	Liana	Rare
205	<i>Homalium zeylanicum</i> Benth.	Flacourtiaceae	Tree	Less common
206	<i>Hydnocarpus</i> sp.	Flacourtiaceae	Tree	Less common
207	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Rubiaceae	Tree	Less common
208	<i>Hyptis suaveolens</i> (L.) Poit	Lamiaceae	Herb	Common
209	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Apocynaceae	Climber	Common
210	<i>Ilex godajam</i> Colebr. ex Hook.f.	Aquifoliaceae	Tree	Less common
211	<i>Impatiens jurpia</i> Buch.-Ham. ex Hook.f. & T. Thomson	Balsaminaceae	Herb	Rare
212	<i>Impatiens trilobata</i> Colebr.	Balsminaceae	Herb	Rare
213	<i>Ixora anthroantha</i> Bremek.	Rubiaceae	Shrub	Rare
214	<i>Jasminum flexile</i> Vahl	Oleaceae	Climber	Common
215	<i>Lagerstroemia flos-reginae</i> Retz.	Lythraceae	Tree	Common
216	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	Tree	Common

SI. No	Botanical Name	Family	Habit	Status
217	<i>Lasia spinosa</i> (L.) Thwaites	Araceae	Herb	Rare
218	<i>Leea guineensis</i> G.Don	Vitaceae	Shrub	Less common
219	<i>Leea indica</i> (Burm. f.) Merr.	Vitaceae	Shrub	Common
220	<i>Lepidagathis incurva</i> Buch.-Ham. ex D. Don Var. <i>incurva</i>	Acanthaceae	Herb	Less common
221	<i>Lepisanthes deficiens</i> Radlk.	Sapindaceae	Tree	Common
222	<i>Limnophila chinensis</i> (Osbeck) Merr.	Scrophulariaceae	Herb	Rare
223	<i>Lindenbergia grandiflora</i> Benth.	Orobanchaceae	Herb	Common
224	<i>Lindernia oppositifolia</i> (L.) Mukerjee	Scrophulariaceae	herb	Rare
225	<i>Litsea salicifolia</i> (Nees) Hook.f.	Lauraceae	Tree	Rare
226	<i>Lophophyllum bicristata</i> Griff.	Menispermaceae	Climber	Common
227	<i>Ludwigia hyssopifolia</i> (G.Don) Exell	Onagraceae	Herb	Rare
228	<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	Onagraceae	Herb	Common
229	<i>Ludwigia perennis</i> L.	Onagraceae	Herb	Common
230	<i>Lygodium microphyllum</i> (Cav.) R.Br	Lydiaceae	Herb	Common
231	<i>Macaranga peltata</i> (Roxb.) Mueller	Euphorbiaceae	Tree	Rare
232	<i>Machilus glaucescens</i> (Nees) Wight	Lauraceae	Tree	Less common
233	<i>Maesa indica</i> (Roxb.) A. DC.	Myrsinaceae	Shrub	Less common
234	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Magnoliaceae	Tree	Less common
235	<i>Magnolia hodgsonii</i> (Hooker.f. & Thomson) Keng.	Magnoliaceae	Tree	Rare
236	<i>Magnolia</i> sp.	Magnoliaceae	Tree	Rare

SI. No	Botanical Name	Family	Habit	Status
237	<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	Euphorbiaceae	Tree	Common
238	<i>Mangifera indica</i> L.	Anacardiaceae	Tree	Less Common
239	<i>Marattia fraxinea</i> Sm.	Marattiaceae	Shrub	Less common
240	<i>Mariscus compactus</i> (Retz.) Bold.	Cyperaceae	Herb	Less common
241	<i>Mariscus paniceus</i> (Rottb.) Vahl	Cyperaceae	Herb	Less common
242	<i>Melastoma malabathricum</i> L.	Melastomataceae	Shrub	Less common
243	<i>Melia composite</i> Willd.	Meliaceae	Tree	Less common
244	<i>Mesua ferrea</i> L.	Caryophyllaceae	Tree	Less common
245	<i>Meyna spinosa</i> Roxb. ex Link	Rubiaceae	Shrub	Rare
246	<i>Mezoneuron cucullatum</i> (Roxb.) Wight & Arn.	Fabaceae	Straggling shrub	Less common
247	<i>Micromelum integerrimum</i> (Roxb. ex DC.) Wight & Arn. ex M.Roem.	Rutaceae	Tree	Rare
248	<i>Micromelum minutum</i> (G.Forst.) Wight & Arn.	Rutaceae	Shrub	Less common
249	<i>Mikania cordata</i> (Burm.f.) B.L.Rob.	Asteraceae	Climber	Abundant
250	<i>Mimosa pudica</i> L.	Fabaceae	Herb	Less common
251	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	Tree	Less common
252	<i>Momordica charantia</i> subsp. <i>abbreviata</i> (Ser.) Greb.	Cucurbitaceae	Climber	Rare
253	<i>Momordica charantia</i> var. <i>charantia</i>	Cucurbitaceae	Climber	Less common
254	<i>Morinda angustifolia</i> Roxb.	Rubiaceae	Shrub	Less common
255	<i>Morinda citrifolia</i> L.	Rubiaceae	Shrub	Common

SI. No	Botanical Name	Family	Habit	Status
256	<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	Tree	Less common
257	<i>Murraya paniculata</i> (L.) Jack	Rutaceae	Tree	Less common
258	<i>Mussaenda</i> sp.	Rubiaceae	Shrub	Less common
259	<i>Naravelia zeylanica</i> DC.	Ranunculaceae	Climber	Common
260	<i>Oplismenus burmanni</i> (Retz.) P.Beauv.	Poaceae	Herb	Abundant
261	<i>Oplismenus compositus</i> (L.) P.Beauv.	Poaceae	Herb	Common
262	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Tree	Common
263	<i>Otochilus fuscus</i> Lindl.	Orchidaceae	Herb	Rare
264	<i>Pandanus unguifer</i> Hook.f.	Pandanaceae	Herb	Rare
265	<i>Panicum nodatum</i> Hitchc. & Chase	Poaceae	Herb	Common
266	<i>Panicum psilopodium</i> Trin.	Poaceae	Herb	abundant
267	<i>Papilionanthe teres</i> (Roxb.) Schltr.	Orchidaceae	Herb	Less common
268	<i>Pavetta indica</i> L.	Rubiaceae	Shrub	Less common
269	<i>Pegia nitida</i> Colebr.	Anacardiaceae	Liana	Rare
270	<i>Pericampylus glaucus</i> (Lam.) Merr.	Menispermaceae	Climber	Rare
271	<i>Pericampylus incanus</i> (Colebr.) Miers ex Hook. f. & Thomson	Menispermaceae	Climber	Rare
272	<i>Persicaria hydropiperoides</i> (Michx.) Small	Menispermaceae	Climber	Rare
273	<i>Phaius tankervilleae</i> var. <i>pulchra</i> (King & Pantl.) Karth.	Orchidaceae	Herb	Rare
274	<i>Phaulopsis imbricata</i> (Foresst.) Sweet	Acanthaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
275	<i>Phlogacanthus thyrsoiflorus</i> Nees	Acanthaceae	Shrub	Less common
276	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Tree	Common
277	<i>Phyllanthus praetervisus</i> Müll.Arg.	Phyllanthaceae	Herb	Common
278	<i>Phyllanthus reticulatus</i> Poir.	Phyllanthaceae	Shrub	Less common
279	<i>Phyllanthus sikkimensis</i> Müll.Arg.	Phyllanthaceae	Subshrub	Less common
280	<i>Phyllanthus urinaria</i> L.	Phyllanthaceae	Herb	Common
281	<i>Piper attenuatum</i> Buch.-Ham. exMiq.	Piperaceae	Climber	Common
282	<i>Piper betleoides</i> DC.	Piperaceae	Climber	Common
283	<i>Piper locnchites</i> Roem. & Sch.	Piperaceae	Climber	Rare
284	<i>Piper longum</i> L.	Piperaceae	Climber	Less common
285	<i>Piper sylvaticum</i> Roxb.	Piperaceae	Climber	Less common
286	<i>Pitardella sikkimensis</i> (Hook.f.) Tirveng.	Rubiaceae	Shrub	Common
287	<i>Pogostemon benghalensis</i> (Burm.f.) Kuntze	Lamiaceae	Herb	Rare
288	<i>Pogostemon purpurescens</i> Dalzell	Lamiaceae	Herb	Rare
289	<i>Polyalthia simiarum</i> (Buch.-Ham. ex Hook. f. & Thomson) Benth. ex Hook. f. & Thomson	Annonaceae	Tree	Less common
290	<i>Polygonum capitatum</i> Buch.-Ham. ex D.Don	Lamiaceae	Herb	Less common
291	<i>Polygonum chinense</i> L.	Polygonaceae	Herb	Less common
292	<i>Polygonum hydropiper</i> L.	Polygonaceae	Herb	Rare
293	<i>Polygonum plebeium</i> R. Brown	Polygonaceae	Herb	Common
294	<i>Potentilla indica</i> (Andrews) Th.Wolf	Rosaceae	Herb	Common

SI. No	Botanical Name	Family	Habit	Status
295	<i>Pothas scandens</i> L.	Araceae	Climber	Common
296	<i>Pouzolzia zeylanica</i> (L.) Benn.	Urticaceae	Habit	Common
297	<i>Premna mollissima</i> Roth	Lamiaceae	Shrub	Less common
298	<i>Pseuderanthemum malabaricum</i> Gamble	Acanthaceae	Herb	Rare
299	<i>Pteris semipinnata</i> L.	Pteridaceae	Herb	Common
300	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Tree	Less common
301	<i>Pterospermum acerifolium</i> L.	Malvaceae	Tree	Less common
302	<i>Pterygota alata</i> (Roxb.) R.Br.	Malvaceae	Tree	Less common
303	<i>Pueraria sikkimensis</i> Prain	Fabaceae	Climber	Less common
304	<i>Pupalia lappacea</i> (L.) Juss.	Amaranthaceae	Herb	Less common
305	<i>Rhaphidophora decursiva</i> (Roxb.) Schott	Araceae	Climber	Common
306	<i>Rhynchochum ellipticum</i> (Wall. ex D.Dietr.) A.DC.	Gesneriaceae	Shrub	Rare
307	<i>Richardia scabra</i> L.	Rubiaceae	Herb	Common
308	<i>Rungia pectinata</i> (L.) Nees.	Acanthaceae	Herb	Common
309	<i>Saccharum spontaneum</i> L.	Poaceae	Herb	Less common
310	<i>Saccolabiopsis pussila</i> (Lindl.) Seidenfaden & Garay	Orchidaceae	Climber	Common
311	<i>Salomonina ciliata</i> (L.) DC.	Polygalaceae	Herb	Rare
312	<i>Falconeria insignis</i> Royle	Euphorbiaceae	Tree	Less common
313	<i>Sauropus compressus</i> var. <i>puberulus</i> (Kurz) Chakrab. & M.Gangop.	Phyllanthaceae	Herb	Rare

SI. No	Botanical Name	Family	Habit	Status
314	<i>Schima wallichii</i> (DC.) Korth.	Theaceae	Tree	Less common
315	<i>Senegalia pennata</i> (L.) Maslin	Fabaceae	Straggling shrub	Common
316	<i>Senna occidentalis</i> L.	Fabaceae	Herb	Less common
317	<i>Senna tora</i> (L.) Roxb.	Fabaceae	Herb	Common
318	<i>Shorea robusta</i> Gaertn.	Dipterocarpaceae	Tree	Abundant
319	<i>Sida alnifolia</i> L.	Malvaceae	Herb	Common
320	<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	Malvaceae	Herb	Abundant
321	<i>Sloanea sterculiacea</i> (Benth.) Rehder & E.H.Wilson	Elaeocarpaceae	Tree	Less common
322	<i>Smilax griffithii</i> A.DC.	Smilacaceae	Climber	Common
323	<i>Smilax ovalifolia</i> Roxb. ex D.Don	Smilacaceae	Climber	Rare
324	<i>Smilax lanceifolia</i> Roxb.	Smilacaceae	Climber	Rare
325	<i>Smilax zeylanica</i> L.	Smilacaceae	Climber	Less common
326	<i>Smitinandia micrantha</i> (Lindl.) Holttum	Orchidaceae	Herb	Less common
327	<i>Solanum khasianum</i> var. <i>chatterjeeanum</i> Sengupta	Solanaceae	Undershrub	Common
328	<i>Solanum torvum</i> Sm.	Solanaceae	Shrub	Common
329	<i>Solena heterophylla</i> Lour.	Cucurbitaceae	Climber	Common
330	<i>Spatholobus</i> sp.	Fabaceae	Climber	Common
331	<i>Spermacoce alata</i> Aubl.	Rubiaceae	Herb	Common
332	<i>Spermacoce latifolia</i> Aubl.	Rubiaceae	Herb	Rare
333	<i>Spermacoce prostrata</i> Aubl.	Rubiaceae	Liana	Less common

SI. No	Botanical Name	Family	Habit	Status
334	<i>Spermacoce pusilla</i> Wall.	Rubiaceae	Herb	Common
335	<i>Stephania japonica</i> var. <i>discolor</i> (Blume) Forman	Menispermaceae	Climber	Rare
336	<i>Sterculia guttata</i> Roxb. ex G.Don	Malvaceae	Tree	Less common
337	<i>Sterculia villosa</i> Roxb.	Malvaceae	Tree	Common
338	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillwyn) Mabb.	Bignoniaceae	Tree	Common
339	<i>Streblus asper</i> Lour.	Moraceae	Tree	Less common
340	<i>Strobilanthes</i> sp.	Acanthaceae	Herb	Less common
341	<i>Suregada multiflora</i> (A. Juss.) Baill.	Euphorbiaceae	Tree	Less common
342	<i>Symplocos glomerata</i> King ex C.B. Clarke (Male plant)	Symplocaceae	Tree	Rare
343	<i>Symplocos</i> sp.	Symplocaceae	Tree	Less common
344	<i>Syzygium formosum</i> (Wall.) Mason	Myrtaceae	Tree	Common
345	<i>Syzygium praecox</i> (Roxb.) Rathakr. & N.C.Nair	Myrtaceae	Tree	Less common
346	<i>Tabernaemontana alternifolia</i> L.	Apocynaceae	Shrub	Common
347	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult.	Apocynaceae	Shrub	Common
348	<i>Tectona grandis</i> L.f.	Lamiaceae	Tree	Common
349	<i>Tephrosia candida</i> (Roxb.) DC.	Fabaceae	Shrub	Abundant
350	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Tree	Common
351	<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	Rare
352	<i>Terminalia myriocarpa</i> Van Heurck & Müll. Arg.	Combretaceae	Tree	Less common

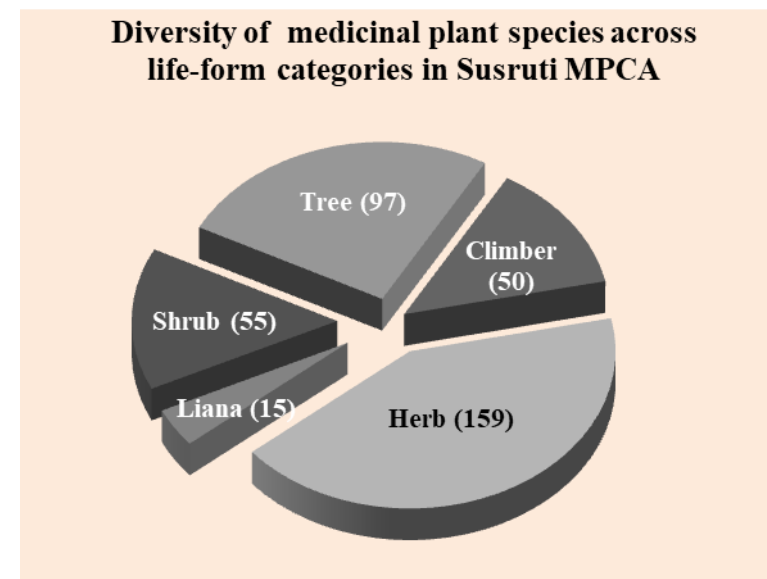
SI. No	Botanical Name	Family	Habit	Status
353	<i>Terminalia tomentosa</i> Wight & Arn.	Combretaceae	Tree	Common
354	<i>Tetrameles nudiflora</i> R.Br.	Combretaceae	Tree	Common
355	<i>Tetrastigma campylocarpum</i> (Kurz) Planch.	Vitaceae	Climber	Common
356	<i>Tetrastigma serrulatum</i> (Roxb.) Planch.	Vitaceae	Climber	Less common
357	<i>Thladiantha cordifolia</i> (Blume) Cogn.	Cucurbitaceae	Climber	Less common
358	<i>Thunbergia coccinea</i> Wall.	Acanthaceae	Climber	Common
359	<i>Thunbergia fragrans</i> Roxb.	Acanthaceae	Climber	Common
360	<i>Toddalia asiatica</i> (L.) Lam.	Rutaceae	Shrub	Common
361	<i>Torenia diffusa</i> D.Don	Linderniaceae	Herb	Less common
362	<i>Trewia nudiflora</i> L.	Euphorbiaceae	Tree	Common
363	<i>Trichosanthes lepiniana</i> Cogn.	Cucurbitaceae	Climber	Less common
364	<i>Triumfetta pentandra</i> A. Rich.	Malvaceae	Herb	Common
365	<i>Tropidia angulosa</i> (Lindl.) Blume	Orchidaceae	Herb	Common
366	<i>Uncaria sessilifructus</i> Roxb.	Rubiaceae	Liana	Common
367	<i>Uraria lagopodoides</i> (L.) DC.	Fabaceae	Herb	Rare
368	<i>Uraria rufescens</i> (DC.) Schindl.	Fabaceae	Herb	Common
369	<i>Uvaria hamiltonii</i> Hook.f. & Thomson	Annonaceae	Tree	Rare
370	<i>Vatica lanceifolia</i> (Roxburgh) Blume	Dipterocarpaceae	Tree	Rare
371	<i>Vernonia albicans</i> DC.	Asteraceae	Herb	Common
372	<i>Wattakaka volubilis</i> (L. f.) Stapf	Apocynaceae	Climber	Less common

SI. No	Botanical Name	Family	Habit	Status
373	<i>Wrightia arborea</i> (Dennst.) Mabb.	Apocynaceae	Tree	Rare
374	<i>Zanonia indica</i> L.	Cucurbitaceae	Climber	Less common
375	<i>Zehneria umbellata</i> (Klein ex Willd.) Thwaites	Cucurbitaceae	Climber	Common
376	<i>Zingiber rubens</i> Roxb.	Zingiberaceae	Herb	Common
377	<i>Ziziphus nummularia</i> (Burm. f.) Wight & Arn.	Rhmanaceae	Shrub	Less common

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants

List of threatened medicinal plants recorded in Sursuti MPCA

Sl.No	Botanical name	Threatened status
1	<i>Alpinia calcarata</i>	Endangered
2	<i>Ampelocissus barbata</i>	Endangered
3	<i>Aristolochia indica</i>	Vulnerable
4	<i>Celastrus paniculatus</i>	Endangered
5	<i>Cinnamomum bejolghota</i>	Vulnerable
6	<i>Dioscorea prazeri</i>	Endangered
7	<i>Drosera burmanni</i>	Endangered
8	<i>Gynocardia odorata</i>	Endangered
9	<i>Helminthostachys zeylanica</i>	Endangered
10	<i>Machilus glaucescens</i>	Critically Endangered
11	<i>Mesua ferrea</i>	Endangered
12	<i>Morinda citrifolia</i>	Vulnerable
13	<i>Pericampylus glaucus</i>	Vulnerable
14	<i>Pterocarpus marsupium</i>	Endangered
15	<i>Stereospermum colais</i>	Vulnerable



Annexure 9. Details of medicinal plant species collected and recorded from Tonglu MPCA, Singalila National Park, Darjeeling district, West Bengal

Seasonal botanical surveys conducted in Tonglu MPCA, Singalila National Park, Darjeeling district, West Bengal recorded totally 301 medicinal plant species

Sl. No	Botanical name	Family	Habit	Status	Exotic plants	Altitude (m)	GPS readings
1	<i>Abies densa</i> Griff.	Pinaceae	Tree	Less common		2980	27° 2.188''N 88° 4.426''E
2	<i>Acer campbellii</i> Hook.f. & Thomson ex Hiern	Sapindaceae	Tree	Less common		2980	27° 2.188''N 88° 4.426''E
3	<i>Acer pectinatum</i> Wall. ex G.Nicholson	Sapindaceae	Tree	Rare		3033	27° 2.207''N 88° 4.592''E
4	<i>Acer sikkimense</i> Miq.	Sapindaceae	Tree	Less common		2980	27° 2.188''N 88° 4.426''E
5	<i>Aconitum ferox</i> Wall. ex Ser.	Ranunculaceae	Undershrub	Common		3033	27° 2.207''N 88° 4.592''E
6	<i>Aconitum palmatum</i> D.Don Syn. <i>Aconitum bisma</i> (Buch.-Ham.) Rapaics	Ranunculaceae	Undershrub	Less common		2980	27° 2.188''N 88° 4.426''E
7	<i>Aconitum spicatum</i> (Brühl) Stapf	Ranunculaceae	Undershrub	Rare		3033	27° 2.207''N 88° 4.592''E
8	<i>Actinidia strigosa</i> Hook.f. & Thomson	Actinidiaceae	Liana	Rare		2980	27° 2.188''N 88° 4.426''E
9	<i>Agrimonia pilosa</i> var. <i>nepalensis</i> (D. Don) Nakai	Rosaceae	Herb	Rare		2980	27° 2.188''N 88° 4.426''E
10	<i>Agrostis micrantha</i> Steud.	Poaceae	Herb	Common		2980	27° 2.188''N 88° 4.426''E
11	<i>Ainsliaea aptera</i> DC.	Asteraceae	Herb	Less common		2980	27° 2.188''N 88° 4.426''E

12	<i>Ainsliaea latifolia</i> (D.Don) Sch.Bip.	Asteraceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
13	<i>Ajuga lobata</i> D.Don	Lamiaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
14	<i>Allium wallichii</i> Kunth	Amaryllidaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
15	<i>Anaphalis busua</i> (Buch.-Ham ex D. Don) DC.	Asteraceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
16	<i>Anaphalis contorta</i> (D.Don) Hook.f.	Asteraceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
17	<i>Anaphalis margaritacea</i> (L.) Benth. & Hook.f.	Asteraceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
18	<i>Anaphalis triplinervis</i> (Sims) C.B.Clarke	Asteraceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
19	<i>Androsace sarmentosa</i> Wall.	Primulaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
20	<i>Aralia leschenaultii</i> (DC.) J.Wen Syn. <i>Pentapanax fragrans</i> (D.Don) Ha	Araliaceae	Tree	Common	3033	27° 2.207'N 88° 4.592'E
21	<i>Argentina anserina</i> (L.) Rydb.	Rosaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
22	<i>Argentina lineata</i> (Trevir.) Soják	Rosaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
23	<i>Argentina microphylla</i> (D.Don) Sojak	Rosaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
24	<i>Argentina polyphylla</i> (Wall. ex Lehm.) Sojak	Rosaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
25	<i>Arisaema erubescens</i> (Wall.) Schott	Araceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
26	<i>Arisaema griffithii</i> Schott	Araceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
27	<i>Arisaema jacquemontii</i> Blume	Araceae	Herb	Rare	3033	27° 2.207'N 88°

						4.592"E
28	<i>Arisaema nepenthoides</i> (Wall.) Mart.	Araceae	Herb	Rare	2980	27° 2.188"N 88° 4.426"E
29	<i>Aristolochia griffithii</i> Hook.f. & Thomson ex Duch.	Aristolochiaceae	Climber	Rare	2980	27° 2.188"N 88° 4.426"E
30	<i>Artemisia indica</i> Willd.	Asteraceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
31	<i>Arundinaria racemosa</i> Munro	Poaceae	Herb	Abundant	2980	27° 2.188"N 88° 4.426"E
32	<i>Arundinella bengalensis</i> (Sprengel) Druce	Poaceae	Herb	Less common	2980	27° 2.188"N 88° 4.426"E
33	<i>Arundinella nepalensis</i> Trinius	Poaceae	Herb	Common	2988	27° 2.225"N 88° 4.492"E
34	<i>Aster sikkimensis</i> Hook.f. & Thomson	Asteraceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
35	<i>Aster tricephalus</i> C.B.Clarke	Asteraceae	Herb	Common	2988	27° 2.225"N 88° 4.492"E
36	<i>Athyrium foliolosum</i> T.Moore ex R.Sim	Aspleniaceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
37	<i>Berberis angulosa</i> Wall. ex Hook.f. & Thomson	Berberidaceae	Shrub	Rare	2980	27° 2.188"N 88° 4.426"E
38	<i>Berberis aristata</i> DC.	Berberidaceae	Shrub	Common	2981	27° 2.090"N 88° 4.368"E
39	<i>Berberis hookeri</i> Lem.	Berberidaceae	Shrub	Common	3020	27° 2.155"N 88° 4.493"E
40	<i>Berberis insignis</i> Hook.f. & Thomson	Berberidaceae	Shrub	Rare	3033	27° 2.207"N 88° 4.592"E
41	<i>Berberis thomsoniana</i> C.K.Schneid.	Berberidaceae	Shrub	Common	2980	27° 2.188"N 88° 4.426"E
42	<i>Berberis umbellata</i> Wall. ex G. Don	Berberidaceae	Shrub	Common	3033	27° 2.207"N 88° 4.592"E

43	<i>Berberis wallichiana</i> DC.	Berberidaceae	Shrub	Less common	3033	27° 2.207'N 88° 4.592'E
44	<i>Bidens biternata</i> (Lour.) Merr. & Sherff	Asteraceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
45	<i>Bistorta amplexicaulis</i> (D.Don) Greene	Polygonaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
46	<i>Bistorta emodi</i> (Meisn.) H.Hara	Polygonaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
47	<i>Buddleja colvilei</i> Hook.f.	Scrophulariaceae	Shrub	Rare	2980	27° 2.188'N 88° 4.426'E
48	<i>Calceolaria mexicana</i> Benth.	Calceolariaceae	Herb	Common	3021	27° 2.155'N 88° 4.493'E
49	<i>Campanula pallida</i> Wall.	Campanulaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
50	<i>Cardiocrinum giganteum</i> (Wall.) Makino	Liliaceae	Herb	Less common	3033	27° 2.207'N 88° 4.592'E
51	<i>Carex cruciata</i> Wahlenb.	Cyperaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
52	<i>Carex decora</i> Boott	Cyperaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
53	<i>Carex fusiformis</i> Nees	Cyperaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
54	<i>Carex munda</i> Boott	Cyperaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
55	<i>Carex pulchra</i> Boott	Cyperaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
56	<i>Castanopsis hystrix</i> Miq.	Fagaceae	Tree	Less common	3033	27° 2.207'N 88° 4.592'E
57	<i>Cautleya gracilis</i> (Sm.) Dandy	Zingiberaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
58	<i>Cautleya gracilis</i> var. <i>robusta</i>	Zingiberaceae	Herb	Common	2980	27° 2.188'N 88°

	(K.Schum.) Sanjappa					4.426"E
59	<i>Cautleya spicata</i> (Sm.) Baker	Zingiberaceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
60	<i>Cerastium glomeratum</i> Thuill.	Caryophyllaceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
61	<i>Chrysosplenium lanuginosum</i> Hook.f. & Thomson	Saxifragaceae	Herb	Common	3033	27° 2.207"N 88° 4.592"E
62	<i>Circaea alpina</i> L.	Onagraceae	Herb	Common	3033	27° 2.207"N 88° 4.592"E
63	<i>Cirsium falconeri</i> (Hook.f.) Petr.	Asteraceae	Herb	Common	3033	27° 2.207"N 88° 4.592"E
64	<i>Cirsium verutum</i> (D.Don) Spreng.	Asteraceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
65	<i>Cirsium wallichii</i> DC.	Asteraceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
66	<i>Clematis acuminata</i> DC.	Ranunculaceae	Climber	Less common	3020	27° 2.155"N 88° 4.493"E
67	<i>Clematis buchananiana</i> DC.	Ranunculaceae	Climber	Rare	2980	27° 2.188"N 88° 4.426"E
68	<i>Commelina maculata</i> Edgew.	Commelinaceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
69	<i>Corydalis casimiriana</i> Duthie & Prain	Papaveraceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
70	<i>Corydalis chaerophylla</i> DC.	Papaveraceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
71	<i>Corydalis longipes</i> DC.	Papaveraceae	Herb	Common	3020	27° 2.155"N 88° 4.493"E
72	<i>Corylus ferox</i> Wall.	Betulaceae	Tree	Common	3020	27° 2.155"N 88° 4.493"E
73	<i>Cotoneaster microphyllus</i> Wall. ex Lindl.	Rosaceae	Shrub	Rare	2980	27° 2.188"N 88° 4.426"E

74	<i>Cotoneaster pannosus</i> Franchet	Rosaceae	Tree	Common	3033	27° 2.207'N 88° 4.592'E
75	<i>Crawfurdia speciosa</i> Wall.	Gentiaaceae	Climber	Common	2980	27° 2.188'N 88° 4.426'E
76	<i>Cryptomeria japonica</i> (Thunb. ex L.f.) D.Don	Cupressaceae	Tree	Common	2980	27° 2.188'N 88° 4.426'E
77	<i>Daphne bholua</i> Buch.-Ham. ex D.Don	Thymelaceae	Shrub	Common	2988	27° 2.225'N 88° 4.492'E
78	<i>Daphne papyracea</i> Wall. ex G. Don	Thymelaeaceae	Tree	Less common	2980	27° 2.188'N 88° 4.426'E
79	<i>Dichroa febrifuga</i> Lour.	Hydrangeaceae	Herb	Rare	3020	27° 2.155'N 88° 4.493'E
80	<i>Dichrocephala integrifolia</i> (L.f.) Kuntze	Asteraceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
81	<i>Didymocarpus oblongus</i> Wall. ex D.Don	Gesneriaceae	Herb	Common	2981	27° 2.090'N 88° 4.368'E
82	<i>Dryopteris chrysocoma</i> (Christ) C.Chr.	Polypodiaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
83	<i>Dryopteris nodosa</i> (C.Presl) Li Bing Zhang Syn. <i>Acrophorus stipellatus</i> T.Moore	Polypodiaceae	Herb	Less common	3020	27° 2.155'N 88° 4.493'E
84	<i>Dryopteris paleacea</i> Fomin	Polypodiaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
85	<i>Elatostema obovatum</i> Wedd.	Urticaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
86	<i>Elatostema sessile</i> J.R.Forst. & G.Forst.	Urticaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
87	<i>Elatostema surculosum</i> Wight	Urticaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
88	<i>Elsholtzia blanda</i> (Benth.) Benth.	Lamiaceae	Herb	Common	2981	27° 2.090'N 88° 4.368'E

89	<i>Elsholtzia fruticosa</i> (D.Don) Rehder	Lamiaceae	Shrub	Less common	2981	27° 2.090'N 88° 4.368'E
90	<i>Elsholtzia strobilifera</i> (Benth.) Benth.	Lamiaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
91	<i>Epilobium cylindricum</i> D.Don	Onagraceae	Herb	Less common	2988	27° 2.225'N 88° 4.492'E
92	<i>Epilobium wallichianum</i> Hausskn.	Onagraceae	Herb	Less common	3020	27° 2.155'N 88° 4.493'E
93	<i>Eriocapitella rupicola</i> (Cambess.) Christenh. & Byng Syn. <i>Anemone rupicola</i> Cambess.	Ranunculaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
94	<i>Erythranthe nepalensis</i> (Benth.) G.L.Nesom	Phrymaceae	Herb	Rare	2988	27° 2.225'N 88° 4.492'E
95	<i>Euonymus echinatus</i> Wall.	Celastraceae	Undershrub	Rare	2980	27° 2.188'N 88° 4.426'E
96	<i>Euonymus frigidus</i> Wall.	Celastraceae	Small shrub	Rare	2980	27° 2.188'N 88° 4.426'E
97	<i>Euonymus viburnoides</i> Prain		Undershrub	Rare	3020	27° 2.155'N 88° 4.493'E
98	<i>Eurya acuminata</i> DC.	Pentaphylacaceae	Shrub	Less common	3020	27° 2.155'N 88° 4.493'E
99	<i>Evodia lunu-ankenda</i> (Gaertn.) Merr.	Rutaceae	Tree	Rare	2980	27° 2.188'N 88° 4.426'E
100	<i>Exbucklandia populnea</i> (R.Br. ex Griff.) R.W.Br.	Hamamelidaceae	Tree	Rare	2988	27° 2.225'N 88° 4.492'E
101	<i>Fragaria daltoniana</i> J.Gay	Rosaceae	Herb	Less common	2988	27° 2.225'N 88° 4.492'E
102	<i>Fragaria nubicola</i> (Lindl. ex Hook.f.) Lacaïta	Rosaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
103	<i>Galium asperuloides</i> Edgew.	Rubiaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E

104	<i>Galium elegans</i> Wall.	Rubiaceae	Herb	Common	2988	27° 2.225'N 88° 4.492'E
105	<i>Galium hirtiflorum</i> Req. ex DC.	Rubiaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
106	<i>Gamblea ciliata</i> C.B.Clarke	Araliaceae	Tree	Less common	3020	27° 2.155'N 88° 4.493'E
107	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Shrub	Less common	2980	27° 2.188'N 88° 4.426'E
108	<i>Gaultheria nummularioides</i> D. Don	Ericaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
109	<i>Gentiana capitata</i> Buch.-Ham. ex D.Don	Gentianaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
110	<i>Gentiana pedicellata</i> (D.Don) Griseb.	Gentianaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
111	<i>Geranium nepalense</i> Sweet	Geraniaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
112	<i>Griffitharia vestita</i> (Wall. ex G.Don) Rushforth Syn. <i>Sorbus vestita</i> (Wall. ex G.Don) Lodd.	Rosaceae	Tree	Less common	2980	27° 2.188'N 88° 4.426'E
113	<i>Gynura bicolor</i> (Roxb. ex Willd.) DC.	Asteraceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
114	<i>Halenia elliptica</i> D.Don	Gentianaceae	Herb	Common	2988	27° 2.225'N 88° 4.492'E
115	<i>Helichrysum luteoalbum</i> (L.) Rchb	Asteraceae	Herb	Rare	3021	27° 2.155'N 88° 4.493'E
116	<i>Hemionitis chrysophylla</i> (Hook.) Christenh. Syn. <i>Cheilanthes chrysophylla</i> Hook.	Pteridaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
117	<i>Hemionitis farinosa</i> (Forssk.) Christenh. Syn. <i>Cheilanthes farinosa</i> (Forssk.) Kaulf.	Pteridaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E

118	<i>Hemiphragma heterophyllum</i> Wall.	Plantaginaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
119	<i>Herminium clavigerum</i> (Lindl.) X.H.Jin, Schuit., Raskoti & Lu Q.Huang	Orchidaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
120	<i>Herpetospermum tonglense</i> (C.B.Clarke) H.Schaef. & S.S.Renner Syn. <i>Biswarea tonglensis</i> (C.B.Clarke) Cogn.	Curcubitaceae	Climber	Rare	2981	27° 2.090'N 88° 4.368'E
121	<i>Holboellia latifolia</i> Wall.	Lardizabalaceae	Liana	Rare	2988	27° 2.225'N 88° 4.492'E
122	<i>Hydrangea aspera</i> Buch.-Ham. ex D.Don	Hydrangeaceae	Shrub	Common	2988	27° 2.225'N 88° 4.492'E
123	<i>Hydrangea heteromalla</i> D. Don	Hydrangeaceae	Small shrub	Less common	3020	27° 2.155'N 88° 4.493'E
124	<i>Hydrocotyle himalaica</i> P.K.Mukh.	Araliaceae	Herb	Rare	3020	27° 2.155'N 88° 4.493'E
125	<i>Hypericum choisyanum</i> Wall. ex N.Robson	Hypericaceae	Shrub	Rare	2980	27° 2.188'N 88° 4.426'E
126	<i>Hypericum elodeoides</i> Choisy	Hypericaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
127	<i>Hypericum hookerianum</i> Wight & Arn.	Hypericaceae	Undershrub	Common	3033	27° 2.207'N 88° 4.592'E
128	<i>Hypericum monanthemum</i> Hook.f. & Thomson ex Dyer	Hypericaceae	Undershrub	Common	2980	27° 2.188'N 88° 4.426'E
129	<i>Ilex dipyrena</i> Wall.	Aquifoliaceae	Shrub	Common	2980	27° 2.188'N 88° 4.426'E
130	<i>Ilex kingiana</i> Cockerell	Aquifoliaceae	Shrub	Less common	3020	27° 2.155'N 88° 4.493'E
131	<i>Ilex sikkimensis</i> Kurz	Aquifoliaceae	Shrub	Less common	2988	27° 2.225'N 88° 4.492'E

132	<i>Impatiens arguta</i> Hook.f. & Thomson	Balsaminaceae	Herb	Less common	3020	27° 2.155'N 88° 4.493'E
133	<i>Impatiens hobsonii</i> Hook.f.	Balsaminaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
134	<i>Impatiens racemosa</i> DC.	Balsaminaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
135	<i>Impatiens stenantha</i> Hook.f.	Balsaminaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
136	<i>Impatiens urticifolia</i> Wall.	Balsaminaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
137	<i>Inula cuspidata</i> (DC.) C.B.Clarke	Asteraceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
138	<i>Iris clarkei</i> Baker ex Hook.f.	Iridaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
139	<i>Jacobaea graciliflora</i> (DC.) Sennikov Syn. <i>Senecio graciliflorus</i> DC.	Asteraceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
140	<i>Jacobaea raphanifolia</i> (Wall. ex DC.) B.Nord. Syn. <i>Senecio raphanifolius</i> Wall. ex DC.	Asteraceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
141	<i>Juncus benghalensis</i> Kunth	Juncaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
142	<i>Juncus bufonius</i> L.	Juncaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
143	<i>Koenigia campanulata</i> (Hook.f.) T.M.Schust. & Reveal	Polygonaceae	Herb	Less common	3033	27° 2.207'N 88° 4.592'E
144	<i>Lessingianthus robustus</i> (Rusby) H.Rob.	Asteraceae	Herb	Common	2981	27° 2.090'N 88° 4.368'E
145	<i>Leycesteria glaucophylla</i> (Hook.f. & Thomson) Hook.f.	Caprifoliaceae	Herb	Rare	2981	27° 2.090'N 88° 4.368'E
146	<i>Ligusticopsis wallichiana</i> (DC.) Pimenov & Kljuykov Syn. <i>Selinum</i>	Apiaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E

	wallichianum (DC.) Raizada & H.O.Saxena						
147	Liparis petiolata (D.Don) P.F.Hunt & Summerh.	Orchidaceae	Herb	Rare		3022	27° 2.155'N 88° 4.493'E
148	Lithocarpus pachyphyllus (Kurz) Rehder	Fagaceae	Tree	Common		3033	27° 2.207'N 88° 4.592'E
149	Litsea sericea (Wall. ex Nees) Hook.f.	Lauraceae	Tree	Less common		3033	27° 2.207'N 88° 4.592'E
150	Lobelia nummularia Lam.	Campanulaceae	Herb	Common		3020	27° 2.155'N 88° 4.493'E
151	Lonicera acuminata Wall.	Caprifoliaceae	Liana	Less common		2980	27° 2.188'N 88° 4.426'E
152	Lonicera glabrata Wall.	Caprifoliaceae	Herb	Common		2980	27° 2.188'N 88° 4.426'E
153	Lonicera hispida Pall. ex Schult.	Caprifoliaceae	Herb	Rare		2988	27° 2.225'N 88° 4.492'E
154	Lycopodium clavatum L.	Lycopodiaceae	Herb	Common	Temp. Northern Hemisphere to Tropical Mountains	3020	27° 2.155'N 88° 4.493'E
155	Lyonia ovalifolia (Wall.) Drude	Ericaceae	Tree	Less common		3020	27° 2.155'N 88° 4.493'E
156	Lyonia villosa (Hook.f. ex C.B.Clarke) Hand.-Mazz.	Ericaceae	Tree	Less common		2980	27° 2.188'N 88° 4.426'E
157	Maesa indica (Roxb.) DC.	Myrsinaceae	Shrub	Common		2980	27° 2.188'N 88° 4.426'E
158	Magnolia campbellii Hook.f. & Thomson	Magnoliaceae	Tree	Less common		2980	27° 2.188'N 88° 4.426'E
159	Magnolia globosa Hook.f. & Thomson	Magnoliaceae	Tree	Rare		3020	27° 2.155'N 88° 4.493'E

160	<i>Malus sikkimensis</i> (Wenz.) Koehne ex C.K.Schneid.	Rosaceae	Shrub	Common	2980	27° 2.188''N 88° 4.426''E
161	<i>Myriactis nepalensis</i> Less.	Asteraceae	Herb	Common	2980	27° 2.188''N 88° 4.426''E
162	<i>Myrsine semiserrata</i> Wall.	Myrsinaceae	Shrub	Less common	3020	27° 2.155''N 88° 4.493''E
163	<i>Neillia thyrsoflora</i> D.Don	Rosaceae	Undershrub	Common	3020	27° 2.155''N 88° 4.493''E
164	<i>Neohymenopogon parasiticus</i> (Wall.) Bennet	Rubiaceae	Undershrub	Rare	2980	27° 2.188''N 88° 4.426''E
165	<i>Neolitsea cuipala</i> (D.Don) Kosterm.	Lauraceae	Tree	Less common	3033	27° 2.207''N 88° 4.592''E
166	<i>Onychium japonicum</i> (Thunb.) Kunze	Pteridaceae	Herb	Common	3033	27° 2.207''N 88° 4.592''E
167	<i>Ophiopogon intermedius</i> D.Don	Asparagaceae	Herb	Common	3033	27° 2.207''N 88° 4.592''E
168	<i>Oreoseris gossypina</i> (Royle) X.D.Xu & V.A.Funk	Asteraceae	Herb	Rare	2980	27° 2.188''N 88° 4.426''E
169	<i>Orthoraphium roylei</i> Nees Syn. <i>Stipa</i> <i>roylei</i> (Nees) Duthie.	Poaceae	Herb	Common	2980	27° 2.188''N 88° 4.426''E
170	<i>Osbeckia stellata</i> var. <i>crinita</i> (Benth. ex Naud.) C.Hansen	Melastomataceae	Shrub	Less common	2988	27° 2.225''N 88° 4.492''E
171	<i>Osmanthus suavis</i> King ex C.B.Clarke	Oleaceae	Tree	Less common	2980	27° 2.188''N 88° 4.426''E
172	<i>Oxalis acetosella</i> L.	Oxalidaceae	Herb	Rare	3033	27° 2.207''N 88° 4.592''E
173	<i>Oxyspora paniculata</i> DC.	Melastomataceae	Shrub	Less common	2980	27° 2.188''N 88° 4.426''E
174	<i>Panax pseudoginseng</i> subsp. <i>himalaicus</i> H.Hara	Araliaceae	Herb	Rare	2980	27° 2.188''N 88° 4.426''E

175	<i>Papaver napaulense</i> (DC.) Christenh. & Byng	Papaveraceae	Herb	Rare	3020	27° 2.155'N 88° 4.493'E
176	<i>Paris polyphylla</i> Sm.	Melanthiaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
177	<i>Parnassia nubicola</i> Wall. ex Royle	Celastraceae	Herb	Rare	2988	27° 2.225'N 88° 4.492'E
178	<i>Parochetus communis</i> D.Don	Fabaceae	Herb	Rare	3020	27° 2.155'N 88° 4.493'E
179	<i>Paspalum thunbergii</i> Kunth	Poaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
180	<i>Pedicularis pantlingii</i> Prain	Orobanchaceae	Herb	Less common	3033	27° 2.207'N 88° 4.592'E
181	<i>Peracarpa carnosus</i> (Wall.) Hook.f. & Thomson	Campanulaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
182	<i>Peristylus biermannianus</i> (King & Pantl.) X.H.Jin, Schuit. & W.T.Jin	Orchidaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
183	<i>Persicaria capitata</i> (Buch.-Ham. ex D.Don) H.Gross	polygonaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
184	<i>Persicaria chinensis</i> (L.) H.Gross	Polygonaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
185	<i>Persicaria runcinata</i> (Buch.-Ham. ex D.Don) H.Gross	Polygonaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
186	<i>Phlomis lanata</i> Willd.	Lamiaceae	Herb	Common	2988	27° 2.225'N 88° 4.492'E
187	<i>Phlomoideus hamosa</i> (Benth.) Mathiesen	Lamiaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
188	<i>Picrorhiza kurroa</i> Royle ex Benth.	Plantaginaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
189	<i>Pieris formosa</i> (Wall.) D.Don	Ericaceae	Tree	Common	3020	27° 2.155'N 88° 4.493'E
190	<i>Pilea ternifolia</i> Wedd.	Urticaceae	Herb	Common	2988	27° 2.225'N 88°

						4.492"E
191	<i>Pimpinella diversifolia</i> DC.	Apiaceae	Herb	Less common	2980	27° 2.188"N 88° 4.426"E
192	<i>Piptanthus nepalensis</i> (Hook.) Sweet	Fabaceae	Tree	Common	2980	27° 2.188"N 88° 4.426"E
193	<i>Plantago asiatica</i> subsp. <i>erosa</i> (Wall.) Z.Yu Li	Plantaginaceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
194	<i>Plantago erosa</i> var. <i>fengdouensis</i> Z.E.Chao & Yong Wang	Plantaginaceae	Herb	Less common	2980	27° 2.188"N 88° 4.426"E
195	<i>Platanthera urceolata</i> (C.B.Clarke) R.M.Bateman	Orchidaceae	Herb	Rare	2980	27° 2.188"N 88° 4.426"E
196	<i>Pleione hookeriana</i> (Lindl.) Rollisson	Orchidaceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
197	<i>Pleione praecox</i> (Sm.) D.Don	Orchidaceae	Herb	Less common	3033	27° 2.207"N 88° 4.592"E
198	<i>Poa mairei</i> Hack.	Poaceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
199	<i>Poa rajbhandarii</i> Noltie	Poaceae	Herb	Common	3033	27° 2.207"N 88° 4.592"E
200	<i>Podophyllum hexandrum</i> Royle	Berberidaceae	Herb	Less common	3033	27° 2.207"N 88° 4.592"E
201	<i>Polygonatum verticillatum</i> (L.) All.	Asparagaceae	Herb	Rare	3033	27° 2.207"N 88° 4.592"E
202	<i>Polygonum runcinatum</i> Buch.-Ham. ex D. Don	Polygonaceae	Herb	Rare	2980	27° 2.188"N 88° 4.426"E
203	<i>Polygonum verticillatum</i> Biroli ex Colla	Polygonaceae	Herb	Less common	3033	27° 2.207"N 88° 4.592"E
204	<i>Polystichum lentum</i> (D.Don) T.Moore	Polypodiaceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E
205	<i>Potentilla indica</i> (Andrews) Th.Wolf	Rosaceae	Herb	Common	2980	27° 2.188"N 88° 4.426"E

206	<i>Pratia nummularia</i> (Lam.) A.Braun & Asch.	Campanulaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
207	<i>Primula capitata</i> Hook.	Primulaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
208	<i>Primula denticulata</i> Sm.	Primulaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
209	<i>Primula irregularis</i> Craib	Primulaceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
210	<i>Primula petiolaris</i> Wall.	Primulaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
211	<i>Primula rotundifolia</i> Wall.	Primulaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
212	<i>Primula scapigera</i> (Hook.f.) Craib	Primulaceae	Herb	Rare	3033	27° 2.207'N 88° 4.592'E
213	<i>Primula vulgaris</i> Huds.	Primulaceae	Herb	Rare	3020	27° 2.155'N 88° 4.493'E
214	<i>Prunella vulgaris</i> L	Lamiaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
215	<i>Prunus rufa</i> Wall. ex Hook.f.	Rosaceae	Tree	Less common	3033	27° 2.207'N 88° 4.592'E
216	<i>Pseudognaphalium affine</i> (D.Don) Anderb.	Asteraceae	Herb	Rare	2980	27° 2.188'N 88° 4.426'E
217	<i>Pteris aspericaulis</i> Wall. ex J.Agardh	Pteridaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
218	<i>Pteris quadriaurita</i> Retz.	Pteridaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
219	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don	Rosaceae	Tree	Common	2980	27° 2.188'N 88° 4.426'E
220	<i>Ranunculus diffusus</i> DC.	Ranunculaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
221	<i>Ranunculus microphyllus</i> Hand.-	Ranunculaceae	Herb	Common	2980	27° 2.188'N 88°

	Mazz.					4.426"E
222	Rhodiola himalensis (D.Don) S.H.Fu	Crassulaceae	Herb	Common	3033	27° 2.207"N 88° 4.592"E
223	Rhododendron arboreum Sm.	Ericaceae	Tree	Common	3033	27° 2.207"N 88° 4.592"E
224	Rhododendron barbatum Wall. ex G.Don	Ericaceae	Tree	Less common	3020	27° 2.155"N 88° 4.493"E
225	Rhododendron falconeri Hook.f.	Ericaceae	Tree	Less common	2980	27° 2.188"N 88° 4.426"E
226	Rhododendron grande Wight	Ericaceae	Tree	Less common	2980	27° 2.188"N 88° 4.426"E
227	Rhododendron griffithianum Wight	Ericaceae	Tree	Common	2980	27° 2.188"N 88° 4.426"E
228	Rhododendron triflorum Hook.f.	Ericaceae	Shrub	Rare	2980	27° 2.188"N 88° 4.426"E
229	Ribes takare D.Don Syn. Ribes acuminatum Wall. ex G.Don	Grossulariaceae	Shrub	Less common	2988	27° 2.225"N 88° 4.492"E
230	Rohdea nepalensis (Raf.) N.Tanaka	Asparagaceae	Herb	Less common	2981	27° 2.090"N 88° 4.368"E
231	Rosa sericea Lindl.	Rosaceae	Shrub	Common	2980	27° 2.188"N 88° 4.426"E
232	Rubia cordifolia L.	Rubiaceae	Climber	Common	2988	27° 2.225"N 88° 4.492"E
233	Rubia manjith Roxb.	Rubiaceae	Climber	Common	2980	27° 2.188"N 88° 4.426"E
234	Rubia wallichiana Decne.	Rubiaceae	Herb	Common	3020	27° 2.155"N 88° 4.493"E
235	Rubus calycinoides Hayata ex Koidz.	Rosaceae	Herb	Less common	2988	27° 2.225"N 88° 4.492"E
236	Rubus ellipticus Sm.	Rosaceae	Shrub	Less common	2980	27° 2.188"N 88° 4.426"E

237	<i>Rubus rugosus</i> Sm.	Rosaceae	Undershrub	Common	2980	27° 2.188''N 88° 4.426''E
238	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Herb	Less common	2980	27° 2.188''N 88° 4.426''E
239	<i>Rungia pectinata</i> (L.) Nees	Acanthaceae	Herb	Less common	2980	27° 2.188''N 88° 4.426''E
240	<i>Sagina japonica</i> (Sw.) Ohwi	Caryophyllaceae	Herb	Rare	2980	27° 2.188''N 88° 4.426''E
241	<i>Salix obscura</i> Andersson	Salicaceae	Tree	Less common	2980	27° 2.188''N 88° 4.426''E
242	<i>Salix thomsoniana</i> Andersson	Salicaceae	Tree	Less common	2980	27° 2.188''N 88° 4.426''E
243	<i>Sambucus adnata</i> Wall. ex DC.	Viburnaceae	Shrub	Less common	2980	27° 2.188''N 88° 4.426''E
244	<i>Sanicula elata</i> Buch.-Ham. ex D.Don	Apiaceae	Herb	Common	2980	27° 2.188''N 88° 4.426''E
245	<i>Sarcococca wallichii</i> Stapf	Euphorbiaceae	Herb	Common	3020	27° 2.155''N 88° 4.493''E
246	<i>Sarocalamus racemosus</i> (Munro) Stapleton Syn. <i>Arundinaria racemosa</i> Munro	Poaceae	Shrub	Common	3020	27° 2.155''N 88° 4.493''E
247	<i>Satyrium nepalense</i> D.Don	Orchidaceae	Herb	Common	2980	27° 2.188''N 88° 4.426''E
248	<i>Schefflera rhododendrifolia</i> (Griff.) Frodin	Araliaceae	Tree	Common	3033	27° 2.207''N 88° 4.592''E
249	<i>Schisandra grandiflora</i> (Wall.) Hook.f. & Thomson	Schisandraceae	Liana	Less common	2980	27° 2.188''N 88° 4.426''E
250	<i>Schisandra neglecta</i> A. C. Smith	Schisandraceae	Shrub	Rare	2980	27° 2.188''N 88° 4.426''E
251	<i>Selaginella monospora</i> Spring	Selaginellaceae	Herb	Common	3033	27° 2.207''N 88° 4.592''E

252	<i>Selinum carvifolium</i> (L.) L. Syn. <i>Selinum tenuifolium</i> Salisb.	Apiaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
253	<i>Selliguea erythrocarpa</i> (Mett.) X.C.Zhang & L.J.He	Polypodiaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
254	<i>Senecio graciliflorus</i> DC.	Asteraceae	Herb	Less common	2981	27° 2.090'N 88° 4.368'E
255	<i>Skimmia laureola</i> Franch.	Rutaceae	Shrub	Rare	2988	27° 2.225'N 88° 4.492'E
256	<i>Smilax elegans</i> Wall. ex Kunth	Smilacaceae	Climber	Rare	2980	27° 2.188'N 88° 4.426'E
257	<i>Smilax munita</i> S.C.Chen Syn. <i>Smilax</i> <i>rigida</i> subsp. <i>myrtillus</i> (A.DC.) T.Koyama	Smilacaceae	Shrub	Common	3033	27° 2.207'N 88° 4.592'E
258	<i>Sorbus foliolosa</i> (Wall.) Spach	Rosaceae	Tree	Rare	3020	27° 2.155'N 88° 4.493'E
259	<i>Spiraea bella</i> Sims	Rosaceae	Undershrub	Common	3020	27° 2.155'N 88° 4.493'E
260	<i>Spiraea micrantha</i> Hook.f.	Rosaceae	Undershrub	Common	2981	27° 2.090'N 88° 4.368'E
261	<i>Stauntonia latifolia</i> (Wall.) R.Br. ex Wall. Syn. <i>Holboellia latifolia</i> Wall.	Lardizabalaceae	Liana	Less common	2981	27° 2.090'N 88° 4.368'E
262	<i>Stellaria decumbens</i> Edgew.	Caryophyllaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
263	<i>Stellaria lanata</i> Hook.f.	Caryophyllaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
264	<i>Stellaria sikkimensis</i> Hook.f.	Caryophyllaceae	Herb	Common	3020	27° 2.155'N 88° 4.493'E
265	<i>Strobilanthes divaricata</i> (Nees) T.Anderson	Acanthaceae	Herb	Common	2981	27° 2.090'N 88° 4.368'E
266	<i>Strobilanthes pentastemonoides</i> (Nees) T.Anderson	Acanthaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E

267	<i>Strobilanthes pentastemonoides</i> (Nees) T.Anderson var. <i>dalhousieana</i> Kuntze	Acanthaceae	Herb	Less common	3020	27° 2.155''N 88° 4.493''E
268	<i>Swertia bimaculata</i> (Siebold & Zucc.) Hook.f. & Thomson ex C.B.Clarke	Gentianaceae	Tree	Less common	2980	27° 2.188''N 88° 4.426''E
269	<i>Swertia chirayita</i> (Roxb.) H.Karst.	Gentianaceae	Herb	Less common	2980	27° 2.188''N 88° 4.426''E
270	<i>Swertia ciliata</i> (D.Don) B.L.Burt	Gentianaceae	Herb	Rare	2980	27° 2.188''N 88° 4.426''E
271	<i>Swertia hookeri</i> C.B.Clarke	Gentianaceae	Herb	Rare	2988	27° 2.225''N 88° 4.492''E
272	<i>Swertia paniculata</i> Wall.	Gentianaceae	Herb	Less common	3020	27° 2.155''N 88° 4.493''E
273	<i>Symplocos dryophila</i> C.B. Clarke	Gentianaceae	Tree	Less common	2980	27° 2.188''N 88° 4.426''E
274	<i>Symplocos glomerata</i> King ex C. B. Clarke	Symplocaceae	Tree	Less common	3033	27° 2.207''N 88° 4.592''E
275	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc.	Symplocaceae	Tree	Common	3033	27° 2.207''N 88° 4.592''E
276	<i>Synotis acuminata</i> (Wall. ex DC.) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Common	2980	27° 2.188''N 88° 4.426''E
277	<i>Synotis alata</i> (Wall. ex DC.) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Less common	3033	27° 2.207''N 88° 4.592''E
278	<i>Synotis cappa</i> (Buch.-Ham. ex D.Don) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Less common	3033	27° 2.207''N 88° 4.592''E
279	<i>Synotis tetrantha</i> (DC.) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Common	2981	27° 2.090''N 88° 4.368''E
280	<i>Taxus wallichiana</i> Zucc.	Taxaceae	Tree	Less common	2980	27° 2.188''N 88° 4.426''E
281	<i>Tetrastigma serrulatum</i> (Roxb.)	Vitaceae	Climber	Common	2980	27° 2.188''N 88°

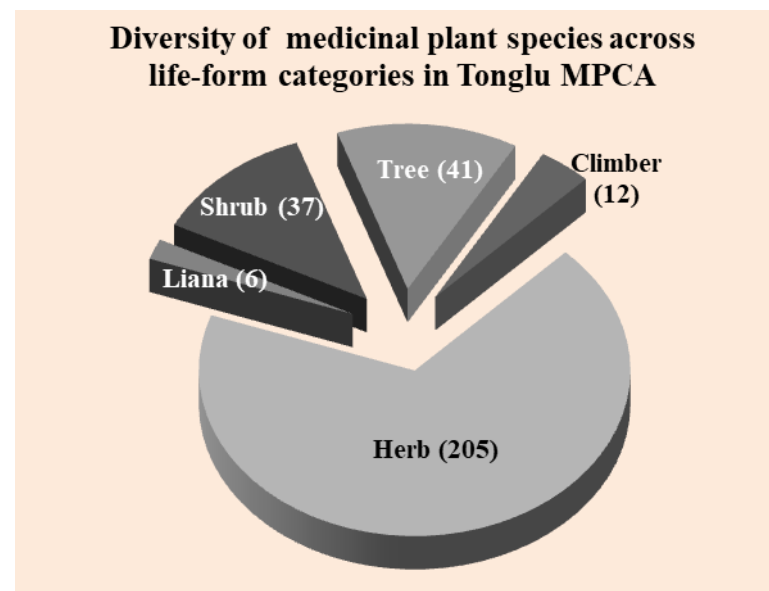
Planch.						4.426"E
282	<i>Thalictrum chelidonii</i> DC.	Ranunculaceae	Herb	Rare	3020	27° 2.155"N 88° 4.493"E
283	<i>Thalictrum cultratum</i> Wall.	Ranunculaceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
284	<i>Thalictrum foliolosum</i> DC.	Ranunculaceae	Herb	Less common	2981	27° 2.090"N 88° 4.368"E
285	<i>Thalictrum rostellatum</i> Hook.f. & Thomson	Ranunculaceae	Herb	Less common	2981	27° 2.090"N 88° 4.368"E
286	<i>Thalictrum virgatum</i> Hook.f. & Thomson	Ranunculaceae	Herb	Less common	2981	27° 2.090"N 88° 4.368"E
287	<i>Thelypteris arida</i> (D.Don) Morton	Aspleniaceae	Herb	Common	3020	27° 2.155"N 88° 4.493"E
288	<i>Tiarella polyphylla</i> D.Don	Saxifragaceae	Herb	Less common	3020	27° 2.155"N 88° 4.493"E
289	<i>Trifolium dubium</i> Sibth.	Fabaceae	Herb	Less common	2980	27° 2.188"N 88° 4.426"E
290	<i>Trifolium repens</i> L.	Fagaceae	Herb	Rare	2980	27° 2.188"N 88° 4.426"E
291	<i>Tripterospermum volubile</i> (D. Don) H. Hara	Gentianaceae	Climber	Less common	2980	27° 2.188"N 88° 4.426"E
292	<i>Tsuga dumosa</i> (D.Don) Eichler	Pinaceae	Tree	Less common	2980	27° 2.188"N 88° 4.426"E
293	<i>Vaccinium nummularia</i> Hook.f. & Thomson ex C.B.Clarke	Ericaceae	Undershrub	Common	2981	27° 2.090"N 88° 4.368"E
294	<i>Vaccinium retusum</i> (Griff.) Hook.f. ex C.B.Clarke	Ericaceae	Undershrub	Common	3020	27° 2.155"N 88° 4.493"E
295	<i>Viburnum erubescens</i> Wall. ex DC	Viburnaceae	Shrub	Common	2981	27° 2.090"N 88° 4.368"E
296	<i>Viburnum mullaha</i> Buch.-Ham. ex D.Don	Viburnaceae	Shrub	Common	2980	27° 2.188"N 88° 4.426"E

297	<i>Viola hookeri</i> Thomson	Violaceae	Herb	Less common	2980	27° 2.188'N 88° 4.426'E
298	<i>Viola pilosa</i> Blume	Violaceae	Herb	Common	2980	27° 2.188'N 88° 4.426'E
299	<i>Viola sikkimensis</i> W.Becker	Violaceae	Herb	Common	3033	27° 2.207'N 88° 4.592'E
300	<i>Yushania maling</i> (Gamble) R.B.Majumdar & Karthik.	Poaceae	Shrub	Common	2981	27° 2.090'N 88° 4.368'E
301	<i>Zeuxine goodyeroides</i> Lindl.	Orchidaceae	Herb	Rare	3020	27° 2.155'N 88° 4.493'E

Rare: < 50 plants; Less common: < 100 plants; Common: > 500 plants; Abundant : > 1000 plants

List of threatened medicinal plants recorded in Tonglu MPCA

Sl.No	Botanical name	Threatened status
1	<i>Aconitum ferox</i>	Endangered
2	<i>Aconitum palmatum</i>	Endangered
3	<i>Aconitum spicatum</i>	Endangered
4	<i>Berberis aristata</i>	Vulnerable
5	<i>Picrorhiza kurroa</i>	Critically Endangered
6	<i>Podophyllum hexandrum</i>	Critically Endangered
7	<i>Swertia chirayita</i>	Critically Endangered
8	<i>Taxus wallichiana</i>	Critically Endangered
9	<i>Thalictrum foliolosum</i>	Vulnerable



Annexure 10. List of families and number of medicinal plant species recorded in seven MPCAs

Sl. No	Family	No. of species	% of species
1	Fabaceae	80	6.4
2	Asteraceae	64	5.1
3	Rubiaceae	56	4.5
4	Poaceae	53	4.3
5	Orchidaceae	50	4.0
6	Acanthaceae	35	2.8
7	Lamiaceae	34	2.7
8	Malvaceae	34	2.7
9	Rosaceae	33	2.7
10	Euphorbiaceae	27	2.2
11	Cyperaceae	22	1.8
12	Apocynaceae	21	1.7
13	Convolvulaceae	21	1.7
14	Araceae	19	1.5
15	Phyllanthaceae	19	1.5
16	Rutaceae	19	1.5
17	Urticaceae	19	1.5
18	Cucurbitaceae	17	1.4
19	Lauraceae	17	1.4
20	Polygonaceae	17	1.4
21	Ranunculaceae	17	1.4
22	Ericaceae	16	1.3
23	Meliaceae	15	1.2

Sl. No	Family	No. of species	% of species
24	Amaranthaceae	14	1.1
25	Balsaminaceae	13	1.0
26	Vitaceae	13	1.0
27	Zingiberaceae	13	1.0
28	Commelinaceae	12	1.0
29	Gentianaceae	12	1.0
30	Asparagaceae	11	0.9
31	Fagaceae	11	0.9
32	Moraceae	11	0.9
33	Pteridaceae	11	0.9
34	Combretaceae	10	0.8
35	Polypodiaceae	10	0.8
36	Primulaceae	10	0.8
37	Verbenaceae	10	0.8
38	Menispermaceae	9	0.7
39	Aspleniaceae	8	0.6
40	Caryophyllaceae	8	0.6
41	Gesneriaceae	8	0.6
42	Piperaceae	8	0.6
43	Plantaginaceae	8	0.6
44	Rhamnaceae	8	0.6
45	Smilacaceae	8	0.6
46	Solanaceae	8	0.6
47	Berberidaceae	7	0.6
48	Campanulaceae	7	0.6

Sl. No	Family	No. of species	% of species
49	Celastraceae	7	0.6
50	Lythraceae	7	0.6
51	Sapindaceae	7	0.6
52	Symplocaceae	7	0.6
53	Apiaceae	6	0.5
54	Arecaceae	6	0.5
55	Dioscoreaceae	6	0.5
56	Hypericaceae	6	0.5
57	Magnoliaceae	6	0.5
58	Myrtaceae	6	0.5
59	Onagraceae	6	0.5
60	Rhizophoraceae	6	0.5
61	Salicaceae	6	0.5
62	Anacardiaceae	5	0.4
63	Araliaceae	5	0.4
64	Capparaceae	5	0.4
65	Caprifoliaceae	5	0.4
66	Linderniaceae	5	0.4
67	Papaveraceae	5	0.4
68	Annonaceae	4	0.3
69	Aquifoliaceae	4	0.3
70	Berberidaceae	4	0.3
71	Ebenaceae	4	0.3
72	Hydrangeaceae	4	0.3
73	Melastomataceae	4	0.3

Sl. No	Family	No. of species	% of species
74	Myrsinaceae	4	0.3
75	Oleaceae	4	0.3
76	Pinaceae	4	0.3
77	Saxifragaceae	4	0.3
78	Violaceae	4	0.3
79	Amaryllidaceae	3	0.2
80	Aristolochiaceae	3	0.2
81	Betulaceae	3	0.2
82	Bignoniaceae	3	0.2
83	Boraginaceae	3	0.2
84	Geraniaceae	3	0.2
85	Ophioglossaceae	3	0.2
86	Oxalidaceae	3	0.2
87	Pentaphragaceae	3	0.2
88	Viburnaceae	3	0.2
89	Begoniaceae	2	0.2
90	Burseraceae	2	0.2
91	Cleomaceae	2	0.2
92	Cornaceae	2	0.2
93	Crassulaceae	2	0.2
94	Dilleniaceae	2	0.2
95	Dipterocarpaceae	2	0.2
96	Elaeocarpaceae	2	0.2
97	Flacourtiaceae	2	0.2
98	Gleicheniaceae	2	0.2

Sl. No	Family	No. of species	% of species
99	Hydrocharitaceae	2	0.2
100	Hypoxidaceae	2	0.2
101	Juncaceae	2	0.2
102	Lardizabalaceae	2	0.2
103	Malpighiaceae	2	0.2
104	Marattiaceae	2	0.2
105	Molluginaceae	2	0.2
106	Olacaceae	2	0.2
107	Orobanchaceae	2	0.2
108	Passifloraceae	2	0.2
109	Phyllanthaceae	2	0.2
110	Plumbaginaceae	2	0.2
111	Polygalaceae	2	0.2
112	Portulacaceae	2	0.2
113	Santalaceae	2	0.2
114	Schisandraceae	2	0.2
115	Schizaeaceae	2	0.2
116	Simaroubaceae	2	0.2
117	Thymelaeaceae	2	0.2
118	Achariaceae	1	0.1
119	Actinidiaceae	1	0.1
120	Aizoaceae	1	0.1
121	Araliaceae	1	0.1
122	Bixaceae	1	0.1
123	Calceolariaceae	1	0.1

Sl. No	Family	No. of species	% of species
124	Cannabaceae	1	0.1
125	Caryophyllaceae	1	0.1
126	Chenopodiaceae	1	0.1
127	Chloranthaceae	1	0.1
128	Clusiaceae	1	0.1
129	Colchicaceae	1	0.1
130	Cupressaceae	1	0.1
131	Cyatheaceae	1	0.1
132	Dennstaedtiaceae	1	0.1
133	Droseraceae	1	0.1
134	Dryopteridaceae	1	0.1
135	Elaeagnaceae	1	0.1
136	Equisetaceae	1	0.1
137	Gnetaceae	1	0.1
138	Grossulariaceae	1	0.1
139	Hamamelidaceae	1	0.1
140	Helwingiaceae	1	0.1
141	Iridaceae	1	0.1
142	Juglandaceae	1	0.1
143	Lecythidaceae	1	0.1
144	Liliaceae	1	0.1
145	Lindsaeaceae	1	0.1
146	Loranthaceae	1	0.1
147	Lycopodiaceae	1	0.1
148	Lythraceae	1	0.1

Sl. No	Family	No. of species	% of species
149	Martyniaceae	1	0.1
150	Melanthiaceae	1	0.1
151	Ochnaceae	1	0.1
152	Osmundaceae	1	0.1
153	Pandanaceae	1	0.1
154	Phrymaceae	1	0.1
155	Pontederiaceae	1	0.1
156	Rhmanaceae	1	0.1
157	Sapotaceae	1	0.1

Sl. No	Family	No. of species	% of species
158	Saururaceae	1	0.1
159	Scrophulariaceae	1	0.1
160	Selaginellaceae	1	0.1
161	Tamaricaceae	1	0.1
162	Taxaceae	1	0.1
163	Tetramelaceae	1	0.1
164	Theaceae	1	0.1

Annexure 11. Details of families and number of medicinal plant species across life-form categories

Family	Climber	Herb	Liana	Shrub	Tree	Total
Fabaceae	11	33	12	10	14	80
Asteraceae	2	62	0	0	0	64
Rubiaceae	5	24	2	16	9	56
Poaceae	0	50	0	3	0	53
Orchidaceae	0	50	0	0	0	50
Acanthaceae	4	25	0	3	3	35
Lamiaceae	0	25	1	3	5	34
Malvaceae	1	19	0	5	9	34
Rosaceae	0	19	0	7	7	33
Euphorbiaceae	0	8	0	6	13	27
Cyperaceae	0	22	0	0	0	22
Apocynaceae	10	2	2	4	3	21
Convolvulaceae	18	3	0	0	0	21
Araceae	4	15	0	0	0	19
Phyllanthaceae	0	8	0	6	5	19
Rutaceae	1	1	2	7	8	19
Urticaceae	0	17	0	2	0	19
Cucurbitaceae	17	0	0	0	0	17
Lauraceae	0	0	0	0	17	17
Polygonaceae	1	16	0	0	0	17
Ranunculaceae	4	13	0	0	0	17
Ericaceae	0	2	0	6	8	16
Meliaceae	0	0	0	0	15	15
Amaranthaceae	1	13	0	0	0	14
Balsaminaceae	0	13	0	0	0	13
Vitaceae	10	0	0	3	0	13
Zingiberaceae	0	13	0	0	0	13
Commelinaceae	1	11	0	0	0	12
Gentianaceae	2	10	0	0	0	12
Asparagaceae	1	9	0	1	0	11
Fagaceae	0	2	0	0	9	11
Moraceae	1	0	0	0	10	11
Pteridaceae	0	11	0	0	0	11
Combretaceae	0	0	1	0	9	10
Polypodiaceae	0	10	0	0	0	10
Primulaceae	0	8	0	2	0	10
Verbenaceae	0	1	0	8	1	10
Menispermaceae	8	1	0	0	0	9

Family	Climber	Herb	Liana	Shrub	Tree	Total
Aspleniaceae	0	8	0	0	0	8
Caryophyllaceae	0	7	0	0	1	8
Gesneriaceae	0	7	0	1	0	8
Piperaceae	7	1	0	0	0	8
Plantaginaceae	0	8	0	0	0	8
Rhamnaceae	0	0	2	6	0	8
Smilacaceae	7	0	0	1	0	8
Solanaceae	0	7	0	1	0	8
Berberidaceae	0	0	0	7	0	7
Campanulaceae	0	7	0	0	0	7
Celastraceae	0	3	1	2	1	7
Lythraceae	0	0	0	1	6	7
Sapindaceae	0	0	0	2	5	7
Symplocaceae	0	0	0	0	7	7
Apiaceae	0	6	0	0	0	6
Arecaceae	1	0	0	1	4	6
Dioscoreaceae	6	0	0	0	0	6
Hypericaceae	0	2	0	4	0	6
Magnoliaceae	0	0	0	0	6	6
Myrtaceae	0	2	0	1	3	6
Onagraceae	0	6	0	0	0	6
Rhizophoraceae	0	0	0	0	6	6
Salicaceae	0	0	0	3	3	6
Anacardiaceae	0	0	1	0	4	5
Araliaceae	0	3	0	0	2	5
Capparaceae	0	0	0	5	0	5
Caprifoliaceae	0	3	1	1	0	5
Linderniaceae	0	4	0	1	0	5
Papaveraceae	1	4	0	0	0	5
Annonaceae	0	0	0	0	4	4
Aquifoliaceae	0	0	0	2	2	4
Berberidaceae	0	1	0	3	0	4
Ebenaceae	0	0	0	0	4	4
Hydrangeaceae	0	2	0	2	0	4
Melastomataceae	0	0	0	4	0	4
Myrsinaceae	0	0	0	4	0	4
Oleaceae	2	0	0	0	2	4
Pinaceae	0	0	0	0	4	4
Saxifragaceae	1	3	0	0	0	4
Violaceae	0	4	0	0	0	4

Family	Climber	Herb	Liana	Shrub	Tree	Total
Amaryllidaceae	0	3	0	0	0	3
Aristolochiaceae	3	0	0	0	0	3
Betulaceae	0	0	0	0	3	3
Bignoniaceae	0	0	0	0	3	3
Boraginaceae	0	3	0	0	0	3
Geraniaceae	0	3	0	0	0	3
Ophioglossaceae	0	3	0	0	0	3
Oxalidaceae	0	3	0	0	0	3
Pentaphragaceae	0	0	0	2	1	3
Viburnaceae	0	0	0	2	1	3
Begoniaceae	0	2	0	0	0	2
Burseraceae	0	0	0	0	2	2
Cleomaceae	0	2	0	0	0	2
Cornaceae	0	0	0	1	1	2
Crassulaceae	0	2	0	0	0	2
Dilleniaceae	0	0	0	0	2	2
Dipterocarpaceae	0	0	0	0	2	2
Elaeocarpaceae	0	0	0	0	2	2
Flacourtiaceae	0	0	0	0	2	2
Gleicheniaceae	0	2	0	0	0	2
Hydrocharitaceae	0	2	0	0	0	2
Hypoxidaceae	0	2	0	0	0	2
Juncaceae	0	2	0	0	0	2
Lardizabalaceae	0	0	2	0	0	2
Malpighiaceae	1	0	0	1	0	2
Marattiaceae	0	1	0	1	0	2
Molluginaceae	0	2	0	0	0	2
Olacaceae	0	0	0	2	0	2
Orobanchaceae	0	2	0	0	0	2
Passifloraceae	2	0	0	0	0	2
Phyllanthaceae	0	0	0	0	2	2
Plumbaginaceae	0	1	0	1	0	2
Polygalaceae	0	2	0	0	0	2
Portulacaceae	0	2	0	0	0	2
Santalaceae	0	1	0	0	1	2
Schisandraceae	0	0	2	0	0	2
Schizaeaceae	0	2	0	0	0	2
Simaroubaceae	0	0	0	0	2	2
Thymelaeaceae	0	0	0	2	0	2
Achariaceae	0	0	0	0	1	1

Family	Climber	Herb	Liana	Shrub	Tree	Total
Actinidiaceae	0	0	1	0	0	1
Aizoaceae	0	1	0	0	0	1
Araliaceae	0	0	0	0	1	1
Bixaceae	0	0	0	0	1	1
Calceolariaceae	0	1	0	0	0	1
Cannabaceae	0	1	0	0	0	1
Caryophyllaceae	0	1	0	0	0	1
Chenopodiaceae	0	1	0	0	0	1
Chloranthaceae	0	1	0	0	0	1
Clusiaceae	0	0	0	0	1	1
Colchicaceae	1	0	0	0	0	1
Cupressaceae	0	0	0	0	1	1
Cyatheaceae	0	1	0	0	0	1
Dennstaedtiaceae	0	1	0	0	0	1
Droseraceae	0	1	0	0	0	1
Dryopteridaceae	0	1	0	0	0	1
Elaeagnaceae	0	0	0	1	0	1
Equisetaceae	0	1	0	0	0	1
Gnetaceae	0	0	1	0	0	1
Grossulariaceae	0	0	0	1	0	1
Hamamelidaceae	0	0	0	0	1	1
Helwingiaceae	0	0	0	1	0	1
Iridaceae	0	1	0	0	0	1
Juglandaceae	0	0	0	0	1	1
Lecythidaceae	0	0	0	0	1	1
Liliaceae	0	1	0	0	0	1
Lindsaeaceae	0	1	0	0	0	1
Loranthaceae	0	1	0	0	0	1
Lycopodiaceae	0	1	0	0	0	1
Lythraceae	0	1	0	0	0	1
Martyniaceae	0	1	0	0	0	1
Melanthiaceae	0	1	0	0	0	1
Ochnaceae	0	0	0	1	0	1
Osmundaceae	0	1	0	0	0	1
Pandanaceae	0	1	0	0	0	1
Phrymaceae	0	1	0	0	0	1
Pontederiaceae	0	1	0	0	0	1
Rhmanaceae	0	0	0	1	0	1
Sapotaceae	0	0	0	0	1	1
Saururaceae	0	1	0	0	0	1

Family	Climber	Herb	Liana	Shrub	Tree	Total
Scrophulariaceae	0	0	0	1	0	1
Selaginellaceae	0	1	0	0	0	1
Tamaricaceae	0	0	0	1	0	1
Taxaceae	0	0	0	0	1	1
Tetramelaceae	0	0	0	0	1	1
Theaceae	0	0	0	0	1	1
Number of species	134	671	31	163	245	1244

Annexure 12. Details of disturbance parameters used for assessing the MPCA sites by scoring method

Sl. No	Site elements
1	Nature of surroundings – sides surrounded either by agricultural lands/plantations or human settlements (4) 1 = One side only 2 = Two sides 3 = Three sides 4 = All four sides
2	Boundary wall/fence around MPCA especially areas bordering with human settlements or non-forest landscapes (5) 0 = Barbed wire fencing in all four sides 1 = Barbed wire fencing in part of sides 2 = Barbed wire fencing in sites bordering roads 3 = Barbed wire fencing in sites nearing the entrance 4 = no boundary walls/fence
3	Access to MPCA site from main road/human settlement (2) 1 = mud road 2 = Metal road/concrete road
4	Distance from human settlement (5) 1 = >500 meters from site 2 = 100 – 500 meters from site 3 = 100 meters from site 4 = houses bordering with MPCA 5 = houses within MPCA
5	Presence of RET species (3) 1 = > 10 species 2 = 5 – 10 species 3 = < 5 species
6	Regeneration of conservation concern species (seedling and sapling stages) (3) 1 = > 10 species 2 = 5 – 10 species 3 = < 5 species
7	Vegetation canopy openness (3) 1 = Small canopy gaps, but few 2 = Small canopy gaps, but many 3 = Large canopy openness
8	Number of trekking paths (3) 1 = One 2 = Two 3 = More than two

9	<p>Frequency of general public entry inside MPCA areas (3)</p> <p>1 = Occasional</p> <p>2 = Pilgrimage times</p> <p>3 = Fair & festival times</p>
10	<p>Presence of tourist attraction (5)</p> <p>1 = Water falls</p> <p>1 = Temple structure</p> <p>1 = Passage to towns</p> <p>1 = Historical or ancient sites</p> <p>1 = Trekking areas</p>
11	<p>Resource extraction (6)</p> <p>1 = Firewood</p> <p>1 = Fodder</p> <p>1 = Timber</p> <p>1 = Medicinal plants</p> <p>1 = Soil or manure</p> <p>1 = Water for agricultural/domestic purpose</p>
12	<p>Vulnerability of fire incidences (4)</p> <p>0 = No history of fire incidences</p> <p>1 = Less chance</p> <p>2 = Moderate chance</p> <p>3 = High chance</p>
13	<p>Extent of area vulnerable for fire incidences (4)</p> <p>0 = No history of fire incidences</p> <p>1 = < 10 ha</p> <p>2 = 10-50 ha</p> <p>3 = > 50 ha</p>
14	<p>Presence of weed and invasive species (3)</p> <p>1 = 1-5 weed species</p> <p>2 = 6-10 weed species</p> <p>3 = more than 10 weed species</p>
15	<p>Departmental activities apart from what is approved (3)</p> <p>0 = No interventions undertaken</p> <p>1 = Planting of plant materials</p> <p>1 = Removal of NTFPs and fuelwood</p> <p>1 = Grazing of animals</p>

Annexure 13. Details of non-native (exotic) medicinal plants recorded in MPCAs

Sl. No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	N.Rajabh atkhawa	North Sevoke	Sursuti	Tonglu	Places of origin
1	<i>Acmella paniculata</i>	Asteraceae	Herb	0	0	1	0	1	1	0	Mexico to NW. Venezuela and Bolivia, Caribbean
2	<i>Acmella radicans</i>	Asteraceae	Herb	0	0	1	0	0	0	0	Tropical America
3	<i>Ageratum conyzoides</i>	Asteraceae	Herb	1	0	1	1	0	1	0	Mexico
4	<i>Alternanthera paronychioides</i>	Amaranthaceae	Herb	1	0	0	0	0	0	0	W. South America to Brazil
5	<i>Amaranthus viridis</i>	Amaranthaceae	Herb	0	0	1	0	0	0	0	SE. Mexico to Tropical America
6	<i>Avicennia officinalis</i>	Acanthaceae	Tree	1	0	0	0	0	0	0	Tropical Asia to N. & E. Australia
7	<i>Biophytum sensitivum</i>	Oxalidaceae	Herb	0	0	1	0	0	0	0	Tropical & Subtropical America
8	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0	NE. Tropical & S. Africa to W. Pacific
9	<i>Calceolaria mexicana</i>	Calceolariaceae	Herb	0	1	0	0	0	0	1	Mexico to Bolivia
10	<i>Centella asiatica</i>	Apiaceae	Herb	1	1	1	1	1	1	0	Central America
11	<i>Chloris barbata</i>	Poaceae	Herb	1	0	1	0	0	0	0	Tropical & Subtropical Old World
12	<i>Croton bonplandianus</i>	Euphorbiaceae	Herb	1	0	1	0	0	0	0	S. Bolivia to Uruguay
13	<i>Cyanthillium cinereum</i>	Asteraceae	Herb	1	0	1	1	0	1	0	Tropical & Subtropical Old World to NW. Pacific
14	<i>Cynodon dactylon</i>	Poaceae	Herb	1	0	1	0	0	1	0	Temp. & Subtropical Old World to Australia
15	<i>Cyperus bulbosus</i>	Cyperaceae	Herb	1	0	0	0	0	0	0	Africa to Australia

Sl. No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	N.Rajabh atkhawa	North Sevoke	Sursuti	Tonglu	Places of origin
16	<i>Cyperus polystachyos</i>	Cyperaceae	Herb	1	0	0	0	0	0	0	Tropics & Subtropics
17	<i>Digitaria ciliaris</i>	Poaceae	Herb	1	0	0	1	1	1	0	Tropical & Subtropical Old World
18	<i>Distimake aegyptius</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0	Tropical & Subtropical America, Tropical Africa.
19	<i>Drymaria cordata</i>	Caryophyllaceae	Herb	0	1	0	1	1	1	0	Mexico to S. Tropical America, Tropical & S. Africa.
20	<i>Duranta erecta</i>	Verbenaceae	Shrub	0	0	1	0	0	0	0	Mexico to Tropical America
21	<i>Eclipta prostrata</i>	Asteraceae	Herb	1	0	1	0	0	0	0	Temp. & Subtropical America
22	<i>Eleusine indica</i>	Poaceae	Herb	1	0	1	0	0	0	0	S. Tropical America
23	<i>Euphorbia chamaesyce</i>	Euphorbiaceae	Herb	1	0	0	0	0	0	0	Macaronesia to W.Siberia
24	<i>Euphorbia scordiifolia</i>	Euphorbiaceae	Herb	1	0	0	0	0	0	0	Macaronesia to Arabian Peninsula
25	<i>Evolvulus nummularius</i>	Convolvulaceae	Herb	1	0	1	0	0	0	0	Tropical & Subtropical America
26	<i>Fimbristylis ferruginea</i>	Cyperaceae	Herb	1	0	0	0	0	0	0	Tropical & Subtropical to Caucasus
27	<i>Gardenia latifolia</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0	Tropical & Subtropical America
28	<i>Glinus oppositifolius</i>	Molluginaceae	Herb	1	0	0	0	0	0	0	Tropical & Subtropical Old World
29	<i>Heliotropium curassavicum</i>	Boraginaceae	Herb	1	0	0	0	0	0	0	Tropical & Subtropical America
30	<i>Ichnocarpus frutescens</i>	Apocynaceae	Climber	0	0	1	1	1	1	0	Mexico to Tropical America
31	<i>Ipomoea</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0	Mexico to S. Tropical

Sl. No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	N.Rajabh atkhawa	North Sevoke	Sursuti	Tonglu	Places of origin
	marginata										America
32	<i>Ipomoea sagittata</i>	Convolvulaceae	Climber	1	0	0	0	0	0	0	SE. & S. Central U.S.A. to Central America, Caribbean, Medit.
33	<i>Ixora arborea</i>	Rubiaceae	Tree	0	0	1	0	0	0	0	Mexico to Brazil, Caribbean.
34	<i>Ludwigia hyssopifolia</i>	Onagraceae	Herb	1	0	0	0	0	1	0	S. Mexico to Tropical America, N. Australia.
35	<i>Lycopodium clavatum</i>	Lycopodiaceae	Herb	0	1	0	0	0	0	1	Temp. Northern Hemisphere to Tropical Mountains
36	<i>Malachra capitata</i>	Malvaceae	Herb	1	0	0	0	0	0	0	Tropical & Subtropical America.
37	<i>Mecardonia procumbens</i>	Plantaginaceae	Herb	1	0	0	0	0	0	0	Tropical & Subtropical America
38	<i>Mikania cordata</i>	Asteraceae	Climber	1	0	0	1	1	1	0	Tropical Old World
39	<i>Mimosa rubicaulis</i>	Fabaceae	Shrub	0	0	1	0	0	0	0	Mexico to Guatemala
40	<i>Pavetta indica</i>	Rubiaceae	Shrub	0	0	1	0	1	1	0	Tropical & Subtropical America
41	<i>Phyla nodiflora</i>	Verbenaceae	Herb	1	0	0	0	0	0	0	Tropics & Subtropics
42	<i>Phyllanthus amarus</i>	Phyllanthaceae	Herb	1	0	1	0	0	0	0	S. Mexico to Tropical America.
43	<i>Physalis angulata</i>	Solanaceae	Herb	1	0	0	0	0	0	0	Tropical & Subtropical America
44	<i>Rotala rosea</i>	Lythraceae	Herb	0	0	1	0	0	0	0	Mexico to Tropical America
45	<i>Scoparia dulcis</i>	Plantaginaceae	Herb	1	0	1	0	0	0	0	Tropical & Subtropical America
46	<i>Sesuvium portulacastrum</i>	Aizoaceae	Herb	1	0	0	0	0	0	0	Tropics & Subtropics

Sl. No	Botanical name	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	N.Rajabh atkhawa	North Sevoke	Sursuti	Tonglu	Places of origin
47	<i>Setaria flavida</i>	Poaceae	Herb	0	0	1	0	0	0	0	Tropical & Subtropical America
48	<i>Shorea robusta</i>	Dipterocarpaceae	Tree	0	0	1	1	1	1	0	Tropical & Subtropical America
49	<i>Sida cordata</i>	Malvaceae	Herb	0	0	1	1	1	1	0	Tropical & Subtropical America
50	<i>Solanum torvum</i>	Solanaceae	Shrub	0	0	1	1	0	1	0	Mexico to N. South America, Caribbean, E. Brazil
51	<i>Suaeda maritima</i>	Chenopodiaceae	Herb	1	0	0	0	0	0	0	Central & E. Canada to E. U.S.A., Europe to W. Siberia, Macaronesia, N. Africa to Japan
52	<i>Torenia crustacea</i>	Linderniaceae	Shrub	1	0	1	0	0	0	0	Tropics & Subtropics
53	<i>Urena lobata</i>	Malvaceae	Herb	1	0	1	1	0	0	0	Tropics & Subtropics
54	<i>Vitex altissima</i>	Lamiaceae	Tree	0	0	1	0	0	0	0	S. Tropical America
55	<i>Xylocarpus moluccensis</i>	Meliaceae	Tree	1	0	0	0	0	0	0	Somalia to N. Mozambique and SW. Pacific

Annexure 14. Details of medicinal plant voucher specimens that are prepared for digital herbarium

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
121925	<i>Abelmoschus moschatus</i> Medik.	Malvaceae	Herb	North Sevoke
121916	<i>Abrus pulchellus</i> Wall. ex Thwaites	Fabaceae	Climber	N.Rajabhatkhawa, North Sevoke, Sursuti
122323	<i>Achyranthes bidentata</i> Blume	Amaranthaceae	Herb	Dhotrey, N.Rajabhatkhawa, North Sevoke, Sursuti
121930	<i>Acmella paniculata</i> (Wall. ex DC.) R.K.Jansen	Asteraceae	Herb	Garpanchkot, North Sevoke, Sursuti
122202	<i>Aerva sanguinolenta</i> (L.) Blume	Amaranthaceae	Herb	North Sevoke, Sursuti
122234	<i>Aeschynanthus micranthus</i> C.B.Clarke	Gesneriaceae	Herb	N.Rajabhatkhawa, Sursuti
122388	<i>Agapetes hookeri</i> (C.B. Clarke.) Sleumer	Ericaceae	Herb	Dhotrey
122355	<i>Ainsliaea latifolia</i> (D.Don) Sch. Bip	Asteraceae	Herb	Dhotrey, Tonglu
121928	<i>Allophylus simplicifolius</i> Radlk.	Sapindaceae	Shrub	North Sevoke, Sursuti
122237	<i>Alocasia macrorrhizos</i> (L.) G.Don	Araceae	Herb	Garpanchkot, Sursuti
121977	<i>Alstonia scholaris</i> (L.)R.Br.	Apocynaceae	Tree	N.Rajabhatkhawa, North Sevoke, Sursuti
211995	<i>Amischotolype hookerii</i> (Hassk.) H.Hara	Commelinaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122317	<i>Anaphalis margaritacea</i> (L.) Benth.& Hook.f.	Asteraceae	Herb	Dhotrey, Tonglu
122314	<i>Anaphalis royleana</i> DC.	Asteraceae	Herb	Dhotrey
122302	<i>Anemone howellii</i> Jeffrey & W.W.Smith	Ranunculaceae	Herb	Dhotrey
121915	<i>Anisomeles heyneana</i> Benth.	Lamiaceae	Herb	Dhotrey, North Sevoke, Sursuti
121943	<i>Aphanamixis polystachya</i> (Wall.) R.N. Parker	Meliaceae	Tree	N.Rajabhatkhawa, North Sevoke, Sursuti
122241	<i>Ardisia neriifolia</i> Wall. ex A.DC.	Myrsinaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122222	<i>Ardisia solanacea</i> (Poir.) Roxb.	Primulaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122238	<i>Arisaema cuspidatum</i> (Roxb.) Engl.	Araceae	Herb	Sursuti
122348	<i>Artemisia vulgaris</i> L.	Asteraceae	Herb	Dhotrey

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
122343	<i>Astilbe rivularis</i> Buch.-Ham. ex D.Don	Saxifragaceae	Herb	Dhotrey
121932	<i>Barleria strigosa</i> Willd	Acanthaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
121921	<i>Bauhinia vahlii</i> Wight & Arn.	Fabaceae	Liana	N.Rajabhatkhawa, North Sevoke, Sursuti
121962	<i>Boehmeria macrophylla</i> Hornem.	Urticaceae	Herb	North Sevoke, Sursuti
121924	<i>Boehmeria platyphylla</i> Var. <i>Scbrella</i> (Roxb.) Wedd	Urticaceae	Herb	North Sevoke, Sursuti
121924	<i>Boehmeria platyphylla</i> Var. <i>Scbrella</i> (Roxb.) Wedd.	Urticaceae	Herb	North Sevoke, Sursuti
122368	<i>Boenninghausenia albiflora</i> (Hook.) Rchb. ex Meisn.	Rutaceae	Herb	Dhotrey
121920	<i>Bridelia stipularis</i> (L.) Blume.	Phyllanthaceae	Tree	Garpanchkot
122330	<i>Calceolaria mexicana</i> Benth.	Calceolariaceae	Herb	Dhotrey, Tonglu
122204	<i>Capparis acutifolia</i> Sweet	Capparaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122311	<i>Carex cruciata</i> Wahlenb.	Cyperaceae	Herb	Dhotrey, Tonglu
121926	<i>Casearia vareca</i> Roxb.	Salicaceae	Shrub	Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
121949	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A.DC.	Fagaceae	Tree	N.Rajabhatkhawa, North Sevoke, Sursuti
122217	<i>Chloranthus officinalis</i> Blume.	Chloranthaceae	Herb	N.Rajabhatkhawa, Sursuti
122279	<i>Cinnamomum cecicodaphne</i> Meisn.	Lauraceae	Tree	North Sevoke
121879	<i>Clerodendrum indicum</i> (L.) Kuntze	Verbenaceae	Shrub	North Sevoke
121934	<i>Clinopodium umbrosum</i> (M.Bieb.) K.Koch	Lamiaceae	Herb	Dhotrey, North Sevoke, Sursuti
121906	<i>Coffea benghalensis</i> B.Heyne ex Roth	Rubiaceae	Herb	North Sevoke, Sursuti
122212	<i>Coix lacryma-jobi</i> L.	Poaceae	Herb	Sursuti
121947	<i>Cola nitida</i> (Vent.) Schott & Endl	Malvaceae	Tree	North Sevoke
122237	<i>Colocasia esculenta</i> (L.) Schott	Lamiaceae	Shrub	North Sevoke, Sursuti

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
121985	<i>Combretum roxburghii</i> Sprengel	Combretaceae	Liana	Garpanchkot, North Sevoke
121975	<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	Bonnie camp, N.Rajabhatkhawa, North Sevoke, Sursuti
121971	<i>Costus speciosus</i> (J.Koenig) Sm.	Zingiberaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122324	<i>Craniotome furcata</i> (Link) Kuntze	Lamiaceae	Herb	Dhotrey
122336	<i>Crawfordia campanulacea</i> Wall. & Griff. ex C.B.Clarke	Gentianaceae	Climber	Dhotrey, Tonglu
121956	<i>Crotalaria epunctata</i> Dalzell	Fabaceae	Herb	North Sevoke
121926	<i>Crotalaria alata</i> G. Don.	Fabaceae	Herb	North Sevoke
121964	<i>Curcuma zedoaria</i> Roxb.	Zingiberaceae	Herb	Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
1219902	<i>Cyathula prostrata</i> (L.) Blume	Amaranthaceae	Herb	Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
122316	<i>Cyathula tomentosa</i> (Roth) Moq.	Amaranthaceae	Herb	Dhotrey
122352	<i>Dactylicapnos scandens</i> (D.Don) Hutch.	Papaveraceae	Climber	Dhotrey
122380	<i>Daphne papyracea</i> Wall. ex G.Don	Thymelaeaceae	Shrub	Dhotrey, Tonglu
121988	<i>Decaspermum fruticosum</i> J.R. Frost & G. Frost.	Myrtaceae	Shrub	North Sevoke, Sursuti
122383	<i>Dendrobium longicornu</i> Lindl.	Orchidaceae	Herb	Dhotrey
121139	<i>Desmodium gangeticum</i> (L.) DC.	Fabaceae	Herb	Sursuti
121919	<i>Desmodium heterocarpon</i> var. <i>Strigosum</i> Meeuwen	Fabaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122221	<i>Desmodium laxiflorum</i> DC.	Fabaceae	Herb	N.Rajabhatkhawa, Sursuti
121919	<i>Desmodium oblongum</i> Wall.ex Benth.	Fabaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
121972	<i>Desmodium triangulare</i> (Retz.)	Fabaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
121901	<i>Dichanthium aristatum</i> (Poir.) C.E.Hubb.	Poaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
121966	<i>Dicliptera paniculata</i> var. <i>subaequibracteata</i>	Acanthaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
	(Bennett) karthik. & Moorthy.			
121942	<i>Dillenia indica</i> L.	Dilleniaceae	Tree	N.Rajabhatkhawa, North Sevoke, Sursuti
122329	<i>Drymaria cordata</i> (L.) Wild	Caryophyllaceae	Herb	Dhotrey, N.Rajabhatkhawa, North Sevoke, Sursuti
12229	<i>Dysoxylum binectariferum</i> Hiern.	Meliaceae	Tree	North Sevoke, Sursuti
121942	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
122347	<i>Elsholtzia fruticosa</i> (D.Don) Rehder	Lamiaceae	Herb	Dhotrey, Tonglu
122308	<i>Elsholtzia strobilifera</i> (Benth.) Benth.	Lamiaceae	Herb	Dhotrey, Tonglu
121939	<i>Equisetum ramosissimum</i> Desf.	Equisetaceae	Herb	Dhotrey, N.Rajabhatkhawa, North Sevoke, Sursuti
122208	<i>Eurya acuminata</i> DC.	Pentaphylacaceae	Shrub	Dhotrey, N.Rajabhatkhawa, Sursuti, Tonglu
121968	<i>Ficus mysorensis</i> var. <i>subrepanda</i> Wall. ex King	Moraceae	Tree	North Sevoke, Sursuti
122307	<i>Galium aparine</i> L.	Rubiaceae	Herb	Dhotrey
122342	<i>Gaultheria fragrantissima</i> Wall.	Ericaceae	Shrub	Dhotrey, Tonglu
122336	<i>Gaultheria nummularioides</i> D.Don	Ericaceae	Herb	Dhotrey, Tonglu
122328	<i>Geranium nepalense</i> Sweet	Geraniaceae	Herb	Dhotrey, Tonglu
121933	<i>Gomphostemma parviflorum</i> Wall & Benth.	Acanthaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
121980	<i>Gouania nepalensis</i> Wall.	Rhamnaceae	Liana	N.Rajabhatkhawa, North Sevoke, Sursuti
122242	<i>Grewia serrulata</i> DC.	Malvaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
121940	<i>Hedyotis scandens</i> Roxb.	Rubiaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122353	<i>Hemiphragma heterophyllum</i> Wall.	Plantaginaceae	Herb	Dhotrey, Tonglu
122344	<i>Heracleum wallichii</i> DC	Apiaceae	Herb	Dhotrey
122221	<i>Hibiscus sabdariffa</i> L.	Malvaceae	Herb	Sursuti
122240	<i>Holmskioldia sanguinea</i> Retz.	Lamiaceae	Liana	Sursuti

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
122310	<i>Hypericum patulum</i> Thunb.	Hypericaceae	Shrub	Dhotrey
122338	<i>Hypericum hookerianum</i> Wight & Arn.	Hypericaceae	Shrub	Dhotrey, Tonglu
121981	<i>Ixora anthroantha</i> Brem.	Rubiaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122321	<i>Lactuca decipiens</i> C.B.Clarke	Asteraceae	Herb	Dhotrey
121992	<i>Lasia spinosa</i> (L.) Thw.	Araceae	Herb	North Sevoke, Sursuti
191910	<i>Lepidagathis incurva</i> Buch.-Ham.ex D.Don	Acanthaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122250	<i>Limnophila chinensis</i> (Osbeck) Merr.	Plantaginaceae	Herb	Garpanchkot, Sursuti
122301	<i>Liparis bootanensis</i> Griffith	Orchidaceae	Herb	Dhotrey
122248	<i>Ludwigia octovalvis</i> (Jacq.) P.H. Raven	Onagraceae	Herb	Sursuti
121987	<i>Ludwigia perennis</i> L.	Onagraceae	Herb	North Sevoke, Sursuti
122332	<i>Lycopodium clavatum</i> L.	Lycopodiaceae	Herb	Dhotrey, Tonglu
121907	<i>Lygodium microphyllum</i> (Cav.) R.Br	Schizaeaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
121274	<i>Maesa indica</i> (Roxb.) A.DC..	Myrsinaceae	Shrub	N.Rajabhatkhawa, Sursuti, Tonglu
122365	<i>Magnolia campbellii</i> Hook.f.& Thomson	Magnoliaceae	Tree	Dhotrey, Tonglu
123366	<i>Mahonia acanthifolia</i> Wall.ex G.Don	Berberidaceae	Shrub	Dhotrey
121914	<i>Mallotus philippensis</i> (Lam.)Mull.Arg.	Euphorbiaceae	Tree	North Sevoke, Sursuti
121984	<i>Marattia fraxinea</i> Sm.	Marattiaceae	Shrub	North Sevoke, Sursuti
122331	<i>Miscanthus nepalensis</i> (Trin.) Hack.	Poaceae	Herb	Dhotrey
122223	<i>Momordica charantia</i> var. <i>abbreviata</i> Sen	Cucurbitaceae	Climber	N.Rajabhatkhawa, Sursuti
121973	<i>Morinda angustifolia</i> Roxb.	Rubiaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122318	<i>Myriactis nepalensis</i> Less	Asteraceae	Herb	Dhotrey, Tonglu
122329	<i>Oplismenus compositus</i> (L.) P.Beauvois	Poaceae	Herb	Dhotrey, Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
122359	<i>Parochetus communis</i> D.Don	Fabaceae	Herb	Dhotrey, Tonglu

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
122224	<i>Pavetta indica</i> L.	Rubiaceae	Shrub	Garpanchkot, N.Rajabhatkhawa, Sursuti
121994	<i>Peliosanthes violacea</i> Var.minor Baker	Asparagaceae	Herb	North Sevoke
121955	<i>Pericampylus glaucus</i> (Lam.) Merr.	Menispermaceae	Climber	North Sevoke, Sursuti
121950	<i>Persicaria hydropiperoides</i> (Michx.) Small	Menispermaceae	Climber	North Sevoke, Sursuti
122215	<i>Phaius tankervilleae</i> Var. <i>Pulchra</i> (King & Pantl.) Karth	Orchidaceae	Herb	Sursuti
121903	<i>Phaulopsis imbricata</i> (Foresst.) Sweet	Acanthaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122213	<i>Phyllanthus praetervisus</i> Mull. Arg.	Phyllanthaceae	Herb	N.Rajabhatkhawa, Sursuti
122362	<i>Pimpinella diversifolia</i> DC.	Apiaceae	Herb	Dhotrey, Tonglu
122214	<i>Piper attenuatum</i> Herb. ex Link.	Piperaceae	Climber	Dhotrey, N.Rajabhatkhawa, North Sevoke, Sursuti
121993	<i>Piper locnhities</i> Roem & Sch.	Piperaceae	Climber	North Sevoke, Sursuti
121953	<i>Piper sylvaticum</i> Roxb.	Piperaceae	Climber	N.Rajabhatkhawa, North Sevoke, Sursuti
12384	<i>Piptanthus nepalensis</i> (Hooker) Sweet	Fabaceae	Tree	Dhotrey, Tonglu
122327	<i>Poa ludens</i> R.R.Stewart	Poaceae	Herb	Dhotrey
121938	<i>Pogostemon benghalensis</i> (Burm.f.) Kuntz.	Lamiaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122244	<i>Polyalthia simiarum</i> Benth & Hook.	Annonaceae	Tree	N.Rajabhatkhawa, Sursuti
122000	<i>Polygonum chinense</i> L.	Polygonaceae	Herb	North Sevoke, Sursuti
122305	<i>Polygonum molle</i> D.Don	Polygonaceae	Herb	North Sevoke, Sursuti
122306	<i>Polygonum runciantum</i> Buchanan-Hamilton	Polygonaceae	Herb	Dhotrey, Tonglu
1222201	<i>Porana paniculata</i> Roxb.	Convolvulaceae	Climber	North Sevoke
122381	<i>Pratia montana</i> (Reinw.ex Blume) Hassk.	Campanulaceae	Herb	Dhotrey
122228	<i>Pseuderanthemum malabaricum</i> Gamble	Acanthaceae	Herb	North Sevoke, Sursuti
121925	<i>Psychotria erratica</i> Hook.Var. <i>pedunculata</i>	Rubiaceae	Herb	North Sevoke

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
122351	<i>Rhododendron griffithianum</i> Wight	Ericaceae	Tree	Dhotrey, Tonglu
122361	<i>Rubia manjith</i> Roxb. ex Fleming	Rubiaceae	Climber	Dhotrey, Tonglu
121920	<i>Sauropus compressus</i> var. <i>puberulus</i> Kurz	Phyllanthaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
122243	<i>Senna hirsuta</i> (L.) H.S. Irwin & Barneby	Fabaceae	Herb	Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
121998	<i>Smilax griffithii</i> A.DC.	Smilacaceae	Climber	North Sevoke, Sursuti
121935	<i>Smilax ovalifolia</i> Roxb ex D. Don.	Smilacaceae	Climber	Garpanchkot, N.Rajabhatkhawa, North Sevoke, Sursuti
122216	<i>Solanum khasianum</i> var. <i>chatterjeeanum</i> Sengupta	Solanaceae	Herb	N.Rajabhatkhawa, Sursuti
122226	<i>Solanum torvum</i> Sw.	Solanaceae	Shrub	Garpanchkot, N.Rajabhatkhawa, Sursuti
121931	<i>Spermacoce prostrata</i> Aubl.	Rubiaceae	Liana	North Sevoke, Sursuti
121922	<i>Spilanthes uliginosa</i> Sw.	Rosaceae	Herb	Tonglu
122371	<i>Stellaria sikkimensis</i> Hook.f.	Caryophyllaceae	Herb	Dhotrey, Tonglu
122315	<i>Swertia chirayita</i> Buch- Ham.ex Wall.	Gentianaceae	Herb	Dhotrey, Tonglu
122247	<i>Symplocos glomerata</i> King ex C.B Clarke.	Symplocaceae	Tree	Dhotrey, Sursuti, Tonglu
122364	<i>Symplocos lucida</i> (Thunb.) Siebold & Zucc.	Symplocaceae	Tree	Dhotrey, Tonglu
122349	<i>Synotis tetrantha</i> (DC.) C.Jeffrey & Y.L.Chen	Asteraceae	Herb	Dhotrey, Tonglu
121954	<i>Syzygium formosum</i> (Wall.) Masam.	Myrtaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
1219909	<i>Tabernaemontana heyneana</i> Wall.	Apocynaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122303	<i>Taxus wallichiana</i> Zucc.	Taxaceae	Tree	Dhotrey, Tonglu
121911	<i>Tephrosia candida</i> (Roxb.) DC.	Fabaceae	Shrub	N.Rajabhatkhawa, North Sevoke, Sursuti
122220	<i>Tetrastigma serrulatum</i> (Roxb.) Planch.	Vitaceae	Climber	Dhotrey, North Sevoke, Sursuti, Tonglu
122340	<i>Tsuga dumosa</i> (D.Don) Eichler	Pinaceae	Tree	Dhotrey, Tonglu
121983	<i>Uncaria sessilifructus</i> Roxb.	Rubiaceae	Liana	N.Rajabhatkhawa, North Sevoke, Sursuti

Coll. No	Botanical name	Family	Habit	Presence in MPCAs
121957	<i>Uraria rufescens</i> (DC) Schindi.	Fabaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti
121967	<i>Uvaria hamiltonii</i> Hook.f. & Thomson.	Annonaceae	Tree	N.Rajabhatkhawa, North Sevoke, Sursuti
122309	<i>Valeriana hardwickei</i> Wall.	Rubiaceae	Herb	Dhotrey
121997	<i>Vernonia clivorum</i> Hance	Asteraceae	Herb	N.Rajabhatkhawa, North Sevoke
122207	<i>Wrightia tomentosa</i> (Roxb.) Roem. & Schult.	Apocynaceae	Tree	N.Rajabhatkhawa, Sursuti
123363	<i>Zanthoxylum armatum</i> DC	Rutaceae	Tree	Dhotrey
122372	<i>Zanthoxylum oxyphyllum</i> Edgeworth	Rutaceae	Shrub	Dhotrey
122229	<i>Zehneria umbellata</i> (Klein ex wild.) Thw.	Cucurbitaceae	Climber	N.Rajabhatkhawa, Sursuti
121971	<i>Zingiber rubens</i> Roxb.	Zingiberaceae	Herb	N.Rajabhatkhawa, North Sevoke, Sursuti

Annexure 15. List of woody plant species (>30 cm) enumerated in the sampling quadrats of 20m x 20m size in seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
1	<i>Abies densa</i>	Pinaceae	Tree	0	1	0	0	0	0	0
2	<i>Acer campbellii</i>	Sapindaceae	Tree	0	0	0	0	0	0	1
3	<i>Acer sikkimense</i>	Sapindaceae	Tree	0	1	0	0	0	0	1
4	<i>Adina cordifolia</i>	Rubiaceae	Tree	0	0	1	0	1	0	0
5	<i>Aegle marmelos</i>	Rutaceae	Tree	0	0	1	0	1	0	0
6	<i>Aglaia perviridis</i>	Meliaceae	Tree	0	0	0	1	1	0	0
7	<i>Aglaia spectabilis</i>	Meliaceae	Tree	0	0	0	1	0	0	0
8	<i>Ailanthus excelsa</i>	Simaroubaceae	Tree	0	0	1	0	0	0	0
9	<i>Ailanthus integrifolia</i>	Simaroubaceae	Tree	0	0	0	1	1	0	0
10	<i>Alangium chinense</i>	Cornaceae	Shrub	0	0	0	0	1	0	0
11	<i>Alangium salviifolium</i>	Cornaceae	Tree	0	0	1	0	0	0	0
12	<i>Alnus nepalensis</i>	Betulaceae	Tree	0	1	0	0	0	0	0
13	<i>Alstonia scholaris</i>	Apocynaceae	Tree	0	0	0	1	1	1	0
14	<i>Aphanamixis polystachya</i>	Meliaceae	Tree	0	0	0	1	1	1	0
15	<i>Aporosa lindleyana</i>	Euphorbiaceae	Tree	0	0	0	1	1	0	0
16	<i>Aralia leschenaultii</i>	Araliaceae	Tree	0	0	0	0	0	0	1
17	<i>Artocarpus chama</i>	Moraceae	Tree	0	0	0	0	1	0	0
18	<i>Artocarpus chaplasha</i>	Moraceae	Tree	0	0	0	0	0	1	0
19	<i>Avicennia alba</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
20	<i>Avicennia marina</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
21	<i>Avicennia officinalis</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
22	<i>Azadirachta indica</i>	Meliaceae	Tree	0	0	1	0	0	0	0
23	<i>Baccaurea ramiflora</i>	Phyllanthaceae	Tree	0	0	0	0	1	1	0
24	<i>Bauhinia vahlii</i>	Fabaceae	Liana	0	0	1	0	1	0	0
25	<i>Bauhinia malabarica</i>	Fabaceae	Tree	0	0	0	0	0	1	0
26	<i>Berberis aristata</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
27	<i>Betula alnoides</i>	Betulaceae	Tree	0	1	0	0	0	0	0
28	<i>Bischofia javanica</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
29	<i>Bombax ceiba</i>	Malvaceae	Tree	0	0	0	0	1	0	0
30	<i>Bridelia glauca</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
31	<i>Bridelia retusa</i>	Phyllanthaceae	Tree	0	0	1	0	1	0	0
32	<i>Bridelia stipularis</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
33	<i>Bruguiera cylindrica</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
34	<i>Bruguiera gymnorhiza</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
35	<i>Buchanania lanzan</i>	Anacardiaceae	Tree	0	0	1	0	0	0	0
36	<i>Butea monosperma</i>	Fabaceae	Tree	0	0	1	0	0	0	0
37	<i>Butea superba</i>	Fabaceae	Liana	0	0	1	0	0	0	0
38	<i>Caesalpinia cucullata</i>	Fabaceae	Liana	0	0	0	0	0	1	0
39	<i>Callicarpa arborea</i>	Lamiaceae	Tree	0	0	0	0	1	0	0
40	<i>Canarium sikkimense</i>	Burseraceae	Tree	0	0	0	0	1	0	0
41	<i>Careya arborea</i>	Lecythidaceae	Tree	0	0	1	1	1	0	0
42	<i>Cassia fistula</i>	Fabaceae	Tree	0	0	1	0	0	0	0
43	<i>Castanopsis indica</i>	Fagaceae	Tree	0	0	0	1	1	1	0
44	<i>Catunaregam longispina</i>	Rubiaceae	Shrub	0	0	0	1	0	0	0
45	<i>Catunaregam spinosa</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
46	<i>Cephalanthus tetrandra</i>	Rubiaceae	Tree	0	0	0	0	1	0	0
47	<i>Ceriops decandra</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
48	<i>Chisocheton cumingianus</i>	Meliaceae	Tree	0	0	0	0	0	1	0
49	<i>Chonemorpha fragrans</i>	Apocynaceae	Liana	0	0	0	0	1	0	0
50	<i>Chukrasia tabularis</i>	Meliaceae	Tree	0	0	1	0	1	1	0
51	<i>Cinnamomum bejolghota</i>	Lauraceae	Tree	0	1	0	1	0	1	0
52	<i>Cinnamomum cecidodaphne</i>	Lauraceae	Tree	0	0	0	0	0	1	0
53	<i>Cochlospermum religiosum</i>	Bixaceae	Tree	0	0	1	0	0	0	0
54	<i>Combretum roxburghii</i>	Combretaceae	Liana	0	0	1	0	0	0	0
55	<i>Croton persimilis</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
56	<i>Cryptomeria japonica</i>	Cupressaceae	Tree	0	1	0	0	0	0	0
57	<i>Dalbergia lanceolaria</i>	Fabaceae	Tree	0	0	1	0	0	0	0
58	<i>Dalbergia latifolia</i>	Fabaceae	Tree	0	0	1	0	0	0	0
59	<i>Dalbergia pinnata</i>	Fabaceae	Tree	0	0	0	0	1	0	0
60	<i>Dalbergia stipulacea</i>	Fabaceae	Shrub	0	0	0	0	1	1	0
61	<i>Daphne papyracea</i>	Thymelaeaceae	Shrub	0	0	0	0	0	0	1
62	<i>Dillenia indica</i>	Dilleniaceae	Tree	0	0	0	1	1	1	0
63	<i>Dillenia pentagyna</i>	Dilleniaceae	Tree	0	0	1	0	1	1	0
64	<i>Diospyros ebenum</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
65	<i>Diospyros melanoxylon</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
66	<i>Diospyros montana</i>	Ebenaceae	Tree	0	0	1	0	1	0	0
67	<i>Diospyros ovalifolia</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
68	<i>Duabanga grandiflora</i>	Lythraceae	Tree	0	0	0	1	1	0	0
69	<i>Dysoxylum binectariferum</i>	Meliaceae	Tree	0	0	0	0	1	1	0
70	<i>Dysoxylum reticulatum</i>	Meliaceae	Tree	0	0	0	1	0	0	0
71	<i>Dysoxylum excelsum</i>	Meliaceae	Tree	0	0	0	0	0	1	0
72	<i>Elaeocarpus sikkimensis</i>	Elaeocarpaceae	Tree	0	1	0	0	0	1	0
73	<i>Erythrina stricta</i>	Fabaceae	Tree	0	0	1	0	0	0	0
74	<i>Eurya japonica</i>	Pentaphylacaceae	Tree	0	1	0	0	0	0	0
75	<i>Evodia fraxinifolia</i>	Rutaceae	Tree	0	0	0	1	0	0	0
76	<i>Evodia lunu-ankenda</i>	Rutaceae	Tree	0	0	0	0	0	0	1
77	<i>Exbucklandia populnea</i>	Hamamelidaceae	Tree	0	0	0	0	0	0	1
78	<i>Excoecaria agallocha</i>	Euphorbiaceae	Tree	1	0	0	0	0	0	0
79	<i>Ficus curtipes</i>	Moraceae	Tree	0	0	0	1	0	0	0
80	<i>Ficus fistulosa</i>	Moraceae	Tree	0	0	0	0	1	0	0
81	<i>Ficus mysorensis</i> var. <i>subrepanda</i>	Moraceae	Tree	0	0	0	0	1	0	0
82	<i>Ficus racemosa</i>	Moraceae	Tree	0	0	1	0	0	0	0
83	<i>Flacourtia jangomas</i>	Salicaceae	Tree	0	0	1	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
84	<i>Gamblea ciliata</i>	Araliaceae	Tree	0	0	0	0	0	0	1
85	<i>Garuga pinnata</i>	Burseraceae	Tree	0	0	0	0	1	0	0
86	<i>Glycosmis cyanocarpa</i> var. <i>cymosa</i>	Rutaceae	Shrub	0	0	0	0	0	1	0
87	<i>Gmelina arborea</i>	Lamiaceae	Tree	0	0	0	1	1	0	0
88	<i>Gnetum montanum</i>	Gnetaceae	Liana	0	0	0	0	1	1	0
89	<i>Griffitharia vestita</i>	Rosaceae	Tree	0	0	0	0	0	0	1
90	<i>Gynocardia odorata</i>	Achariaceae	Tree	0	0	0	1	1	1	0
91	<i>Haldina cordifolia</i>	Rubiaceae	Tree	0	0	0	1	0	0	0
92	<i>Helicteres isora</i>	Malvaceae	Tree	0	0	1	0	0	0	0
93	<i>Holarrhena pubescens</i>	Apocynaceae	Tree	0	0	1	1	0	1	0
94	<i>Huberantha cerasoides</i>	Annonaceae	Tree	0	0	1	0	0	0	0
95	<i>Hydrangea aspera</i>	Hydrangeaceae	Shrub	0	0	0	0	0	0	1
96	<i>Hymenodictyon orixense</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
97	<i>Ilex kingiana</i>	Aquifoliaceae	Shrub	0	0	0	0	0	0	1
98	<i>Ilex sikkimensis</i>	Aquifoliaceae	Tree	0	1	0	0	0	0	0
99	<i>Ixora arborea</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
100	<i>Ixora brachiata</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
101	<i>Lagerstroemia flos-reginae</i>	Lythraceae	Tree	0	0	0	0	1	1	0
102	<i>Lagerstroemia parviflora</i>	Lythraceae	Tree	0	0	1	1	1	1	0
103	<i>Lannea coromandelica</i>	Anacardiaceae	Tree	0	0	1	1	1	0	0
104	<i>Leea asiatica</i>	Vitaceae	Shrub	0	0	0	1	0	0	0
105	<i>Lepisanthes deficiens</i>	Sapindaceae	Tree	0	0	0	1	0	0	0
106	<i>Lindera assamica</i>	Lauraceae	Tree	0	1	0	0	0	0	0
107	<i>Lithocarpus fenestratus</i>	Fagaceae	Tree	0	1	0	0	0	0	0
108	<i>Lithocarpus pachyphyllus</i>	Fagaceae	Tree	0	0	0	0	0	0	1
109	<i>Litsea elongata</i>	Lauraceae	Tree	0	1	0	0	0	0	0
110	<i>Litsea glutinosa</i>	Lauraceae	Tree	0	0	0	0	1	1	0
111	<i>Litsea javanica</i>	Lauraceae	Tree	0	1	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
112	<i>Litsea lancifolia</i>	Lauraceae	Tree	0	0	0	1	0	0	0
113	<i>Litsea salicifolia</i>	Lauraceae	Tree	0	0	0	1	0	1	0
114	<i>Litsea sericea</i>	Lauraceae	Tree	0	0	0	0	0	0	1
115	<i>Litsea monopetala</i>	Lauraceae	Tree	0	0	0	0	0	1	0
116	<i>Macaranga denticulata</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
117	<i>Machilus edulis</i>	Lauraceae	Tree	0	1	0	0	0	0	0
118	<i>Machilus glaucescens</i>	Lauraceae	Tree	0	0	0	1	1	1	0
119	<i>Madhuca longifolia</i> var. <i>latifolia</i>	Sapotaceae	Tree	0	0	1	0	0	1	0
120	<i>Magnolia campbellii</i>	Magnoliaceae	Tree	0	1	0	0	0	0	1
121	<i>Magnolia champaca</i>	Magnoliaceae	Tree	0	0	0	1	1	1	0
122	<i>Magnolia doitsopa</i>	Magnoliaceae	Tree	0	1	0	0	0	0	0
123	<i>Magnolia globosa</i>	Magnoliaceae	Tree	0	0	0	0	0	0	1
124	<i>Magnolia hodgsonii</i>	Magnoliaceae	Tree	0	0	0	0	1	1	0
125	<i>Magnolia pterocarpa</i>	Magnoliaceae	Tree	0	1	0	1	0	0	0
126	<i>Mahonia nepalensis</i>	Berberidaceae	Shrub	0	1	0	0	0	0	0
127	<i>Mallotus philippensis</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
128	<i>Mallotus repandus</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
129	<i>Mangifera indica</i>	Anacardiaceae	Tree	0	0	0	0	1	0	0
130	<i>Meliosma simplicifolia</i>	Sabiaceae	Tree	0	0	0	0	1	0	0
131	<i>Mesua ferrea</i>	Caryophyllaceae	Tree	0	0	0	1	1	1	0
132	<i>Micromelum integerrimum</i>	Rutaceae	Tree	0	0	0	0	0	1	0
133	<i>Mimosa rubicaulis</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
134	<i>Mitragyna parvifolia</i>	Rubiaceae	Tree	0	0	1	1	0	0	0
135	<i>Morus macroura</i>	Moraceae	Tree	0	0	0	0	0	1	0
136	<i>Neolitsea cuipala</i>	Lauraceae	Tree	0	0	0	0	0	0	1
137	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Tree	0	0	1	0	0	0	0
138	<i>Ocotea lancifolia</i>	Lauraceae	Tree	0	0	0	0	1	1	0
139	<i>Oroxylum indicum</i>	Bignoniaceae	Tree	0	0	0	1	1	1	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
140	<i>Phyllanthus emblica</i>	Phyllanthaceae	Tree	0	0	1	1	0	0	0
141	<i>Pieris formosa</i>	Ericaceae	Tree	0	1	0	0	0	0	1
142	<i>Pinus patula</i>	Pinaceae	Tree	0	1	0	0	0	0	0
143	<i>Polyalthia simiarum</i>	Annonaceae	Tree	0	0	0	1	1	1	0
144	<i>Polyalthia cerasoides</i>	Annonaceae	Tree	0	0	0	1	0	0	0
145	<i>Premna mollissima</i>	Lamiaceae	Shrub	0	0	0	1	1	1	0
146	<i>Premna bengalensis</i>	Lamiaceae	Shrub	0	0	0	0	0	1	0
147	<i>Prunus nepalensis</i>	Rosaceae	Tree	0	0	0	0	0	0	1
148	<i>Prunus rufa</i>	Rosaceae	Tree	0	0	0	0	0	0	1
149	<i>Psydrax dicoccos</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
150	<i>Pterocarpus marsupium</i>	Fabaceae	Tree	0	0	1	0	0	0	0
151	<i>Pterospermum acerifolium</i>	Malvaceae	Tree	0	0	0	1	0	0	0
152	<i>Pterygota alata</i>	Malvaceae	Tree	0	0	0	1	1	0	0
153	<i>Quercus lamellosa</i>	Fagaceae	Tree	0	1	0	0	0	0	0
154	<i>Quercus lineata</i>	Fagaceae	Tree	0	1	0	0	0	0	0
155	<i>Quercus pachyphylla</i>	Fagaceae	Tree	0	1	0	0	0	0	0
156	<i>Quercus thomsoniana</i>	Fagaceae	Tree	0	1	0	0	0	0	0
157	<i>Rhododendron arboreum</i>	Ericaceae	Tree	0	1	0	0	0	0	1
158	<i>Rhododendron barbatum</i>	Ericaceae	Tree	0	1	0	0	0	0	0
159	<i>Rhododendron falconeri</i>	Ericaceae	Tree	0	1	0	0	0	0	1
160	<i>Rhododendron griffithianum</i>	Ericaceae	Tree	0	0	0	0	0	0	1
161	<i>Rhododendron hodgsonii</i>	Ericaceae	Tree	0	0	0	0	0	0	1
162	<i>Saurauia roxburghii</i>	Actinidiaceae	Tree	0	0	0	0	0	1	0
163	<i>Schefflera rhododendrifolia</i>	Araliaceae	Tree	0	1	0	0	0	0	0
164	<i>Schima wallichii</i>	Theaceae	Tree	0	0	0	1	0	1	0
165	<i>Schleichera oleosa</i>	Sapindaceae	Tree	0	0	1	0	0	0	0
166	<i>Semecarpus anacardium</i>	Anacardiaceae	Tree	0	0	1	0	0	1	0
167	<i>Senegalia chundra</i>	Fabaceae	Tree	0	0	1	0	0	0	0
168	<i>Shorea robusta</i>	Dipterocarpaceae	Tree	0	0	1	1	1	1	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
169	<i>Sloanea sterculiacea</i>	Elaeocarpaceae	Tree	0	0	0	0	1	1	0
170	<i>Sonneratia alba</i>	Lythraceae	Tree	1	0	0	0	0	0	0
171	<i>Sonneratia apetala</i>	Lythraceae	Tree	1	0	0	0	0	0	0
172	<i>Sonneratia caseolaris</i>	Lythraceae	Tree	1	0	0	0	0	0	0
173	<i>Soymida febrifuga</i>	Meliaceae	Tree	0	0	1	0	0	0	0
174	<i>Spatholobus parviflorus</i>	Fabaceae	Liana	0	0	1	0	0	0	0
175	<i>Spondias pinnata</i>	Anacardiaceae	Tree	0	0	0	0	0	1	0
176	<i>Sterculia villosa</i>	Malvaceae	Tree	0	0	1	1	1	1	0
177	<i>Stereospermum colais</i>	Bignoniaceae	Tree	0	0	0	1	1	1	0
178	<i>Stereospermum suaveolens</i>	Bignoniaceae	Tree	0	0	1	0	0	0	0
179	<i>Streblus asper</i>	Moraceae	Tree	0	0	1	0	1	0	0
180	<i>Suregada multiflora</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
181	<i>Symplocos dryophila</i>	Symplocaceae	Tree	0	0	0	0	0	0	1
182	<i>Symplocos lucida</i>	Symplocaceae	Tree	0	0	0	0	0	1	1
183	<i>Symplocos racemosa</i>	Symplocaceae	Tree	0	0	1	0	0	0	0
184	<i>Symplocos theifolia</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
185	<i>Symplocos cochinchinensis</i> v <i>ar. laurina</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
186	<i>Syzygium cumini</i>	Myrtaceae	Tree	0	0	1	0	1	1	0
187	<i>Syzygium formosum</i>	Myrtaceae	Tree	0	0	0	1	1	1	0
188	<i>Syzygium jambos</i>	Myrtaceae	Tree	0	0	1	0	0	0	0
189	<i>Syzygium nervosum</i>	Myrtaceae	Tree	0	0	1	0	0	0	0
190	<i>Syzygium praecox</i>	Myrtaceae	Tree	0	0	0	1	0	0	0
191	<i>Syzygium tetragonum</i>	Myrtaceae	Tree	0	0	0	0	1	0	0
192	<i>Taxus wallichiana</i>	Taxaceae	Tree	0	1	0	0	0	0	1
193	<i>Tectona grandis</i>	Lamiaceae	Tree	0	0	0	0	1	0	0
194	<i>Terminalia alata</i>	Combretaceae	Tree	0	0	1	0	0	0	0
195	<i>Terminalia anogeissiana</i>	Combretaceae	Tree	0	0	1	0	0	0	0
196	<i>Terminalia bellirica</i>	Combretaceae	Tree	0	0	0	0	0	1	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanch kot	North Rajabhatkawa	North Sevoke	Sursuti	Tonglu
197	<i>Terminalia chebula</i>	Combretaceae	Tree	0	0	1	0	1	0	0
198	<i>Terminalia crenulata</i>	Combretaceae	Tree	0	0	0	0	1	0	0
199	<i>Terminalia myriocarpa</i>	Combretaceae	Tree	0	0	0	0	1	0	0
200	<i>Terminalia tomentosa</i>	Combretaceae	Tree	0	0	0	0	1	0	0
201	<i>Tetradium fraxinifolium</i>	Rutaceae	Tree	0	1	0	0	0	0	0
202	<i>Tetrameles nudiflora</i>	Tetramelaceae	Tree	0	0	0	0	1	0	0
203	<i>Toona ciliata</i>	Meliaceae	Tree	0	0	0	1	0	1	0
204	<i>Trema orientale</i>	Cannabaceae	Tree	0	0	1	0	0	0	0
205	<i>Trewia nudiflora</i>	Euphorbiaceae	Tree	0	0	0	1	1	1	0
206	<i>Tsuga dumosa</i>	Pinaceae	Tree	0	0	0	0	0	0	1
207	<i>Turpinia nepalensis</i>	Staphyleaceae	Tree	0	0	0	0	0	1	0
208	<i>Uvaria hamiltonii</i>	Annonaceae	Tree	0	0	0	1	0	0	0
209	<i>Vatica lanceifolia</i>	Dipterocarpaceae	Tree	0	0	0	1	0	0	0
210	<i>Ventilago madraspatana</i>	Rhamnaceae	Liana	0	0	1	0	0	0	0
211	<i>Viburnum erubescens</i>	Viburnaceae	Tree	0	0	0	0	0	0	1
212	<i>Wrightia arborea</i>	Apocynaceae	Tree	0	0	0	1	0	1	0
213	<i>Xylia xylocarpa</i>	Fabaceae	Tree	0	0	0	1	0	0	0
214	<i>Xylocarpus granatum</i>	Meliaceae	Tree	1	0	0	0	0	0	0

Annexure 16. List of plant species with ≤ 30 cm plant size enumerated in the sampling of 5m x 5m size placed within 20m x 20m quadrats seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
1	<i>Acer campbellii</i>	Sapindaceae	Tree	0	1	0	0	0	0	0
2	<i>Actinodaphne obovata</i>	Lauraceae	Tree	0	0	0	0	1	0	0
3	<i>Actinodaphne</i> sp.	Lauraceae	Tree	0	0	0	0	1	0	0
4	<i>Aegialitis rotundifolia</i>	Plumbaginaceae	Shrub	1	0	0	0	0	0	0
5	<i>Aegiceras corniculatum</i>	Primulaceae	Shrub	1	0	0	0	0	0	0
6	<i>Aegle marmelos</i>	Rutaceae	Tree	0	0	1	0	0	0	0
7	<i>Aglaia perviridis</i>	Meliaceae	Tree	0	0	0	1	0	0	0
8	<i>Aglaia spectabilis</i>	Meliaceae	Tree	0	0	0	1	0	0	0
9	<i>Alangium chinense</i>	Cornaceae	Shrub	0	0	0	0	1	0	0
10	<i>Alangium salviifolium</i>	Cornaceae	Tree	0	0	1	0	0	0	0
11	<i>Alstonia scholaris</i>	Apocynaceae	Tree	0	0	0	1	1	1	0
12	<i>Aphanamixis polystachya</i>	Meliaceae	Tree	0	0	0	1	1	1	0
13	<i>Aporosa lindleyana</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
14	<i>Artocarpus chama</i>	Moraceae	Tree	0	0	0	1	0	0	0
15	<i>Avicennia alba</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
16	<i>Avicennia marina</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
17	<i>Avicennia officinalis</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
18	<i>Baccaurea ramiflora</i>	Phyllanthaceae	Tree	0	0	0	0	1	1	0
19	<i>Bauhinia vahlii</i>	Fabaceae	Liana	0	0	1	0	0	0	0
20	<i>Berberis aristata</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
21	<i>Berberis hookeri</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
22	<i>Berberis insignis</i>	Berberidaceae	Shrub	0	1	0	0	0	0	0
23	<i>Berberis thomsoniana</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
24	<i>Berberis wallichiana</i>	Berberidaceae	Shrub	0	1	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchko t	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
25	<i>Bischofia javanica</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
26	<i>Bridelia glauca</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
27	<i>Bridelia retusa</i>	Phyllanthaceae	Tree	0	0	1	0	1	0	0
28	<i>Bridelia scandens</i>	Phyllanthaceae	Shrub	0	0	1	1	0	1	0
29	<i>Buddleja colvilei</i>	Scrophulariaceae	Shrub	0	0	0	0	0	0	1
30	<i>Butea monosperma</i>	Fabaceae	Tree	0	0	1	0	0	0	0
31	<i>Butea superba</i>	Fabaceae	Liana	0	0	1	0	0	0	0
32	<i>Caesalpinia crista</i>	Fabaceae	Liana	1	0	0	0	0	0	0
33	<i>Canthium coromandelicum</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
34	<i>Carissa spinarum</i>	Apocynaceae	Shrub	0	0	1	0	0	0	0
35	<i>Casearia graveolens</i>	Salicaceae	Shrub	0	0	0	0	1	0	0
36	<i>Casearia vareca</i>	Salicaceae	Shrub	0	0	0	1	1	1	0
37	<i>Cassia fistula</i>	Fabaceae	Tree	0	0	1	0	0	0	0
38	<i>Catunaregam brandisii</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
39	<i>Celastrus paniculatus</i>	Celastraceae	Liana	0	0	0	0	1	0	0
40	<i>Ceriops decandra</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
41	<i>Ceriops tagal</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
42	<i>Chonemorpha fragrans</i>	Apocynaceae	Liana	0	0	0	0	1	0	0
43	<i>Chukrasia tabularis</i>	Meliaceae	Tree	0	0	1	1	0	0	0
44	<i>Cinnamomum bejolghota</i>	Lauraceae	Tree	0	1	0	0	0	1	0
45	<i>Cissus pallida</i>	Vitaceae	Climber	0	0	0	1	0	0	0
46	<i>Cissus woodrowii</i>	Vitaceae	Climber	0	0	1	0	0	0	0
47	<i>Clausena lansium</i>	Rutaceae	Shrub	0	0	1	0	0	0	0
48	<i>Cleistanthus collinus</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
49	<i>Clerodendrum viscosum</i>	Verbenaceae	Shrub	0	0	1	1	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
50	<i>Cochlospermum religiosum</i>	Bixaceae	Tree	0	0	1	0	0	0	0
51	<i>Coffea benghalensis</i>	Rubiaceae	Shrub	0	0	0	1	1	0	0
52	<i>Coix lacryma-jobi</i>	Poaceae	Herb	0	0	0	0	0	1	0
53	<i>Combretum roxburghii</i>	Combretaceae	Liana	0	0	1	0	1	1	0
54	<i>Cotoneaster microphyllus</i>	Rosaceae	Shrub	0	0	0	0	0	0	1
55	<i>Croton caudatus</i>	Euphorbiaceae	Shrub	0	0	0	1	0	1	0
56	<i>Dalbergia pinnata</i>	Fabaceae	Tree	0	0	0	1	1	0	0
57	<i>Daphne bholua</i>	Thymelaeaceae	Shrub	0	1	0	0	0	0	0
58	<i>Daphne papyracea</i>	Thymelaeaceae	Shrub	0	1	0	0	0	0	1
59	<i>Dillenia pentagyna</i>	Dilleniaceae	Tree	0	0	1	1	0	1	0
60	<i>Diospyros melanoxylon</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
61	<i>Diospyros montana</i>	Ebenaceae	Tree	0	0	1	1	1	0	0
62	<i>Diospyros ovalifolia</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
63	<i>Dysoxylum binectariferum</i>	Meliaceae	Tree	0	0	0	0	1	1	0
64	<i>Dysoxylum reticulatum</i>	Meliaceae	Tree	0	0	0	1	0	1	0
65	<i>Elaeocarpus sikkimensis</i>	Elaeocarpaceae	Tree	0	0	0	1	0	0	0
66	<i>Elsholtzia fruticosa</i>	Lamiaceae	Shrub	0	0	0	0	0	0	1
67	<i>Embelia tsjeriam-cottam</i>	Myrsinaceae	Shrub	0	0	0	0	1	0	0
68	<i>Erycibe paniculata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
69	<i>Euonymus viburnoides</i>	Celastraceae	Tree	0	0	0	0	0	0	1
70	<i>Eurya acuminata</i>	Pentaphragmaceae	Shrub	0	1	0	0	0	0	0
71	<i>Eurya japonica</i>	Pentaphragmaceae	Tree	0	1	0	0	0	0	0
72	<i>Exbucklandia populnea</i>	Hamamelidaceae	Tree	0	1	0	0	0	0	0
73	<i>Excoecaria agallocha</i>	Euphorbiaceae	Tree	1	0	0	0	0	0	0
74	<i>Ficus hispida</i>	Moraceae	Tree	0	0	1	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
75	<i>Flacourtia jangomas</i>	Salicaceae	Tree	0	0	1	0	0	0	0
76	<i>Gardenia latifolia</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
77	<i>Gaultheria fragrantissima</i>	Ericaceae	Shrub	0	1	0	0	0	0	0
78	<i>Glycosmis pentaphylla</i>	Rutaceae	Shrub	0	0	1	0	0	0	0
79	<i>Gnetum montanum</i>	Gnetaceae	Liana	0	0	0	0	1	1	0
80	<i>Grewia rhamnifolia</i>	Malvaceae	Shrub	0	0	1	0	0	0	0
81	<i>Gynocardia odorata</i>	Achariaceae	Tree	0	0	0	1	1	1	0
82	<i>Helicteres isora</i>	Malvaceae	Tree	0	0	1	0	0	0	0
83	<i>Helwingia himalaica</i>	Helwingiaceae	Shrub	0	1	0	0	0	0	0
84	<i>Heritiera fomes</i>	Malvaceae	Tree	1	0	0	0	0	0	0
85	<i>Holarrhena pubescens</i>	Apocynaceae	Tree	0	0	1	0	1	0	0
86	<i>Holboellia latifolia</i>	Lardizabalaceae	Liana	0	0	0	0	0	0	1
87	<i>Holmskiodia sanguinea</i>	Lamiaceae	Liana	0	0	0	0	0	1	0
88	<i>Hymenodictyon orixense</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
89	<i>Ilex dipyrena</i>	Aquifoliaceae	Shrub	0	1	0	0	0	0	0
90	<i>Ixora anthroantha</i>	Rubiaceae	Shrub	0	0	0	1	0	0	0
91	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Shrub	0	0	1	0	0	0	0
92	<i>Lagerstroemia parviflora</i>	Lythraceae	Tree	0	0	1	0	1	0	0
93	<i>Lannea coromandelica</i>	Anacardiaceae	Tree	0	0	1	0	0	0	0
94	<i>Laportea crenulata</i>	Urticaceae	Shrub	0	0	0	1	0	0	0
95	<i>Lasianthus sikkimensis</i>	Rubiaceae	Shrub	0	0	0	1	0	0	0
96	<i>Leea asiatica</i>	Vitaceae	Shrub	0	0	0	1	0	0	0
97	<i>Leea indica</i>	Vitaceae	Shrub	0	0	0	0	1	0	0
98	<i>Lepisanthes deficiens</i>	Sapindaceae	Tree	0	0	0	1	0	0	0
99	<i>Lithocarpus fenestratus</i>	Fagaceae	Tree	0	1	0	0	0	0	0
100	<i>Litsea albescens</i>	Lauraceae	Tree	0	1	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
101	<i>Litsea glutinosa</i>	Lauraceae	Tree	0	0	0	0	1	1	0
102	<i>Litsea salicifolia</i>	Lauraceae	Tree	0	0	0	0	0	1	0
103	<i>Macaranga peltata</i>	Euphorbiaceae	Tree	0	0	0	0	0	1	0
104	<i>Machilus edulis</i>	Lauraceae	Tree	0	1	0	0	0	0	0
105	<i>Machilus glaucescens</i>	Lauraceae	Tree	0	0	0	0	1	1	0
106	<i>Madhuca longifolia</i> var. <i>latifolia</i>	Sapotaceae	Tree	0	0	1	0	0	0	0
107	<i>Magnolia champaca</i>	Magnoliaceae	Tree	0	0	0	0	1	0	0
108	<i>Magnolia hodgsonii</i>	Magnoliaceae	Tree	0	0	0	0	1	0	0
109	<i>Mallotus philippensis</i>	Euphorbiaceae	Tree	0	0	0	0	1	0	0
110	<i>Mallotus repandus</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
111	<i>Mesua ferrea</i>	Caryophyllaceae	Tree	0	0	0	1	0	0	0
112	<i>Miliusa velutina</i>	Annonaceae	Tree	0	0	1	0	0	0	0
113	<i>Mimosa rubicaulis</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
114	<i>Mitragyna parvifolia</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
115	<i>Morinda angustifolia</i>	Rubiaceae	Shrub	0	0	0	1	1	0	0
116	<i>Neillia thyrsiflora</i>	Rosaceae	Shrub	0	1	0	0	0	0	0
117	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Tree	0	0	1	0	0	0	0
118	<i>Ochlandra sp.</i>	Poaceae	Shrub	0	0	1	0	0	0	0
119	<i>Olax nano</i>	Olacaceae	Shrub	0	0	1	0	0	0	0
120	<i>Olax scandens</i>	Olacaceae	Shrub	0	0	1	0	0	0	0
121	<i>Phlogacanthus thyrsiflorus</i>	Acanthaceae	Shrub	0	0	0	0	1	0	0
122	<i>Ocotea lancifolia</i>	Lauraceae	Tree	0	0	0	0	0	1	0
123	<i>Phoenix paludosa</i>	Arecaceae	Shrub	1	0	0	0	0	0	0
124	<i>Phyllanthus emblica</i>	Phyllanthaceae	Tree	0	0	1	0	1	0	0
125	<i>Pitardella sikkimensis</i>	Rubiaceae	Shrub	0	0	0	1	0	0	0
126	<i>Polyalthia simiarum</i>	Annonaceae	Tree	0	0	0	1	0	1	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
127	<i>Prunus rufa</i>	Rosaceae	Tree	0	0	0	0	0	0	1
128	<i>Psyrdrax dicoccos</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
129	<i>Pterospermum acerifolium</i>	Malvaceae	Tree	0	0	0	0	1	0	0
130	<i>Pterygota alata</i>	Malvaceae	Tree	0	0	0	0	1	0	0
131	<i>Pueraria sikkimensis</i>	Fabaceae	Climber	0	0	0	0	1	0	0
132	<i>Quercus lamellosa</i>	Fagaceae	Tree	0	1	0	0	0	0	0
133	<i>Quercus pachyphylla</i>	Fagaceae	Tree	0	1	0	0	0	0	0
134	<i>Rhododendron arboreum</i>	Ericaceae	Tree	0	1	0	0	0	0	1
135	<i>Rhododendron barbatum</i>	Ericaceae	Tree	0	1	0	0	0	0	0
136	<i>Rhododendron falconeri</i>	Ericaceae	Tree	0	1	0	0	0	0	0
137	<i>Rhododendron grande</i>	Ericaceae	Tree	0	1	0	0	0	0	1
138	<i>Rhododendron griffithianum</i>	Ericaceae	Tree	0	1	0	0	0	0	1
139	<i>Rosa sericea</i>	Rosaceae	Shrub	0	0	0	0	0	0	1
140	<i>Salacia chinensis</i>	Celastraceae	Shrub	1	0	0	0	0	0	0
141	<i>Schefflera rhododendrifolia</i>	Araliaceae	Tree	0	1	0	0	0	0	1
142	<i>Schima wallichii</i>	Theaceae	Tree	0	0	0	1	0	1	0
143	<i>Semecarpus anacardium</i>	Anacardiaceae	Tree	0	0	1	0	0	1	0
144	<i>Shorea robusta</i>	Dipterocarpaceae	Tree	0	0	1	0	1	0	0
145	<i>Skimmia laureola</i>	Rutaceae	Shrub	0	0	0	0	0	0	1
146	<i>Sloanea sterculiacea</i>	Elaeocarpaceae	Tree	0	0	0	0	0	1	0
147	<i>Smilax ovalifolia</i>	Smilacaceae	Climber	0	0	0	0	1	0	0
148	<i>Sonneratia apetala</i>	Lythraceae	Tree	1	0	0	0	0	0	0
149	<i>Sorbus foliolosa</i>	Rosaceae	Tree	0	0	0	0	0	0	1
150	<i>Soymida febrifuga</i>	Meliaceae	Tree	0	0	1	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
151	<i>Spatholobus parviflorus</i>	Fabaceae	Liana	0	0	1	0	0	0	0
152	<i>Sterculia villosa</i>	Malvaceae	Tree	0	0	0	1	0	0	0
153	<i>Stereospermum colais</i>	Bignoniaceae	Tree	0	0	0	1	1	0	0
154	<i>Streblus asper</i>	Moraceae	Tree	0	0	1	0	0	0	0
155	<i>Suregada multiflora</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
156	<i>Symplocos dryophila</i>	Symplocaceae	Tree	0	1	0	0	0	0	1
157	<i>Symplocos glomerata</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
158	<i>Symplocos lucida</i>	Symplocaceae	Tree	0	1	0	0	0	0	1
159	<i>Symplocos ramosissima</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
160	<i>Syzygium formosum</i>	Myrtaceae	Tree	0	0	0	1	1	0	0
161	<i>Syzygium nervosum</i>	Myrtaceae	Tree	0	0	1	0	0	0	0
162	<i>Tabernaemontana alternifolia</i>	Apocynaceae	Shrub	0	0	0	1	0	0	0
163	<i>Taxus wallichiana</i>	Taxaceae	Tree	0	1	0	0	0	0	1
164	<i>Terminalia alata</i>	Combretaceae	Tree	0	0	1	0	0	0	0
165	<i>Terminalia anogeissiana</i>	Combretaceae	Tree	0	0	1	0	0	0	0
166	<i>Terminalia chebula</i>	Combretaceae	Tree	0	0	1	0	1	1	0
167	<i>Terminalia elliptica</i>	Combretaceae	Tree	0	0	1	0	0	0	0
168	<i>Terminalia myriocarpa</i>	Combretaceae	Tree	0	0	0	0	1	0	0
169	<i>Tetradium fraxinifolium</i>	Rutaceae	Tree	0	1	0	0	0	0	0
170	<i>Tetrastigma campylocarpum</i>	Vitaceae	Climber	0	0	0	1	1	0	0
171	<i>Tetrastigma serrulatum</i>	Vitaceae	Climber	0	1	0	0	0	0	0
172	<i>Thunbergia alata</i>	Acanthaceae	Climber	0	0	1	0	0	0	0
173	<i>Toona ciliata</i>	Meliaceae	Tree	0	0	0	1	0	0	0
174	<i>Trewia nudiflora</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
175	<i>Turpinia nepalensis</i>	Staphyleaceae	Tree	0	0	0	0	0	1	0
176	<i>Uncaria sessilifructus</i>	Rubiaceae	Liana	0	0	0	0	0	1	0
177	<i>Vaccinium retusum</i>	Ericaceae	Shrub	0	0	0	0	0	0	1
178	<i>Vangueria spinosa</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
179	<i>Ventilago madraspatana</i>	Rhamnaceae	Liana	0	0	1	0	0	0	0
180	<i>Viburnum erubescens</i>	Viburnaceae	Tree	0	1	0	0	0	0	1
181	<i>Viburnum mullaha</i>	Viburnaceae	Shrub	0	0	0	0	0	0	1
182	<i>Wrightia arborea</i>	Apocynaceae	Tree	0	0	0	0	0	1	0
183	<i>Xylia xylocarpa</i>	Fabaceae	Tree	0	0	0	1	0	0	0
184	<i>Xylocarpus granatum</i>	Meliaceae	Tree	1	0	0	0	0	0	0
185	<i>Yushania maling</i>	Poaceae	Shrub	0	1	0	0	0	0	1
186	<i>Zanthoxylum armatum</i>	Rutaceae	Tree	0	1	0	0	0	0	0
187	<i>Ziziphus nummularia</i>	Rhmanaceae	Shrub	0	0	0	0	0	1	0
188	<i>Ziziphus oenopolia</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0
189	<i>Ziziphus rugosa</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0
	Total			14	34	62	38	40	29	24

Annexure 17. List of herbs, shrubs and plant seedlings enumerated in the sampling of 1m x 1m size placed in four corners of 20m x 20m quadrats seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
1	<i>Abelmoschus moschatus</i>	Malvaceae	Herb	0	0	0	0	1	0	0
2	<i>Abies densa</i>	Pinaceae	Tree	0	1	0	0	0	0	0
3	<i>Acacia pennata</i>	Fabaceae	Liana	0	0	0	0	1	0	0
4	<i>Acanthus ilicifolius</i>	Acanthaceae	Herb	1	0	0	0	0	0	0
5	<i>Acer campbellii</i>	Sapindaceae	Tree	0	1	0	0	0	0	1
6	<i>Achyranthes aspera</i>	Amaranthaceae	Herb	0	0	0	1	1	1	0
7	<i>Achyranthes bidentata</i>	Amaranthaceae	Herb	0	0	0	0	0	1	0
8	<i>Acmella paniculata</i>	Asteraceae	Herb	0	0	0	0	1	0	0
9	<i>Acmella uliginosa</i>	Asteraceae	Herb	0	0	0	0	1	0	0
10	<i>Aconitum ferox</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
11	<i>Aconitum palmatum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
12	<i>Actinodaphne obovata</i>	Lauraceae	Tree	0	0	0	1	1	1	0
13	<i>Actinodaphne sp.</i>	Lauraceae	Tree	0	0	0	0	1	0	0
14	<i>Adiantum edgeworthii</i>	Pteridaceae	Herb	0	1	0	0	0	0	0
15	<i>Adina cordifolia</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
16	<i>Aegialitis rotundifolia</i>	Plumbaginaceae	Shrub	1	0	0	0	0	0	0
17	<i>Aegiceras corniculatum</i>	Primulaceae	Shrub	1	0	0	0	0	0	0
18	<i>Aegle marmelos</i>	Rutaceae	Tree	0	0	1	0	0	0	0
19	<i>Aeschynanthus parviflorus</i>	Gesneriaceae	Herb	0	0	0	0	0	1	0
20	<i>Ageratum conyzoides</i>	Asteraceae	Herb	0	0	0	0	0	1	0
21	<i>Ageratum houstonianum</i>	Asteraceae	Herb	0	0	0	0	1	0	0
22	<i>Ainsliaea latifolia</i>	Asteraceae	Herb	0	1	0	0	0	0	1
23	<i>Alangium chinense</i>	Cornaceae	Shrub	0	0	0	0	1	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
24	<i>Allium wallichii</i>	Amaryllidaceae	Herb	0	0	0	0	0	0	1
25	<i>Allophylus cobbe</i>	Sapindaceae	Shrub	0	0	0	1	0	0	0
26	<i>Allophylus simplicifolius</i>	Sapindaceae	Shrub	0	0	0	0	1	1	0
27	<i>Alocasia fallax</i>	Araceae	Herb	0	0	0	1	1	0	0
28	<i>Alstonia scholaris</i>	Apocynaceae	Tree	0	0	0	1	1	0	0
29	<i>Amischotolype hookerii</i>	Commelinaceae	Herb	0	0	0	0	1	0	0
30	<i>Ampelocissus latifolia</i>	Vitaceae	Climber	0	0	1	0	0	0	0
31	<i>Anaphalis contorta</i>	Asteraceae	Herb	0	1	0	0	0	0	1
32	<i>Anaphalis margaritacea</i>	Asteraceae	Herb	0	1	0	0	0	0	1
33	<i>Anaphalis royleana</i>	Asteraceae	Herb	0	1	0	0	0	0	0
34	<i>Anaphalis triplinervis</i>	Asteraceae	Herb	0	0	0	0	0	0	1
35	<i>Andrographis paniculata</i>	Acanthaceae	Herb	0	0	1	1	0	0	0
36	<i>Angiopteris evecta</i>	Marattiaceae	Herb	0	0	0	0	0	1	0
37	<i>Anisomeles indica</i>	Lamiaceae	Herb	0	0	0	1	0	0	0
38	<i>Anthogonium gracile</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
39	<i>Aphanamixis polystachya</i>	Meliaceae	Tree	0	0	0	0	1	1	0
40	<i>Apluda mutica</i>	Poaceae	Herb	0	0	1	0	0	0	0
41	<i>Ardisia solanacea</i>	Primulaceae	Shrub	0	0	0	1	1	1	0
42	<i>Argentina microphylla</i>	Rosaceae	Herb	0	0	0	0	0	0	1
43	<i>Argyreia roxburghii</i>	Convolvulaceae	Climber	0	0	0	1	1	0	0
44	<i>Arisaema cuspidatum</i>	Araceae	Herb	0	0	0	0	0	1	0
45	<i>Aristolochia indica</i>	Aristolochiaceae	Climber	0	0	1	1	1	0	0
46	<i>Aristolochia tagala</i>	Aristolochiaceae	Climber	0	0	0	0	1	0	0
47	<i>Artocarpus chaplasha</i>	Moraceae	Tree	0	0	0	0	1	0	0
48	<i>Asparagus racemosus</i>	Asparagaceae	Climber	0	0	1	1	0	0	0
49	<i>Asplenium erectum</i>	Aspleniaceae	Herb	0	0	0	1	1	1	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
50	<i>Athyrium biserrulatum</i>	Aspleniaceae	Herb	0	0	0	0	1	1	0
51	<i>Avicennia alba</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
52	<i>Avicennia marina</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
53	<i>Avicennia officinalis</i>	Acanthaceae	Tree	1	0	0	0	0	0	0
54	<i>Ayenia grandifolia</i>	Malvaceae	Climber	0	0	0	1	0	0	0
55	<i>Ayenia herbacea</i>	Malvaceae	Herb	0	0	1	0	0	0	0
56	<i>Azadirachta indica</i>	Meliaceae	Tree	0	0	1	0	0	0	0
57	<i>Baliospermum montanum</i>	Euphorbiaceae	Shrub	0	0	0	1	0	0	0
58	<i>Barleria cristata</i>	Acanthaceae	Herb	0	0	0	1	0	0	0
59	<i>Barleria strigosa</i>	Acanthaceae	Herb	0	0	0	0	1	1	0
60	<i>Bauhinia vahlii</i>	Fabaceae	Liana	0	0	0	1	0	1	0
61	<i>Bauhinia variegata</i>	Fabaceae	Tree	0	0	0	0	1	0	0
62	<i>Begonia aconitifolia</i>	Begoniaceae	Herb	0	1	0	0	0	0	0
63	<i>Berberis thomsoniana</i>	Berberidaceae	Shrub	0	0	0	0	0	0	1
64	<i>Berchemia floribunda</i>	Rhamnaceae	Shrub	0	0	0	0	1	0	0
65	<i>Blumea lacera</i>	Asteraceae	Herb	0	0	1	0	0	0	0
66	<i>Boehmeria macrophylla</i> <i>var. macrophylla</i>	Urticaceae	Herb	0	0	0	0	1	0	0
67	<i>Boehmeria platyphylla</i>	Urticaceae	Herb	0	0	0	0	1	0	0
68	<i>Boenninghausenia albiflora</i>	Rutaceae	Herb	0	1	0	0	0	0	0
69	<i>Bothriochloa pertusa</i>	Poaceae	Herb	0	0	1	0	1	0	0
70	<i>Brachiaria eruciformis</i>	Poaceae	Herb	0	0	0	1	0	0	0
71	<i>Breynia vitis-idaea</i>	Phyllanthaceae	Shrub	0	0	1	0	0	0	0
72	<i>Bridelia retusa</i>	Phyllanthaceae	Tree	0	0	1	0	0	0	0
73	<i>Bridelia scandens</i>	Phyllanthaceae	Shrub	0	0	0	0	0	1	0
74	<i>Bruguiera cylindrica</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
75	<i>Butea monosperma</i>	Fabaceae	Tree	0	0	1	0	0	0	0
76	<i>Butea superba</i>	Fabaceae	Liana	0	0	1	0	0	0	0
77	<i>Caesalpinia crista</i>	Fabaceae	Liana	0	0	0	1	0	0	0
78	<i>Cajanus scarabaeoides</i>	Fabaceae	Climber	0	0	1	0	0	0	0
79	<i>Calceolaria mexicana</i>	Calceolariaceae	Herb	0	1	0	0	0	0	0
80	<i>Callicarpa tomentosa</i>	Verbenaceae	Tree	0	0	0	0	1	0	0
81	<i>Canarium strictum</i>	Burseraceae	Tree	0	0	0	0	1	0	0
82	<i>Canthium rheedei</i>	Rubiaceae	Shrub	0	0	0	1	1	0	0
83	<i>Capparis acutifolia</i>	Capparaceae	Shrub	0	0	0	0	1	0	0
84	<i>Capparis acutifolia</i> subsp. <i>Sabiifolia</i>	Capparaceae	Shrub	0	0	0	0	1	0	0
85	<i>Cardiocrinum giganteum</i>	Liliaceae	Herb	0	0	0	0	0	0	1
86	<i>Carex cruciata</i>	Cyperaceae	Herb	0	1	0	0	0	0	1
87	<i>Carex filicina</i>	Cyperaceae	Herb	0	1	0	0	0	0	0
88	<i>Careya arborea</i>	Lecythidaceae	Tree	0	0	1	0	0	1	0
89	<i>Carissa spinarum</i>	Apocynaceae	Shrub	0	0	1	0	0	0	0
90	<i>Casearia graveolens</i>	Salicaceae	Shrub	0	0	0	1	0	0	0
91	<i>Casearia vareca</i>	Salicaceae	Shrub	0	0	0	1	1	0	0
92	<i>Cassia fistula</i>	Fabaceae	Tree	0	0	1	0	0	0	0
93	<i>Catunaregam brandisii</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
94	<i>Catunaregam longispina</i>	Rubiaceae	Shrub	0	0	0	1	0	0	0
95	<i>Cautleya gracilis</i>	Zingiberaceae	Herb	0	1	0	0	0	0	0
96	<i>Cayratia pedata</i>	Vitaceae	Climber	0	0	1	1	1	0	0
97	<i>Cayratia trifolia</i>	Vitaceae	Climber	0	0	0	1	1	1	0
98	<i>Celastrus paniculatus</i>	Celastraceae	Liana	0	0	0	1	1	1	0
99	<i>Ceriops decandra</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0
100	<i>Ceriops tagal</i>	Rhizophoraceae	Tree	1	0	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
101	<i>Chloranthus elatior</i>	Chloranthaceae	Herb	0	0	0	1	0	1	0
102	<i>Chlorophytum tuberosum</i>	Asparagaceae	Herb	0	0	0	0	1	0	0
103	<i>Chonemorpha fragrans</i>	Apocynaceae	Liana	0	0	0	1	1	0	0
104	<i>Chromolaena odorata</i>	Asteraceae	Herb	0	0	1	0	1	0	0
105	<i>Chrysopogon aciculatus</i>	Poaceae	Herb	0	0	1	0	0	0	0
106	<i>Cinnamomum bejolghota</i>	Lauraceae	Tree	0	0	0	1	1	0	0
107	<i>Cirsium falconeri</i>	Asteraceae	Herb	0	0	0	0	0	0	1
108	<i>Cissus adnata</i>	Vitaceae	Climber	0	0	1	0	0	0	0
109	<i>Cissus pallida</i>	Vitaceae	Climber	0	0	0	0	1	0	0
110	<i>Claoxylon longipetiolatum</i>	Euphorbiaceae	Shrub	0	0	0	1	0	0	0
111	<i>Clausena excavata</i>	Meliaceae	Tree	0	0	0	0	1	0	0
112	<i>Clausena lansium</i>	Rutaceae	Shrub	0	0	1	0	0	0	0
113	<i>Clematis buchananiana</i>	Ranunculaceae	Climber	0	1	0	0	0	0	0
114	<i>Clerodendrum phlomidis</i>	Verbenaceae	Shrub	0	0	1	0	0	0	0
115	<i>Clerodendrum viscosum</i>	Verbenaceae	Shrub	0	0	1	1	1	1	0
116	<i>Clinopodium umbrosum</i>	Lamiaceae	Herb	0	0	0	0	1	0	0
117	<i>Coccinia grandis</i>	Cucurbitaceae	Climber	0	0	1	0	0	0	0
118	<i>Coffea benghalensis</i>	Rubiaceae	Herb	0	0	0	1	1	1	0
119	<i>Combretum roxburghii</i>	Combretaceae	Liana	0	0	1	0	0	1	0
120	<i>Commelina benghalensis</i>	Commelinaceae	Herb	0	0	0	0	0	1	0
121	<i>Commelina diffusa</i>	Commelinaceae	Herb	0	0	0	0	0	1	0
122	<i>Commelina longifolia</i>	Commelinaceae	Herb	0	0	0	1	1	1	0
123	<i>Corallocarpus epigaeus</i>	Cucurbitaceae	Climber	0	0	0	1	0	0	0
124	<i>Costus speciosus</i>	Zingiberaceae	Herb	0	0	0	0	0	1	0
125	<i>Crotalaria albida</i>	Fabaceae	Herb	0	0	1	0	0	0	0
126	<i>Crotalaria epunctata</i>	Fabaceae	Herb	0	0	0	0	1	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
127	<i>Crotalaria montana</i>	Fabaceae	Herb	0	0	0	0	1	0	0
128	<i>Croton caudatus</i>	Euphorbiaceae	Shrub	0	0	0	1	1	1	0
129	<i>Croton persimilis</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
130	<i>Croton roxburghii</i>	Euphorbiaceae	Tree	0	0	1	0	0	1	0
131	<i>Cryptolepis sinensis</i>	Apocynaceae	Climber	0	0	0	1	1	0	0
132	<i>Curculigo orchoides</i>	Hypoxidaceae	Herb	0	0	1	0	1	1	0
133	<i>Curculigo trichocarpa</i>	Hypoxidaceae	Herb	0	0	0	0	1	1	0
134	<i>Curcuma zedoaria</i>	Zingiberaceae	Herb	0	0	0	0	1	0	0
135	<i>Cyanotis axillaris</i>	Commelinaceae	Herb	0	0	0	0	0	1	0
136	<i>Cyanotis cristata</i>	Commelinaceae	Herb	0	0	0	0	1	1	0
137	<i>Cyanthillium cinereum</i>	Asteraceae	Herb	0	0	1	0	0	0	0
138	<i>Cyathula prostrata</i>	Amaranthaceae	Herb	0	0	0	0	1	1	0
139	<i>Cyclea bicristata</i>	Menispermaceae	Climber	0	0	0	1	1	1	0
140	<i>Cyclea peltata</i>	Fabaceae	Climber	0	0	0	0	1	1	0
141	<i>Cynodon dactylon</i>	Poaceae	Herb	0	0	0	0	0	1	0
142	<i>Cyperus pangorei</i>	Cyperaceae	Herb	0	0	0	0	1	0	0
143	<i>Dalbergia lanceolaria</i>	Fabaceae	Tree	0	0	1	0	0	0	0
144	<i>Dalbergia pinnata</i>	Fabaceae	Tree	0	0	0	0	0	1	0
145	<i>Dalbergia stipulacea</i>	Fabaceae	Shrub	0	0	0	1	1	1	0
146	<i>Daphne papyracea</i>	Thymelaeaceae	Shrub	0	0	0	0	0	0	1
147	<i>Deeringia amaranthoides</i>	Amaranthaceae	Herb	0	0	0	0	1	0	0
148	<i>Dendrocnide sinuata</i>	Urticaceae	Shrub	0	0	0	0	1	0	0
149	<i>Derris trifoliata</i>	Fabaceae	Climber	1	0	0	0	0	0	0
150	<i>Desmodium gangeticum</i>	Fabaceae	Herb	0	0	1	0	0	1	0
151	<i>Desmodium triflorum</i>	Fabaceae	Herb	0	0	0	1	0	0	0
152	<i>Dichanthium annulatum</i>	Poaceae	Herb	0	0	0	1	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
153	<i>Dichrocephala integrifolia</i>	Asteraceae	Herb	0	0	0	0	0	0	1
154	<i>Dicliptera bupleuroides</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
155	<i>Dictyospermum montanum</i>	Commelinaceae	Herb	0	0	0	1	1	1	0
156	<i>Dictyospermum ovalifolium</i>	Orchidaceae	Herb	0	0	0	1	0	1	0
157	<i>Didymocarpus oblongus</i>	Gesneriaceae	Herb	0	0	0	0	0	0	1
158	<i>Dillenia indica</i>	Dilleniaceae	Tree	0	0	0	0	1	0	0
159	<i>Dillenia pentagyna</i>	Dilleniaceae	Tree	0	0	0	0	1	0	0
160	<i>Dioscorea floribunda</i>	Dioscoreaceae	Climber	0	0	1	0	0	0	0
161	<i>Diospyros ebenum</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
162	<i>Diospyros melanoxylon</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
163	<i>Diospyros ovalifolia</i>	Ebenaceae	Tree	0	0	1	0	0	0	0
164	<i>Diplazium esculentum</i>	Aspleniaceae	Herb	0	0	0	1	1	0	0
165	<i>Dryopteris sikkimensis</i>	Polypodiaceae	Herb	0	0	0	1	1	0	0
166	<i>Dysoxylum reticulatum</i>	Meliaceae	Tree	0	0	0	0	0	1	0
167	<i>Elatostema obtusum</i>	Urticaceae	Herb	0	1	0	0	0	0	0
168	<i>Elatostema sessile</i>	Urticaceae	Herb	0	1	0	0	0	0	0
169	<i>Elatostema surculosum</i>	Urticaceae	Herb	0	0	0	0	0	0	1
170	<i>Elephantopus scaber</i>	Asteraceae	Herb	0	0	0	1	1	0	0
171	<i>Elsholtzia blanda</i>	Lamiaceae	Herb	0	0	0	0	0	0	1
172	<i>Elsholtzia strobilifera</i>	Lamiaceae	Herb	0	0	0	0	0	0	1
173	<i>Embelia tsjeriam-cottam</i>	Myrsinaceae	Shrub	0	0	0	0	1	0	0
174	<i>Epilobium cylindricum</i>	Onagraceae	Herb	0	1	0	0	0	0	0
175	<i>Equisetum ramosissimum</i>	Equisetaceae	Herb	0	0	0	0	1	0	0
176	<i>Eranthemum purpurascens</i>	Acanthaceae	Herb	0	0	1	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
177	<i>Euonymus echinatus</i>	Celastraceae	Herb	0	0	0	0	0	0	1
178	<i>Eurya acuminata</i>	Pentaphylacaceae	Shrub	0	1	0	1	0	1	0
179	<i>Excoecaria agallocha</i>	Euphorbiaceae	Tree	1	0	0	0	0	0	0
180	<i>Ficus hispida</i>	Moraceae	Tree	0	0	1	0	0	0	0
181	<i>Finlaysonia obovata</i>	Apocynaceae	Climber	1	0	0	0	0	0	0
182	<i>Flacourtia indica</i>	Salicaceae	Shrub	0	0	1	0	0	0	0
183	<i>Floscopa scandens</i>	Commelinaceae	Herb	0	0	0	1	1	0	0
184	<i>Fragaria nubicola</i>	Rosaceae	Herb	0	1	0	0	0	0	0
185	<i>Galium aparine</i>	Rubiaceae	Herb	0	1	0	0	0	0	0
186	<i>Galium asperuloides</i>	Rubiaceae	Herb	0	0	0	0	0	0	1
187	<i>Galium elegans</i>	Rubiaceae	Herb	0	0	0	0	0	0	1
188	<i>Gaultheria fragrantissima</i>	Ericaceae	Shrub	0	0	0	0	0	0	1
189	<i>Gaultheria nummularioides</i>	Ericaceae	Herb	0	1	0	0	0	0	1
190	<i>Gentiana capitata</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
191	<i>Gentiana pedicellata</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
192	<i>Geophila repens</i>	Rubiaceae	Herb	0	0	0	1	0	0	0
193	<i>Geranium nepalense</i>	Geraniaceae	Herb	0	1	0	0	0	0	1
194	<i>Girardinia diversifolia</i>	Urticaceae	Herb	0	0	0	1	0	0	0
195	<i>Glycosmis mauritiana</i>	Rutaceae	Shrub	0	0	1	0	0	0	0
196	<i>Glycosmis pentaphylla</i>	Rutaceae	Shrub	0	0	0	1	0	0	0
197	<i>Gnetum montanum</i>	Gnetaceae	Liana	0	0	0	1	1	1	0
198	<i>Gomphostemma lucidum</i>	Lamiaceae	Herb	0	0	0	0	0	1	0
199	<i>Gomphostemma ovatum</i>	Lamiaceae	Herb	0	0	0	1	1	1	0
200	<i>Gomphostemma parviflorum</i>	Acanthaceae	Shrub	0	0	0	0	1	0	0
201	<i>Gonostegia triandra</i>	Urticaceae	Herb	0	1	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
202	<i>Gouania leptostachya</i>	Rhamnaceae	Liana	0	0	0	1	1	1	0
203	<i>Grewia rhamnifolia</i>	Malvaceae	Shrub	0	0	1	0	0	0	0
204	<i>Grewia hirsuta</i>	Malvaceae	Shrub	0	0	1	0	0	0	0
205	<i>Gynocardia odorata</i>	Achariaceae	Tree	0	0	0	1	0	0	0
206	<i>Halenia elliptica</i>	Gentianaceae	Herb	0	0	0	0	0	0	1
207	<i>Hedychium wardii</i>	Zingiberaceae	Herb	0	0	0	0	0	1	0
208	<i>Hedyotis scandens</i>	Rubiaceae	Herb	0	0	0	1	0	0	0
209	<i>Helicteres isora</i>	Malvaceae	Tree	0	0	1	0	0	0	0
210	<i>Hemidesmus indicus</i>	Apocynaceae	Climber	0	0	1	1	1	1	0
211	<i>Hemiphragma heterophyllum</i>	Plantaginaceae	Herb	0	0	0	0	0	0	1
212	<i>Henckelia pumila</i>	Gesneriaceae	Herb	0	1	0	0	0	0	0
213	<i>Henckelia urticifolia</i>	Gesneriaceae	Herb	0	1	0	0	0	0	0
214	<i>Heritiera fomes</i>	Malvaceae	Tree	1	0	0	0	0	0	0
215	<i>Herminium clavigerum</i>	Orchidaceae	Herb	0	1	0	0	0	0	1
216	<i>Herpetospermum tonglense</i>	Cucurbitaceae	Climber	0	0	0	0	0	0	1
217	<i>Holarrhena pubescens</i>	Apocynaceae	Tree	0	0	1	0	0	0	0
218	<i>Holboellia latifolia</i>	Lardizabalaceae	Liana	0	0	0	0	0	0	1
219	<i>Huberantha cerasoides</i>	Annonaceae	Tree	0	0	0	1	0	0	0
220	<i>Hypericum choisyianum</i>	Hypericaceae	Shrub	0	0	0	0	0	0	1
221	<i>Hypericum hookerianum</i>	Hypericaceae	Shrub	0	1	0	0	0	0	1
222	<i>Ichnocarpus frutescens</i>	Apocynaceae	Climber	0	0	1	1	1	1	0
223	<i>Ilex dipyrena</i>	Aquifoliaceae	Shrub	0	1	0	0	0	0	0
224	<i>Impatiens arguta</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
225	<i>Impatiens cathcartii</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
226	<i>Impatiens radiata</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
227	<i>Impatiens stenantha</i>	Balsaminaceae	Herb	0	1	0	0	0	0	0
228	<i>Impatiens urticifolia</i>	Balsaminaceae	Herb	0	1	0	0	0	0	1
229	<i>Ipomoea marginata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
230	<i>Ipomoea obscura</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
231	<i>Iris clarkei</i>	Iridaceae	Herb	0	0	0	0	0	0	1
232	<i>Ixora anthroantha</i>	Rubiaceae	Shrub	0	0	0	1	0	0	0
233	<i>Ixora arborea</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
234	<i>Jacquemontia paniculata</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
235	<i>Jasminum dispernum</i>	Oleaceae	Climber	0	1	0	0	0	0	0
236	<i>Jasminum flexile</i>	Oleaceae	Climber	0	0	0	1	1	1	0
237	<i>Koenigia campanulata</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
238	<i>Lactuca dissecta</i>	Asteraceae	Herb	0	1	0	0	0	0	0
239	<i>Lagerstroemia parviflora</i>	Lythraceae	Tree	0	0	0	0	1	1	0
240	<i>Lantana camara</i>	Verbenaceae	Shrub	0	0	1	0	0	0	0
241	<i>Laportea crenulata</i>	Urticaceae	Shrub	0	0	0	1	0	0	0
242	<i>Lasia spinosa</i>	Araceae	Herb	0	0	0	0	1	0	0
243	<i>Leea asiatica</i>	Vitaceae	Shrub	0	0	0	1	0	0	0
244	<i>Leea guineensis</i>	Vitaceae	Shrub	0	0	0	1	0	0	0
245	<i>Leea indica</i>	Vitaceae	Shrub	0	0	0	0	1	0	0
246	<i>Lepidagathis incurva</i> var. <i>incurva</i>	Acanthaceae	Herb	0	0	0	1	1	1	0
247	<i>Lepisanthes deficiens</i>	Sapindaceae	Tree	0	0	0	1	0	1	0
248	<i>Leucas decemdentata</i>	Lamiaceae	Herb	0	0	1	0	0	0	0
249	<i>Litsea albescens</i>	Lauraceae	Tree	0	1	0	0	0	0	0
250	<i>Litsea lancifolia</i>	Lauraceae	Tree	0	0	0	1	0	0	0
251	<i>Litsea salicifolia</i>	Lauraceae	Tree	0	0	0	0	0	1	0
252	<i>Lycopodium clavatum</i>	Lycopodiaceae	Herb	0	1	0	0	0	0	0

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253	<i>Lygodium japonicum</i>	Schizaeaceae	Herb	0	0	1	1	0	0	0
254	<i>Lygodium microphyllum</i>	Schizaeaceae	Herb	0	0	0	1	1	1	0
255	<i>Macaranga denticulata</i>	Euphorbiaceae	Tree	0	0	0	1	0	0	0
256	<i>Macaranga peltata</i>	Euphorbiaceae	Tree	0	0	0	0	1	1	0
257	<i>Machilus glaucescens</i>	Lauraceae	Tree	0	0	0	1	0	0	0
258	<i>Maesa indica</i>	Myrsinaceae	Shrub	0	0	0	1	0	0	0
259	<i>Maianthemum fuscum</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
260	<i>Mallotus philippensis</i>	Euphorbiaceae	Tree	0	0	0	0	1	1	0
261	<i>Mangifera indica</i>	Anacardiaceae	Tree	0	0	0	0	1	1	0
262	<i>Mangifera sylvatica</i>	Anacardiaceae	Tree	0	0	0	0	1	0	0
263	<i>Marattia fraxinea</i>	Marattiaceae	Shrub	0	0	0	0	1	1	0
264	<i>Memecylon cerasiforme</i>	Melastomataceae	Shrub	0	0	0	1	0	0	0
265	<i>Mesua ferrea</i>	Caryophyllaceae	Tree	0	0	0	0	0	1	0
266	<i>Micromelum minutum</i>	Rutaceae	Shrub	0	0	0	0	1	1	0
267	<i>Mikania cordata</i>	Asteraceae	Climber	0	0	0	1	1	1	0
268	<i>Millettia pachycarpa</i>	Fabaceae	Liana	0	0	0	1	1	0	0
269	<i>Mimosa pudica</i>	Fabaceae	Herb	0	0	1	1	0	0	0
270	<i>Mimosa rubicaulis</i>	Fabaceae	Shrub	0	0	1	0	0	0	0
271	<i>Miscanthus nepalensis</i>	Poaceae	Herb	0	1	0	0	0	0	0
272	<i>Morinda angustifolia</i>	Rubiaceae	Shrub	0	0	0	0	1	0	0
273	<i>Mucuna pruriens</i>	Fabaceae	Climber	0	0	1	0	0	0	0
274	<i>Murraya koenigii</i>	Rutaceae	Tree	0	0	0	1	0	0	0
275	<i>Murraya paniculata</i>	Rutaceae	Tree	0	0	0	0	1	1	0
276	<i>Myriactis nepalensis</i>	Asteraceae	Herb	0	1	0	0	0	0	1
277	<i>Neillia thyrsoiflora</i>	Rosaceae	Herb	0	1	0	0	0	0	1
278	<i>Nelsonia canescens</i>	Acanthaceae	Herb	0	0	0	1	0	0	0

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279	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Tree	0	0	1	0	0	0	0
280	<i>Ochlandra sp.</i>	Poaceae	Shrub	0	0	1	0	0	0	0
281	<i>Ochna pumila</i>	Ochnaceae	Shrub	0	0	1	0	0	0	0
282	<i>Oenothera rosea</i>	Onagraceae	Herb	0	0	0	0	0	0	1
283	<i>Olax nano</i>	Olacaceae	Shrub	0	0	1	0	0	0	0
284	<i>Ophiopogon intermedius</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
285	<i>Oplismenus burmanni</i>	Poaceae	Herb	0	1	0	1	1	1	0
286	<i>Oplismenus compositus</i>	Poaceae	Herb	0	1	1	1	1	1	0
287	<i>Oryza coarctata</i>	Poaceae	Herb	1	0	0	0	0	0	0
288	<i>Osbeckia stellata var. crinita</i>	Melastomataceae	Shrub	0	1	0	0	0	0	0
289	<i>Pandanus unguifer</i>	Pandanaceae	Herb	0	0	0	0	0	1	0
290	<i>Panicum nodatum</i>	Poaceae	Herb	0	0	0	0	1	1	0
291	<i>Panicum psilopodium</i>	Poaceae	Herb	0	0	0	0	1	1	0
292	<i>Paris polyphylla</i>	Melanthiaceae	Herb	0	1	0	0	0	0	1
293	<i>Passiflora foetida</i>	Passifloraceae	Climber	0	0	1	0	0	0	0
294	<i>Pedicularis pantlingii</i>	Orobanchaceae	Herb	0	0	0	0	0	0	1
295	<i>Peliosanthes violacea var. minor</i>	Asparagaceae	Herb	0	0	0	0	1	0	0
296	<i>Peperomia tetraphylla</i>	Piperaceae	Herb	0	1	0	0	0	0	0
297	<i>Persicaria chinensis</i>	Polygonaceae	Herb	0	1	0	0	1	0	0
298	<i>Persicaria runcinata</i>	Polygonaceae	Herb	0	1	0	0	0	0	0
299	<i>Phaulopsis imbricata</i>	Acanthaceae	Herb	0	0	0	1	1	0	0
300	<i>Phlogacanthus thyrsoiflorus</i>	Acanthaceae	Shrub	0	0	0	0	1	1	0
301	<i>Phoenix paludosa</i>	Arecaceae	Shrub	1	0	0	0	0	0	0
302	<i>Phyllanthus emblica</i>	Phyllanthaceae	Tree	0	0	1	0	0	1	0
303	<i>Phyllanthus niruri</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0

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304	<i>Phyllanthus praetervisus</i>	Phyllanthaceae	Herb	0	0	0	1	0	1	0
305	<i>Phyllanthus reticulatus</i>	Phyllanthaceae	Shrub	0	0	0	0	0	1	0
306	<i>Phyllanthus rheedii</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0
307	<i>Phyllanthus sikkimensis</i>	Phyllanthaceae	Shrub	0	0	0	0	1	1	0
308	<i>Phyllanthus urinaria</i>	Phyllanthaceae	Herb	0	0	0	0	1	1	0
309	<i>Phyllanthus virgatus</i>	Phyllanthaceae	Herb	0	0	1	0	0	0	0
310	<i>Phyllodium pulchellum</i>	Fabaceae	Herb	0	0	1	0	0	0	0
311	<i>Pilea ternifolia</i>	Urticaceae	Herb	0	0	0	0	0	0	1
312	<i>Pimpinella diversifolia</i>	Apiaceae	Herb	0	0	0	0	0	0	1
313	<i>Piper attenuatum</i>	Piperaceae	Climber	0	1	0	1	1	1	0
314	<i>Piper betleoides</i>	Piperaceae	Climber	0	0	0	1	1	1	0
315	<i>Piper locnchites</i>	Piperaceae	Climber	0	0	0	0	1	1	0
316	<i>Piper longum</i>	Piperaceae	Climber	0	0	0	1	0	0	0
317	<i>Piper retrofractum</i>	Piperaceae	Climber	0	0	0	1	0	0	0
318	<i>Piper suipigua</i>	Piperaceae	Climber	0	1	0	0	0	0	0
319	<i>Piper sylvaticum</i>	Piperaceae	Climber	0	0	0	1	1	1	0
320	<i>Pleurolobus gangeticus</i>	Fabaceae	Herb	0	0	1	0	0	0	0
321	<i>Poa ludens</i>	Poaceae	Herb	0	1	0	0	0	0	0
322	<i>Poa mairei</i>	Poaceae	Herb	0	0	0	0	0	0	1
323	<i>Pogostemon benghalensis</i>	Lamiaceae	Herb	0	0	0	1	0	0	0
324	<i>Pogostemon purpurescens</i>	Lamiaceae	Herb	0	0	0	1	1	0	0
325	<i>Polyalthia simiarum</i>	Annonaceae	Tree	0	0	0	1	0	1	0
326	<i>Polygonatum oppositifolium</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
327	<i>Polygonum chinense</i>	Polygonaceae	Herb	0	1	0	0	1	1	0
328	<i>Polygonum hydropiper</i>	Polygonaceae	Herb	0	0	0	0	0	1	0

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329	<i>Polygonum molle</i>	Polygonaceae	Herb	0	0	0	0	0	0	1
330	<i>Polygonum plebeium</i>	Polygonaceae	Herb	0	0	0	0	0	1	0
331	<i>Polygonum runcinatum</i>	Polygonaceae	Herb	0	1	0	0	0	0	1
332	<i>Porana paniculata</i>	Convolvulaceae	Climber	0	0	0	0	1	0	0
333	<i>Potentilla fruticosa</i>	Rosaceae	Herb	0	1	0	0	0	0	0
334	<i>Potentilla indica</i>	Rosaceae	Herb	0	0	0	1	0	0	1
335	<i>Pothas scandens</i>	Arecaceae	Climber	0	0	0	1	0	0	0
336	<i>Pouzolzia zeylanica</i>	Urticaceae	Herb	0	0	0	1	0	0	0
337	<i>Pratia montana</i>	Campanulaceae	Herb	0	1	0	0	0	0	0
338	<i>Pseudarthria viscida</i>	Fabaceae	Herb	0	0	1	0	0	0	0
339	<i>Pseuderanthemum malabaricum</i>	Acanthaceae	Herb	0	0	0	1	1	0	0
340	<i>Psychotria erratica</i> var. <i>pedunculata</i>	Rubiaceae	Herb	0	0	0	0	1	0	0
341	<i>Psyrax dicoccos</i>	Rubiaceae	Tree	0	0	1	0	0	0	0
342	<i>Pteris aspericaulis</i>	Pteridaceae	Herb	0	0	0	0	0	0	1
343	<i>Pteris cretica</i>	Pteridaceae	Herb	0	1	0	0	0	0	0
344	<i>Pteris quadriaurita</i>	Pteridaceae	Herb	0	1	0	0	0	0	0
345	<i>Pteris semipinnata</i>	Pteridaceae	Herb	0	0	0	1	0	0	0
346	<i>Pterospermum acerifolium</i>	Malvaceae	Tree	0	0	0	0	1	0	0
347	<i>Pterygota alata</i>	Malvaceae	Tree	0	0	0	0	1	0	0
348	<i>Pupalia lappacea</i>	Amaranthaceae	Herb	0	0	0	0	1	0	0
349	<i>Quercus lamellosa</i>	Fagaceae	Tree	0	1	0	0	0	0	0
350	<i>Quercus pachyphylla</i>	Fagaceae	Tree	0	1	0	0	0	0	0
351	<i>Rauvolfia serpentina</i>	Apocynaceae	Herb	0	0	0	1	0	0	0
352	<i>Rauvolfia tetraphylla</i>	Apocynaceae	Shrub	0	0	1	0	0	0	0
353	<i>Rhododendron arboreum</i>	Ericaceae	Tree	0	0	0	0	0	0	1

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354	<i>Rhododendron griffithianum</i>	Ericaceae	Tree	0	1	0	0	0	0	0
355	<i>Rivea hypocrateriformis</i>	Convolvulaceae	Climber	0	0	1	0	0	0	0
356	<i>Rohdea nepalensis</i>	Asparagaceae	Herb	0	1	0	0	0	0	0
357	<i>Rosa sericea</i>	Rosaceae	Shrub	0	0	0	0	0	0	1
358	<i>Rubia cordifolia</i>	Rubiaceae	Climber	0	0	0	0	0	0	1
359	<i>Rubia manjith</i>	Rubiaceae	Climber	0	1	0	0	0	0	1
360	<i>Rubia sikkimensis</i>	Rubiaceae	Climber	0	1	0	0	0	0	0
361	<i>Rubia wallichiana</i>	Rubiaceae	Climber	0	0	0	0	0	0	1
362	<i>Rubus acuminatus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
363	<i>Rubus lineatus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
364	<i>Rubus paniculatus</i>	Rosaceae	Herb	0	1	0	0	0	0	0
365	<i>Rubus rugosus</i>	Rosaceae	Herb	0	1	0	0	0	0	1
366	<i>Rungia pectinata</i>	Acanthaceae	Herb	0	0	1	1	0	0	0
367	<i>Sarcococca wallichii</i>	Euphorbiaceae	Herb	0	1	0	0	0	0	1
368	<i>Sarocalamus racemosus</i>	Poaceae	Shrub	0	0	0	0	0	0	1
369	<i>Satyrium nepalense</i>	Orchidaceae	Herb	0	0	0	0	0	0	1
370	<i>Sauropus androgynus</i>	Phyllanthaceae	Shrub	0	0	0	1	0	0	0
371	<i>Sauropus compressus</i> var. <i>puberulus</i>	Phyllanthaceae	Herb	0	0	0	0	1	0	0
372	<i>Schisandra grandiflora</i>	Schisandraceae	Liana	0	0	0	0	0	0	1
373	<i>Schleichera oleosa</i>	Sapindaceae	Tree	0	0	1	0	0	0	0
374	<i>Selaginella monospora</i>	Selaginellaceae	Herb	0	0	0	0	0	0	1
375	<i>Selliguea erythrocarpa</i>	Polypodiaceae	Herb	0	1	0	0	0	0	1
376	<i>Semecarpus anacardium</i>	Anacardiaceae	Tree	0	0	1	0	0	0	0
377	<i>Senecio graciliflorus</i>	Asteraceae	Herb	0	0	0	0	0	0	1
378	<i>Senecio scandens</i>	Asteraceae	Climber	0	1	0	0	0	0	0

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379	<i>Shorea robusta</i>	Dipterocarpaceae	Tree	0	0	1	0	1	0	0
380	<i>Sida cordata</i>	Malvaceae	Herb	0	0	1	0	1	0	0
381	<i>Smilax elegans</i>	Smilacaceae	Climber	0	1	0	0	0	0	1
382	<i>Smilax munita</i>	Smilacaceae	Shrub	0	0	0	0	0	0	1
383	<i>Smilax myrtilus</i>	Smilacaceae	Climber	0	1	0	0	0	0	0
384	<i>Smilax ovalifolia</i>	Smilacaceae	Climber	0	0	1	0	0	0	0
385	<i>Smilax zeylanica</i>	Smilacaceae	Climber	0	0	0	0	1	1	0
386	<i>Solanum khasianum</i> var. <i>chatterjeeanum</i>	Solanaceae	Herb	0	0	0	1	0	0	0
387	<i>Sonneratia alba</i>	Lythraceae	Tree	1	0	0	0	0	0	0
388	<i>Sonneratia apetala</i>	Lythraceae	Tree	1	0	0	0	0	0	0
389	<i>Soymida febrifuga</i>	Meliaceae	Tree	0	0	1	0	0	0	0
390	<i>Spermacoce latifolia</i>	Rubiaceae	Herb	0	0	0	0	0	1	0
391	<i>Spermacoce prostrata</i>	Rubiaceae	Liana	0	0	0	0	1	0	0
392	<i>Spermacoce pusilla</i>	Rubiaceae	Herb	0	0	0	0	1	0	0
393	<i>Stellaria sikkimensis</i>	Caryophyllaceae	Herb	0	1	0	0	0	0	0
394	<i>Stephania japonica</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
395	<i>Stephania japonica</i> var. <i>discolor</i>	Menispermaceae	Climber	0	0	0	1	1	0	0
396	<i>Stereospermum colais</i>	Bignoniaceae	Tree	0	0	0	0	1	1	0
397	<i>Streblus asper</i>	Moraceae	Tree	0	0	1	0	0	0	0
398	<i>Strobilanthes divaricata</i>	Acanthaceae	Herb	0	1	0	0	0	0	1
399	<i>Strobilanthes pentastemonoides</i>	Acanthaceae	Herb	0	1	0	0	0	0	1
400	<i>Strobilanthes</i> sp.	Acanthaceae	Herb	0	0	0	0	1	0	0
401	<i>Suaeda maritima</i>	Chenopodiaceae	Herb	1	0	0	0	0	0	0
402	<i>Suregada multiflora</i>	Euphorbiaceae	Tree	0	0	1	0	0	0	0
403	<i>Swertia chirayita</i>	Gentianaceae	Herb	0	1	0	0	0	0	1

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
404	<i>Symplocos glomerata</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
405	<i>Symplocos lucida</i>	Symplocaceae	Tree	0	1	0	0	0	0	0
406	<i>Symplocos racemosa</i>	Symplocaceae	Tree	0	0	1	0	0	0	0
407	<i>Synotis cappa</i>	Asteraceae	Herb	0	1	0	0	0	0	0
408	<i>Syzygium cumini</i>	Myrtaceae	Herb	0	0	1	0	0	0	0
409	<i>Syzygium formosum</i>	Myrtaceae	Herb	0	0	0	1	1	1	0
410	<i>Syzygium praecox</i>	Myrtaceae	Tree	0	0	0	1	1	0	0
411	<i>Tabernaemontana alternifolia</i>	Apocynaceae	Shrub	0	0	0	1	0	0	0
412	<i>Tabernaemontana divaricata</i>	Apocynaceae	Shrub	0	0	0	0	1	1	0
413	<i>Tectona grandis</i>	Lamiaceae	Tree	0	0	0	0	1	0	0
414	<i>Terminalia anogeissiana</i>	Combretaceae	Tree	0	0	1	0	0	0	0
415	<i>Terminalia chebula</i>	Combretaceae	Tree	0	0	1	0	1	0	0
416	<i>Tetrameles nudiflora</i>	Tetramelaceae	Tree	0	0	0	0	1	0	0
417	<i>Tetrastigma campylocarpum</i>	Vitaceae	Climber	0	0	0	1	1	1	0
418	<i>Tetrastigma serrulatum</i>	Vitaceae	Climber	0	1	0	0	1	1	0
419	<i>Thalictrum foliolosum</i>	Ranunculaceae	Herb	0	0	0	0	0	0	1
420	<i>Thespesia populnea</i>	Malvaceae	Herb	1	0	0	0	0	0	0
421	<i>Thunbergia coccinea</i>	Acanthaceae	Climber	0	0	0	0	1	0	0
422	<i>Tinospora cordifolia</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
423	<i>Tinospora crispa</i>	Menispermaceae	Climber	0	0	1	0	0	0	0
424	<i>Tinospora sinensis</i>	Menispermaceae	Herb	0	0	1	0	0	0	0
425	<i>Torenia diffusa</i>	Linderniaceae	Herb	0	0	0	1	0	0	0
426	<i>Tripterospermum volubile</i>	Gentianaceae	Climber	0	1	0	0	0	0	1
427	<i>Triumfetta pentandra</i>	Malvaceae	Herb	0	0	0	0	1	0	0

Sl. No	Species	Family	Habit	Bonnie camp	Dhotrey	Garpanchkot	North Rajabhatkhawa	North Sevoke	Sursuti	Tonglu
428	<i>Triumfetta rhomboidea</i>	Malvaceae	Herb	0	0	1	0	0	0	0
429	<i>Uncaria sessilifructus</i>	Rubiaceae	Liana	0	0	0	1	0	0	0
430	<i>Uraria lagopodoides</i>	Fabaceae	Herb	0	0	0	1	0	1	0
431	<i>Urtica dioica</i>	Urticaceae	Herb	0	1	0	0	0	0	0
432	<i>Uvaria hamiltonii</i>	Annonaceae	Tree	0	0	0	0	1	0	0
433	<i>Valeriana hardwickei</i>	Rubiaceae	Herb	0	1	0	0	0	0	0
434	<i>Vallisneria spiralis</i>	Apocynaceae	Liana	0	0	0	1	1	1	0
435	<i>Vangueria spinosa</i>	Rubiaceae	Shrub	0	0	1	0	0	0	0
436	<i>Ventilago madraspatana</i>	Rhamnaceae	Liana	0	0	1	0	0	0	0
437	<i>Vernonia clivorum</i>	Asteraceae	Herb	0	0	0	1	0	0	0
438	<i>Viburnum erubescens</i>	Viburnaceae	Tree	0	1	0	0	0	0	1
439	<i>Viola pilosa</i>	Violaceae	Herb	0	1	0	0	0	0	1
440	<i>Viola sikkimensis</i>	Violaceae	Herb	0	1	0	0	0	0	1
441	<i>Wrightia arborea</i>	Apocynaceae	Tree	0	0	0	0	0	1	0
442	<i>Xylocarpus granatum</i>	Meliaceae	Tree	1	0	0	0	0	0	0
443	<i>Xylocarpus moluccensis</i>	Meliaceae	Tree	1	0	0	0	0	0	0
444	<i>Yushania maling</i>	Poaceae	Shrub	0	1	0	0	0	0	1
445	<i>Zeuxine goodyeroides</i>	Orchidaceae	Herb	0	1	0	0	0	0	0
446	<i>Ziziphus oenopolia</i>	Rhamnaceae	Shrub	0	0	1	0	0	0	0
	Total			21	91	97	108	136	94	73

Annexure 18. List and details of respondents, who participated in the community survey, from villages neighbouring seven Medicinal Plants Conservation Areas (MPCAs) in West Bengal

Sl.No	Village	MPCA	Name of community member	Gender	Age
1	Bagmara	Garpanchkot	Sarita Mahato	Female	40
2	Bagmara	Garpanchkot	Rajesh Mahato	Male	32
3	Bagmara	Garpanchkot	Sasthipada Mahato	Male	69
4	Bagmara	Garpanchkot	Sangita Mahato	Female	28
5	Bagmara	Garpanchkot	Tarabati Mahato	Female	40
6	Bagmara	Garpanchkot	Sakuntala Mahato	Female	35
7	Bagmara	Garpanchkot	Santidebi Mahato	Female	55
8	Bagmara	Garpanchkot	Sakuntala Mahato	Female	55
9	Bagmara	Garpanchkot	kalipada Mahato	Male	45
10	Bagmara	Garpanchkot	Kamal Mahato	Male	66
11	Bagmara	Garpanchkot	Kanika Mahato	Female	15
12	Bagmara	Garpanchkot	Kamal Mahato	Male	35
13	Bagmara	Garpanchkot	Shibdas Mandi	Male	30
14	Bagmara	Garpanchkot	Sarat Mahato	Male	50
15	Bagmara	Garpanchkot	Malati Baskey	Female	21
16	Bagmara	Garpanchkot	Sabita Baskey	Female	40
17	Bagmara	Garpanchkot	Rashmoni Baskey	Female	19
18	Bagmara	Garpanchkot	Sundar Baskey	Female	25
19	Bagmara	Garpanchkot	Malati Todu	Female	30
20	Bagmara	Garpanchkot	Raghunath Murmu	Male	52
21	Bagmara	Garpanchkot	Laxmi Baskey	Female	75
22	Bagmara	Garpanchkot	Adrija Mahato	Female	13
23	Bagmara	Garpanchkot	Chinta Mahato	Female	34
24	Bagmara	Garpanchkot	Menoka soren	Female	40
25	Bagmara	Garpanchkot	Rupmoni Soren	Female	38
26	Bagmara	Garpanchkot	Panmoni Soren	Female	45
27	Bagmara	Garpanchkot	Dasharath Murmu	Male	61
28	Bagmara	Garpanchkot	Kamal Mahato	Male	66
29	Bagmara	Garpanchkot	Kabita Soren	Female	36
30	Bagmara	Garpanchkot	Amulaya Mahato	Female	42
31	Bagmara	Garpanchkot	Babujon Murmu	Male	30
32	Bagmara	Garpanchkot	Bablu Baskey	Male	22
33	Bagmara	Garpanchkot	Sunil Mandi	Male	40
34	Bagmara	Garpanchkot	Parimal Mahato	Male	35
35	Bagmara	Garpanchkot	Jagatsadhu Baskey	Male	55
36	Bagmara	Garpanchkot	Nayati Murmu	Female	34
37	Bagmara	Garpanchkot	Purnima Baskey	Female	25
38	Bagmara	Garpanchkot	Lakhiram Kishu	Male	38
39	Bagmara	Garpanchkot	Mangal Baskey	Male	61
40	Bagmara	Garpanchkot	Manu Tudu	Male	75
41	Bagmara	Garpanchkot	Anindita Baskey	Female	24

Sl.No	Village	MPCA	Name of community member	Gender	Age
42	Bagmara	Garpanchkot	Arati Baskey	Female	60
43	Bagmara	Garpanchkot	Shrimati Mandi	Female	23
44	Bagmara	Garpanchkot	Pashupati Mahato	Male	40
45	Bagmara	Garpanchkot	Prashanta Baskey	Male	34
46	Bagmara	Garpanchkot	Rohan Mandi	Male	60
47	Bagmara	Garpanchkot	Jishu Marandi	Male	60
48	Bagmara	Garpanchkot	Arjun Mahato	Male	56
49	Bagmara	Garpanchkot	Jiten Mahato	Male	58
50	Bagmara	Garpanchkot	Sanjoy Mahato	Male	42
51	Bagmara	Garpanchkot	Haradhan Mahato	Male	38
52	Bagmara	Garpanchkot	Rajen Soren	Male	32
53	Bagmara	Garpanchkot	Sarat Soren	Male	47
54	Bagmara	Garpanchkot	Kabita Soren	Female	42
55	Bagmara	Garpanchkot	Renuka Mahato	Female	47
56	Rampur	Garpanchkot	Manik Gorai	Male	70
57	Rampur	Garpanchkot	Rajesh Kumar Gorai	Male	28
58	Rampur	Garpanchkot	Poran Gorai	Male	60
59	Rampur	Garpanchkot	Uttam Gorai	Male	37
60	Rampur	Garpanchkot	Dinesh Gorai	Male	32
61	Rampur	Garpanchkot	Bapi Mallick	Male	37
62	Rampur	Garpanchkot	Kishan Mallick	Male	26
63	Rampur	Garpanchkot	Bipin Mallick	Male	35
64	Rampur	Garpanchkot	Shyamapada Gorai	Male	73
65	Rampur	Garpanchkot	Jiban Chandra Gorai	Male	69
66	Rampur	Garpanchkot	Monbhola Bauri	Male	45
67	Rampur	Garpanchkot	Prabir kumar Patra	Male	30
68	Rampur	Garpanchkot	Prabir Patra	Male	29
69	Rampur	Garpanchkot	Sanjay Gorai	Male	32
70	Rampur	Garpanchkot	Gopal Mallick	Male	60
71	Rampur	Garpanchkot	Kalyani Mallick	Male	55
72	Rampur	Garpanchkot	Sudhir Mallick	Male	35
73	Rampur	Garpanchkot	Baidyanath Gorai	Male	52
74	Rampur	Garpanchkot	Sanjay Chatterjee	Male	28
75	Rampur	Garpanchkot	Prabir Banerjee	Male	30
76	Rampur	Garpanchkot	Arun Mallick	Male	60
77	Rampur	Garpanchkot	Pramatha Nath Mukherjee	Male	84
78	Rampur	Garpanchkot	Kokil Gorai	Male	56
79	Rampur	Garpanchkot	Ananda Gorai	Male	35
80	Rampur	Garpanchkot	Jharna Mallick	Female	35
81	Rampur	Garpanchkot	Rekha Mallick	Female	35
82	Rampur	Garpanchkot	Fatik Patra	Male	72
83	Rampur	Garpanchkot	Dilip Gorai	Male	45
84	Rampur	Garpanchkot	Mohan Gorai	Male	28
85	Rampur	Garpanchkot	Saurav Shikdar	Male	26
86	Rampur	Garpanchkot	Santosh Gorai	Male	35

Sl.No	Village	MPCA	Name of community member	Gender	Age
87	Rampur	Garpanchkot	Kartik Bauri	Male	65
88	Rampur	Garpanchkot	Ashok Patra	Male	70
89	Rampur	Garpanchkot	Raghunath Gorai	Male	58
90	Rampur	Garpanchkot	Kalipada Bauri	Male	35
91	Rampur	Garpanchkot	Bijoy Bauri	Male	32
92	Rampur	Garpanchkot	Kartik Gorai	Male	34
93	Rampur	Garpanchkot	Mukunda Gorai	Male	42
94	Rampur	Garpanchkot	Ajit Bauri	Male	38
95	Rampur	Garpanchkot	Nimai Bauri	Male	62
96	Rampur	Garpanchkot	Ashok Bauri	Male	31
97	Rampur	Garpanchkot	Nirmal Bauri	Male	56
98	Rampur	Garpanchkot	Bishnu Bauri	Male	45
99	Rampur	Garpanchkot	Somen Bauri	Male	35
100	Rampur	Garpanchkot	Nepal Bauri	Male	38
101	Rampur	Garpanchkot	Sati Bauri	Female	63
102	Rampur	Garpanchkot	Mahadeb Bauri	Male	71
103	Rampur	Garpanchkot	Arun Bauri	Male	56
104	Rampur	Garpanchkot	Manisha Patra	Female	23
105	Rampur	Garpanchkot	Gauranga Bauri	Male	32
106	Rampur	Garpanchkot	Chanda Mukherjee	Female	27
107	Rampur	Garpanchkot	Durshashan Bauri	Male	32
108	Rampur	Garpanchkot	Kalipada Bauri	Male	76
109	Rampur	Garpanchkot	Rani Bauri	Female	23
110	Rampur	Garpanchkot	Durjadhan Bauri	Male	35
111	Rampur	Garpanchkot	Barsha Patra	Female	22
112	Rampur	Garpanchkot	Shikha Gorai	Female	24
113	Rampur	Garpanchkot	Subodh Bauri	Male	56
114	Rampur	Garpanchkot	Jiten Mahato	Male	35
115	Rampur	Garpanchkot	Amal Mandal	Male	32
116	Rampur	Garpanchkot	Bhairab Bauri	Male	31
117	Rampur	Garpanchkot	Tushar Patra	Male	32
118	Rampur	Garpanchkot	Somenath Patra	Male	37
119	Shiulibari	Garpanchkot	Rajani Karmakar	Female	45
120	Shiulibari	Garpanchkot	Shiblal Soren	Male	28
121	Shiulibari	Garpanchkot	Anil Murmu	Male	30
122	Shiulibari	Garpanchkot	Pratima Rajwar	Female	15
123	Shiulibari	Garpanchkot	Kishan Bauri	Male	20
124	Shiulibari	Garpanchkot	Bandana Karmakar	Female	23
125	Shiulibari	Garpanchkot	Rajib Bauri	Male	29
126	Shiulibari	Garpanchkot	Ratan Karmakar	Male	45
127	Shiulibari	Garpanchkot	Ananda Bauri	Male	74
128	Shiulibari	Garpanchkot	Maya Bauri	Female	20
129	Shiulibari	Garpanchkot	Kabita Bauri	Female	20
130	Shiulibari	Garpanchkot	Ramlal Murmu	Male	50
131	Shiulibari	Garpanchkot	Bijali Bauri	Female	25

Sl.No	Village	MPCA	Name of community member	Gender	Age
132	Shiulibari	Garpanchkot	Sukhlal Hembram	Male	70
133	Shiulibari	Garpanchkot	Namita Rajwar	Female	50
134	Shiulibari	Garpanchkot	Sonaram mandi	Male	28
135	Shiulibari	Garpanchkot	Laxmimoni Soren	Female	25
136	Shiulibari	Garpanchkot	Mathan Ch Kishku	Male	44
137	Shiulibari	Garpanchkot	Binod Karmakar	Male	57
138	Shiulibari	Garpanchkot	Milani Soren	Female	65
139	Shiulibari	Garpanchkot	Badani Hansda	Female	38
140	Shiulibari	Garpanchkot	Rabidas Mandi	Male	25
141	Shiulibari	Garpanchkot	Parbati Tudu	Female	25
142	Shiulibari	Garpanchkot	Saharai Mandi	Male	32
143	Shiulibari	Garpanchkot	Sukhlal Soren	Male	65
144	Shiulibari	Garpanchkot	Aloka Bauri	Female	60
145	Shiulibari	Garpanchkot	Pansukhi Murku	Female	15
146	Shiulibari	Garpanchkot	Dulali Soren	Female	50
147	Shiulibari	Garpanchkot	Santo Hasda	Male	22
148	Shiulibari	Garpanchkot	Ramani Kishku	Female	22
149	Shiulibari	Garpanchkot	Ramdas Hansda	Male	45
150	Shiulibari	Garpanchkot	Arati Kishku	Female	35
151	Shiulibari	Garpanchkot	Nabin Hembrem	Male	55
152	Shiulibari	Garpanchkot	Nakul karmakar	Male	71
153	Shiulibari	Garpanchkot	Shrimati Ksku	Female	82
154	Shiulibari	Garpanchkot	Srimati Mandi	Female	25
155	Shiulibari	Garpanchkot	Ramchand Kishku	Male	53
156	Shiulibari	Garpanchkot	Rabilal Kishku	Male	66
157	Shiulibari	Garpanchkot	Sanatan Kishku	Male	60
158	Shiulibari	Garpanchkot	Nandini Kishku	Female	22
159	Shiulibari	Garpanchkot	Kalilal Kishku	Male	38
160	Shiulibari	Garpanchkot	Sanmoni Mandi	Female	60
161	Shiulibari	Garpanchkot	Nandalal Mandi	Male	65
162	Shiulibari	Garpanchkot	Dhananjay Bauri	Male	40
163	Shiulibari	Garpanchkot	Borolal Kishku	Male	50
164	Shiulibari	Garpanchkot	Prabhat Hembram	Male	21
165	Purbashreedharpur	Bonnie camp	Kanka Pandit	Female	55
166	Purbashreedharpur	Bonnie camp	Lakxmi Rani Mandal	Female	54
167	Purbashreedharpur	Bonnie camp	Gour Mandal	Male	59
168	Purbashreedharpur	Bonnie camp	Bharati Giri	Female	28
169	Purbashreedharpur	Bonnie camp	Pranati Bag	Female	37
170	Purbashreedharpur	Bonnie camp	Utpala Maity	Male	45
171	Purbashreedharpur	Bonnie camp	Sharynomoye Nayak	Female	28
172	Purbashreedharpur	Bonnie camp	Manimala Bag	Female	45
173	Purbashreedharpur	Bonnie camp	Chameli Das	Female	31
174	Purbashreedharpur	Bonnie camp	Durga Das	Male	30
175	Purbashreedharpur	Bonnie camp	Prabhathi Das	Female	51
176	Purbashreedharpur	Bonnie camp	Durga Bor	Female	60

Sl.No	Village	MPCA	Name of community member	Gender	Age
177	Purbashreedharpur	Bonnie camp	Nimai Bor	Male	30
178	Purbashreedharpur	Bonnie camp	Madhumita Nayak	Female	26
179	Purbashreedharpur	Bonnie camp	Aparna Das	Female	35
180	Purbashreedharpur	Bonnie camp	Asthami Mondal	Female	72
181	Purbashreedharpur	Bonnie camp	Devi Mondal	Female	48
182	Purbashreedharpur	Bonnie camp	Surajit Bera	Male	52
183	Purbashreedharpur	Bonnie camp	Anima Bera	Female	45
184	Purbashreedharpur	Bonnie camp	Jogomaya Neogi	Female	32
185	Purbashreedharpur	Bonnie camp	Laxmi Das	Female	45
186	Purbashreedharpur	Bonnie camp	Arati Mondal	Female	38
187	Purbashreedharpur	Bonnie camp	Sitaram Mondal	Male	82
188	Purbashreedharpur	Bonnie camp	Nilima Mondal	Female	25
189	Purbashreedharpur	Bonnie camp	Modan Mondal	Male	77
190	Purbashreedharpur	Bonnie camp	Paresh Das	Male	52
191	Purbashreedharpur	Bonnie camp	Geeta Shikari	Female	55
192	Purbashreedharpur	Bonnie camp	Shefali Haldar	Female	27
193	Purbashreedharpur	Bonnie camp	Prabhash Ch. Bhuiya	Male	40
194	Purbashreedharpur	Bonnie camp	Anishika Haldar	Female	23
195	Purbashreedharpur	Bonnie camp	Arpita Mondal	Female	11
196	Purbashreedharpur	Bonnie camp	Soumitra Bera	Male	20
197	Purbashreedharpur	Bonnie camp	Gautam Mondal	Male	40
198	Purbashreedharpur	Bonnie camp	Rakesh Mondal	Male	16
199	Purbashreedharpur	Bonnie camp	Pranab Pandit	Male	36
200	Purbashreedharpur	Bonnie camp	Kundu Bairagi	Female	45
201	Purbashreedharpur	Bonnie camp	Anil Das	Male	42
202	Purbashreedharpur	Bonnie camp	Chittaranjan Niyogi	Male	62
203	Ambika nagar	Bonnie camp	Shubhendu Das	Male	37
204	Ambika nagar	Bonnie camp	Subal Ch. Das	Male	59
205	Ambika nagar	Bonnie camp	Falguni Sau	Female	21
206	Ambika nagar	Bonnie camp	Panchanan Das	Male	52
207	Ambika nagar	Bonnie camp	Jharna Sau	Female	29
208	Ambika nagar	Bonnie camp	Mamata Sahoo	Female	28
209	Ambika nagar	Bonnie camp	Anjali Sau	Female	25
210	Ambika nagar	Bonnie camp	Purnima Manna	Female	45
211	Ambika nagar	Bonnie camp	Kalipada Patra	Male	39
212	Ambika nagar	Bonnie camp	Purnima Nayek	Female	45
213	Ambika nagar	Bonnie camp	Pankaj Maiti	Male	61
214	Ambika nagar	Bonnie camp	Bhyagyadhar Das	Male	43
215	Ambika nagar	Bonnie camp	Nomita Nayek	Female	33
216	Ambika nagar	Bonnie camp	Laxmi Nayek	Female	35
217	Ambika nagar	Bonnie camp	Ambika Nayek	Female	26
218	Ambika nagar	Bonnie camp	Tapan Mandal	Male	59
219	Ambika nagar	Bonnie camp	Shambhu Charan Sheet	Male	50
220	Ambika nagar	Bonnie camp	Chaitali Jana	Female	23
221	Ambika nagar	Bonnie camp	Shankar Das	Male	54

Sl.No	Village	MPCA	Name of community member	Gender	Age
222	Ambika nagar	Bonnie camp	Manabendra Sheet	Male	62
223	Ambika nagar	Bonnie camp	Pritilata Manna	Female	24
224	Ambika nagar	Bonnie camp	Barnali Jana	Female	27
225	Ambika nagar	Bonnie camp	Chandana Maiti	Female	21
226	Ambika nagar	Bonnie camp	Keshab Ch. Kayal	Male	57
227	Ambika nagar	Bonnie camp	Rupali Mondal	Female	22
228	Ambika nagar	Bonnie camp	Mallika Maiti	Female	24
229	Ambika nagar	Bonnie camp	Sabali Das	Female	32
230	Ambika nagar	Bonnie camp	Radharani Bhuiya	Male	65
231	Ambika nagar	Bonnie camp	Aparna Das	Female	28
232	Ambika nagar	Bonnie camp	Sulekha Das	Female	25
233	Ambika nagar	Bonnie camp	Gouri Giri	Female	35
234	Ambika nagar	Bonnie camp	Durga Das	Female	30
235	Ambika nagar	Bonnie camp	Bholanath Mondal	Male	28
236	Ambika nagar	Bonnie camp	Partama Gana	Female	38
237	Ambika nagar	Bonnie camp	Santana Maiti	Female	32
238	Ambika nagar	Bonnie camp	Debabrata Baidya	Male	32
239	Ambika nagar	Bonnie camp	Mamani Nayek	Female	33
240	Ambika nagar	Bonnie camp	Debka Mandal	Female	51
241	Ambika nagar	Bonnie camp	Bishu Mandal	Male	27
242	Ambika nagar	Bonnie camp	Ajay Das	Male	49
243	Ambika nagar	Bonnie camp	Sadhan Raut	Male	55
244	Ambika nagar	Bonnie camp	Shrinibash Mondal	Male	46
245	Ambika nagar	Bonnie camp	Menoka Payer	Female	31
246	Ambika nagar	Bonnie camp	Kabita Hazra	Female	45
247	Ambika nagar	Bonnie camp	Jharna Mondal	Female	30
248	Ambika nagar	Bonnie camp	Bholanath Mondal	Male	30
249	Ambika nagar	Bonnie camp	Parbati Baul	Female	33
250	Ambika nagar	Bonnie camp	Subhadra Mondal	Female	21
251	Ambika nagar	Bonnie camp	Sanjoy Gharami	Male	24
252	Ambika nagar	Bonnie camp	Radharani Maiti	Female	42
253	Ambika nagar	Bonnie camp	Shyamali Haldar	Female	40
254	Ambika nagar	Bonnie camp	Shubhendu Bhuiya	Male	41
255	Ambika nagar	Bonnie camp	Suktara Mondal	Female	45
256	Ambika nagar	Bonnie camp	Deepak Maiti	Male	52
257	Ambika nagar	Bonnie camp	Barnali Maiti	Female	34
258	Ambika nagar	Bonnie camp	Indranath Mondal	Male	26
259	Ambika nagar	Bonnie camp	Dibakar Patra	Male	58
260	Ambika nagar	Bonnie camp	Lakhan Samanta	Male	88
261	Ambika nagar	Bonnie camp	Sushil Pradhan	Male	35
262	Ambika nagar	Bonnie camp	Kashinath Haldar	Male	57
263	Buxa 28 Forest Village	North Rajabhatkhawa	Temba Lama	Male	66
264	Buxa 28 Forest Village	North Rajabhatkhawa	Durga Adhikari	Male	65

Sl.No	Village	MPCA	Name of community member	Gender	Age
265	Buxa 28 Forest Village	North Rajabhatkhawa	Surya Lama	Female	22
266	Buxa 28 Forest Village	North Rajabhatkhawa	Roma Pradhan	Female	22
267	Buxa 28 Forest Village	North Rajabhatkhawa	Jage Lama	Male	29
268	Buxa 28 Forest Village	North Rajabhatkhawa	Roman Pradhan	Male	23
269	Buxa 28 Forest Village	North Rajabhatkhawa	Sankar Rai	Male	66
270	Buxa 28 Forest Village	North Rajabhatkhawa	Dally Lama	Male	52
271	Buxa 28 Forest Village	North Rajabhatkhawa	Laxmi Pradhan	Female	43
272	Buxa 28 Forest Village	North Rajabhatkhawa	Rajen Rai	Male	55
273	Buxa 28 Forest Village	North Rajabhatkhawa	Rikta Lama	Female	27
274	Buxa 28 Forest Village	North Rajabhatkhawa	Sanam Pradhan	Male	32
275	Buxa 28 Forest Village	North Rajabhatkhawa	Punam Lama	Female	42
276	Buxa 29 Forest Village	North Rajabhatkhawa	Yogesh Lama	Male	19
277	Buxa 29 Forest Village	North Rajabhatkhawa	Ritika Darjee	Female	12
278	Buxa 29 Forest Village	North Rajabhatkhawa	Annapurna karki	Female	13
279	Buxa 29 Forest Village	North Rajabhatkhawa	Lalati Lama	Female	40
280	Buxa 29 Forest Village	North Rajabhatkhawa	Thuli Maya Lama	Female	60
281	Buxa 29 Forest Village	North Rajabhatkhawa	Indrabahadur Rai	Male	66
282	Buxa 29 Forest Village	North Rajabhatkhawa	Suraj Lama	Male	44
283	Buxa 29 Forest Village	North Rajabhatkhawa	Kishan Darjee	Male	20
284	Buxa 29 Forest Village	North Rajabhatkhawa	Meera Lama	Female	45
285	Buxa 29 Forest Village	North Rajabhatkhawa	Kancha Karki	Male	80
286	Buxa 29 Forest Village	North Rajabhatkhawa	Kancha Lama	Male	43
287	Buxa 29 Forest Village	North Rajabhatkhawa	Saraswati Darjee	Female	25
288	Buxa 29 Forest Village	North Rajabhatkhawa	Pankaj Lama	Male	21
289	Buxa 29 Forest Village	North Rajabhatkhawa	Pradip Darjee	Male	64
290	Buxa 29 Forest Village	North Rajabhatkhawa	Deepesh Lama	Male	17
291	Buxa 29 Forest Village	North Rajabhatkhawa	Sailee Darjee	Female	50
292	Buxa 29 Forest Village	North Rajabhatkhawa	Arun Kumar Rai	Male	49

Sl.No	Village	MPCA	Name of community member	Gender	Age
293	Bamni	Sursuti	Rohit Oraon	Male	18
294	Bamni	Sursuti	Lothru Munda	Male	36
295	Bamni	Sursuti	Elarus Oraon	Male	48
296	Bamni	Sursuti	Heeramoni Munda	Female	22
297	Bamni	Sursuti	Rangila Oraon	Female	19
298	Bamni	Sursuti	Sukura Oraon	Male	55
299	Bamni	Sursuti	Patiram Munda	Male	26
300	Bamni	Sursuti	Nirmal Oraon	Male	40
301	Bamni	Sursuti	Sumari Munda	Female	50
302	Bamni	Sursuti	Sukri Oraon	Female	35
303	Bamni	Sursuti	Laxman Munda	Male	67
304	Bamni	Sursuti	Nima Munda	Female	25
305	Bamni	Sursuti	Kamini Oraon	Female	55
306	Bamni	Sursuti	Sukram Munda	Male	30
307	Bamni	Sursuti	Nirlal Oraon	Male	35
308	Borodighi	Sursuti	Piru Oraon	Male	57
309	Borodighi	Sursuti	Bishal Oraon	Male	26
310	Borodighi	Sursuti	Sukra Khariya	Male	60
311	Borodighi	Sursuti	Pati Oraon	Female	48
312	Borodighi	Sursuti	Dome Khariya	Male	66
313	Borodighi	Sursuti	Gondori Oraon	Female	70
314	Borodighi	Sursuti	Karma Oraon	Male	90
315	Borodighi	Sursuti	Bablu Oraon	Male	26
316	Borodighi	Sursuti	Suni Oraon	Female	38
317	Borodighi	Sursuti	Kayo Oraon	Female	58
318	Borodighi	Sursuti	Mitku Oraon	Male	55
319	Borodighi	Sursuti	Kamesh Oraon	Male	39
320	10mile	North Sevoke	Ramkumar Subba	Male	52
321	10mile	North Sevoke	L.B. Ghale	Male	77
322	10mile	North Sevoke	Deepak Rai	Male	50
323	10mile	North Sevoke	Heera Subba	Female	52
324	10mile	North Sevoke	Domok Biswakarma	Male	50
325	10mile	North Sevoke	Deepa Thapa	Female	34
326	10mile	North Sevoke	Hemant Ghimirey	Male	30
327	10mile	North Sevoke	Rebika Rai	Female	48
328	10mile	North Sevoke	Birkhe Biswakarma	Male	78
329	10mile	North Sevoke	Roma Ghimirey	Female	28
330	10mile	North Sevoke	Bhagat Rai	Male	48
331	10mile	North Sevoke	Karan Biswakarma	Male	19
332	10mile	North Sevoke	Seema Rai	Female	36
333	10mile	North Sevoke	Jyoti Biswakarma	Female	27
334	10mile	North Sevoke	Ganesh Chettrey	Male	50
335	10mile	North Sevoke	Suren Kami	Male	36
336	Dhotrey	Dhotrey	Gopal Chetrey	Male	29
337	Dhotrey	Dhotrey	Nabin Rai	Male	38

Sl.No	Village	MPCA	Name of community member	Gender	Age
338	Dhotrey	Dhotrey	Santi Tamang	Female	25
339	Dhotrey	Dhotrey	Rinji Tamang	Male	70
340	Dhotrey	Dhotrey	Shree Prasad Rai	Male	75
341	Dhotrey	Dhotrey	Pushpakala Mukhia	Female	18
342	Dhotrey	Dhotrey	Kumar Tamang	Male	66
343	Dhotrey	Dhotrey	Nitu Tamang	Female	24
344	Dhotrey	Dhotrey	Kundan Tamang	Male	33
345	Dhotrey	Dhotrey	Sanam Wangdi Sherpa	Male	63
346	Dhotrey	Dhotrey	Onge Tamang	Male	60
347	Dhotrey	Dhotrey	Sarmila Rai	Female	45
348	Dhotrey	Dhotrey	Suresh Chettri	Male	49
349	Dhotrey	Dhotrey	Sarita Tamang	Female	24
350	Dhotrey	Dhotrey	Reena Mukhia	Female	16
351	Dhotrey	Dhotrey	Subhash Tamang	Male	31
352	Dhotrey	Dhotrey	Sumi Tamang	Female	28
353	Dhotrey	Dhotrey	Phoolmaya Rai	Female	61
354	Dhotrey	Dhotrey	Jiban Tamang	Male	53
355	Dhotrey	Dhotrey	Nisha Rai	Female	18
356	Dhotrey	Dhotrey	Mani Raj Rai	Male	19
357	Dhotrey	Dhotrey	Chunnyu Sherpa	Female	44
358	Dhotrey	Dhotrey	Aity Tamang	Female	50
359	Dhotrey	Dhotrey	Dawa Tamang	Male	55
360	Dhotrey	Dhotrey	Anjuli Subba	Female	26
361	Dhotrey	Dhotrey	Sukmati Tamang	Female	83
362	Sellembong	Dhotrey	Lakpa Chiki	Female	30
363	Sellembong	Dhotrey	Pemba Sherpa	Male	30
364	Sellembong	Dhotrey	Passang Nuri Sherpa	Male	38
365	Sellembong	Dhotrey	Passang Sherpa	Male	49
366	Sellembong	Dhotrey	Phurba Lamu	Female	26
367	Chotahatta	Dhotrey	Ram Bahadur Rai	Male	40
368	Chotahatta	Dhotrey	Som Bahadur Rai	Male	54
369	Chotahatta	Dhotrey	Chandrakala Rai	Male	50
370	Chotahatta	Dhotrey	Bhagirathi Rai	Male	67
371	Chotahatta	Dhotrey	Abraham Rai	Male	63
372	Chotahatta	Dhotrey	Bhagat Rai	Male	28
373	Chotahatta	Dhotrey	Sunita Rai	Female	35
374	Chotahatta	Dhotrey	Barnabas Rai	Male	28
375	Chotahatta	Dhotrey	Ram Bahadur Rai	Male	45
376	Chotahatta	Dhotrey	Dhiraj Rai	Male	28
377	Chotahatta	Dhotrey	Anjana Rai	Female	22
378	Chotahatta	Dhotrey	Kamala Rai	Female	45
379	Chotahatta	Dhotrey	Laldhan Rai	Male	65
380	Chotahatta	Dhotrey	Santosh Rai	Male	47
381	Chotahatta	Dhotrey	Diksha Rai	Female	19
382	Chotahatta	Dhotrey	Ditesh Rai	Male	14

Sl.No	Village	MPCA	Name of community member	Gender	Age
383	Chotahatta	Dhotrey	Dil Kumar Rai	Male	58
384	Chotahatta	Dhotrey	Kumari Rai	Female	35
385	Chotahatta	Dhotrey	Stella Rai	Female	22
386	Chotahatta	Dhotrey	Neera Rai	Female	36
387	Chotahatta	Dhotrey	Pem Cheki Sherpa	Female	43
388	Chotahatta	Dhotrey	Bobita Rai	Female	40
389	Chotahatta	Dhotrey	Ashok Rai	Male	34
390	Chotahatta	Dhotrey	Punya Prakash Rai	Male	42
391	Dilpa	Tonglu	Lakpa Temba Sherpa	Male	57
392	Dilpa	Tonglu	Passang Lamu Sherpa	Female	31
393	Dilpa	Tonglu	Nimdiki Sherpa	Female	55
394	Dilpa	Tonglu	Rohit Chettri	Male	14
395	Dilpa	Tonglu	Srijana Magar	Female	17
396	Dilpa	Tonglu	Nirmala Chettri	Female	17
397	Dilpa	Tonglu	Tashi Sherpa	Male	62
398	Dilpa	Tonglu	S. B. Thapa	Male	74
399	Dilpa	Tonglu	Nuri Sherpa	Male	22
400	Dilpa	Tonglu	Passang Sherpa	Male	75
401	Dilpa	Tonglu	Sunima Sherpa	Female	58
402	Dilpa	Tonglu	Yoses Sherpa	Male	28
403	Tonglu	Tonglu	Raju Thapa	Male	36
404	Tonglu	Tonglu	Ashma Thapa	Female	16
405	Tonglu	Tonglu	Rojina Thapa	Female	33
406	Tonglu	Tonglu	Anisa Thapa	Female	17
407	Tonglu	Tonglu	Sabina Rai	Female	20
408	Tonglu	Tonglu	Tsering Sherpa	Female	44
409	Tonglu	Tonglu	Kumar Thapa	Male	48
410	Magma	Tonglu	Lakpa Sherpa	Male	69
411	Magma	Tonglu	Dichen Yalmoo	Female	25
412	Magma	Tonglu	Geeta Tamang	Female	36
413	Magma	Tonglu	Rachna Thapa	Female	25
414	Magma	Tonglu	Pranisha Pradhan Rai	Female	25
415	Magma	Tonglu	Tshering Sherpa	Male	34
416	Magma	Tonglu	Chandra Kumar Pradhan	Male	67
417	Magma	Tonglu	Surya Chamling	Male	33
418	Magma	Tonglu	Harka Bahadur Rai	Male	44
419	Magma	Tonglu	Chokey Sherpa	Female	27
420	Magma	Tonglu	Santakumar Rai	Male	56
421	Magma	Tonglu	Birbahadur Rai	Male	45
422	Tumling	Tonglu	Sange Serpa	Male	28
423	Tumling	Tonglu	Parbati Gurung	Female	60
424	Tumling	Tonglu	Biraj Gurung	Male	25
425	Tumling	Tonglu	Oom Gurung	Male	40
426	Tumling	Tonglu	Kalo Gursing	Female	35
427	Tumling	Tonglu	Chandra Bahadur Rai	Male	65



National Medicinal Plants Board
Ministry of AYUSH

Central Sector Scheme
on
Conservation, Development and
Sustainable Management
of
Medicinal Plants

OPERATIONAL GUIDELINES



National Medicinal Plants Board

Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homoeopathy
(AYUSH)
Government of India



**Central Sector Scheme on Conservation,
Development and Sustainable
Management of Medicinal Plants**

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**NATIONAL MEDICINAL PLANTS BOARD
MINISTRY of AYUSH
GOVERNMENT OF INDIA**

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CONTENTS

1. Preamble	1
2. Objective	2
3. Strategy	4
4. Component of the scheme	6
4.1 Conservation of medicinal plants through Multi-Pronged Strategy	6
4.1.1 <i>In-situ</i> Conservation	6
a) Medicinal Plants Conservation and Development Areas (MPCDA)	6
b) <i>In-situ</i> resource augmentation	8
4.1.2 <i>Ex-situ</i> Conservation	9
4.1.3 Engaging Eco task Force for rehabilitation of critical Medicinal Plant Habitats	12
4.2 Support to JFMCs/Panchayats/Van Panchayats/BMCs/SHGs	13
4.3 Technology Development, Research and Quality	16
4.3.1 Research and Development	16
4.3.2 Quality Assurance	19
4.3.2.1 Promotion of Good Practices	19
4.3.2.2 Raw Drug Repositories	21
4.4 Information, Education and Communication (IEC)	21
4.4.1 Participation in exhibition/fair & publicity material	22
4.4.2 Aushadhi Vanaspati Mitra Program (AVMP)	24
4.4.3 Workshop/Seminar/Conference & Arogya Fair	24
4.4.4 Financial Obligation of Contractual Farming Activities of Previous Plan	26
4.4.5 Publication	26
4.4.6 Setting up of web portal	27
4.4.7 Training and Capacity Building	28

4.4.8	Facilitation centres	29
4.5	Herbal Gardens	32
4.5.1	Home Herbal Gardens	32
4.5.2	School Herbal Gardens	33
4.5.3	Institutional/Public Herbal Gardens	34
4.5.4	National/State Herbal Gardens	35
4.6	Other Promotional activities	36
4.7	Other Interventions	37
4.7.1	Bi-lateral/International cooperation	37
a)	Setting up of information centers in Indian Missions abroad	39
b)	Commissioning studies on Specific aspects of medicinal plants	39
4.7.2	Marketing	40
a)	Marketing Intervention	41
b)	Minimum Support Price (MSP)	42
4.7.3	Medicinal Plant Species Specific Campaign including use of Multimedia	42
4.8.	Institutional Strengthening	43
4.8.1	Strengthening of SMPBs	43
4.8.2	Regional Centres of NMPB	44
5.	Administrative & Financial Arrangements of NMPB	46
5.1	Project Screening Committee (PSC)	46
5.2	Standing Finance Committee (SFC)	47
6.	Procedure for processing project proposal for approval	49
7.	Implementation and Monitoring	50
8.	Monitoring and Evaluation	53
9.	Appendix	55
	<i>Important Cost Norms</i>	55

10. Annexure I	59
<i>Cost Norms for Plantation of Medicinal Plants</i>	59
11. Annexure II	62
<i>Format for submitting Action Plan of Nucleus Centre of SMPBs</i>	62
12. Annexure III	64
<i>Format for seeking Assistance for Conservation, Resource Augmentation and JFMCs Components</i>	64
13. Annexure IV	72
<i>Format for submission of Research, Technology Development and Quality Assurance Proposal</i>	72
14. Annexure V	93
<i>Format for submission of Herbal Garden Proposal</i>	93
15. Annexure VI	97
<i>Format for submission of Proposal for Seminar/Symposium/ Conferences/ Workshops/ Capacity Building/ Training</i>	97
16. Annexure VII	101
<i>Format for submission of Proposal of School Herbal Garden and Home Herbal Garden</i>	101
17. Proforma for submission of Annual Progress Report	103
<i>Format-I (Conservation Project)</i>	105
<i>Format-II (Project of JFMCs/Panchayats/Van Panchayats/SHGs)</i>	107
18. Format for Utilization Certificate	109
19. Format for submission of Annual Statement of Accounts	110
20. Terms & Conditions of Financial Assistance	112
21. Annexure VIII	116
<i>Format for Signing Bond</i>	

Operational Guidelines for the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants

1. Preamble

India is home to diverse range of medicinal plants which have been used for centuries by the local people to meet not only their own primary health care needs but also to address ailments of domesticated animals (Pashuayurveda) & crops. (Vrikshayurveda). Medicinal Plants form the major resource base of our indigenous healthcare traditions. Although in recent years cultivation of medicinal plants has started gaining momentum, still a significant part of our requirements continue to be met from wild sources. In order to meet increasing demand for medicinal plants both domestic and from overseas markets we need to focus on both *ex-situ* cultivation of medicinal plants as well as *in-situ* conservation efforts through systematic surveys, augmenting local medicinal plants and aromatic species of medicinal significance through afforestation as per silvicultural principles and management prescriptions. With this in mind the Central Sector Scheme for conservation, development and sustainable management of medicinal plants was initially approved by the cabinet vide no. CCEA/21/2008 dated 26.06.2008.

The scheme also focusses on quality R&D, capacity building through trainings, raising awareness through promotional activities like creation of Home/School Herbal Gardens. The scheme also seeks to support programs for quality assurance and standardization through development of Good Agriculture and Collection Practices (GACPs); development of monographs laying down standards of quality, safety and efficacy; development of agro-techniques and a credible institution a mechanism for certification of quality of raw drugs, seeds and planting material. Apart from this, medicinal plants collection and trade accounts for as much as 40 to 50% of the household income in certain forest rich regions, hence, the scheme also aims at livelihood improvement of local communities, especially in forest fringe areas.

The Scheme has been continuing since the XI Plan and on the basis of experience gained, reports furnished by the third party monitoring agency and feedback from the stakeholders, it is clearly felt that the scheme needs to continue during the XII Plan period with appropriate modifications based on the experience gained.

The activities proposed to be undertaken in the scheme will also help the country to meet its international obligations in the field of medicinal plant's biodiversity and promoting bilateral/international cooperation which is not only critical for future growth of the sector but also for establishing India as a global leader in the sector.

2. Objectives of the Scheme:

The efforts of the National Medicinal Plants Board (NMPB) need to be considerably upscaled to tackle the whole range of issues impacting the sustained availability of quality herbs. The strategy needs to focus on both cultivation and collection, together with R&D, promotion and information dissemination through IT dedicated mechanisms for procurement of MAPs, ensuring Minimum Support Price, setting up networked Agri-Mandis for MAPs, drawing up a database of cultivators and growers / cooperatives. Speciality warehousing & strengthening of the supply chain is another priority area. In order to cater to the domestic market needs of ASU industry, promotion of primary producer companies (PPCs) should be taken-up in a focused manner. These organizations would then be brought into the foreground for marketing of their produce (either cultivated or collected from wild). The most important aspect is of-course capacity building of all the stake-holders especially the collectors who constitute the poorest of the poor of society

The main objectives of the scheme are as follows:

- Promote *in-situ* conservation of medicinal plants which are important to the AYUSH and Folk systems of medicine. In situ conservation measures would involve survey, inventorisation and documentation of important medicinal plants in their native/natural habitat coupled with resource augmentation in eco-systems where they form part of the naturally occurring biotic community, preventing degradation of such eco-systems in a holistic manner and reversing the onslaught of invasive alien weeds;
- Promote *ex-situ* conservation by supporting such programs in rural/ degraded forest/public/non-public/institutional lands/urban & peri-urban lands and waste lands.
- Engage the Eco-Task Force mechanism for reversing habitat degradation of medicinal plants. Conservation & development of eco-systems with medicinal plants bio-diversity.

- Promote R&D in all aspects of medicinal plants, development of agro-techniques, post-harvest management, storage and processing, developing molecular characterization tools etc. and promotion of IT.
- Enhance community mobilization and facilitate sustainable livelihood systems based on medicinal plants for farmers, collectors and other stake holders especially in forest fringe areas.
- Ensure Quality Assurance - Maintain Good Quality Gene Pool Sources of medicinal plants and aromatic plants having medicinal applications. Mapping, upgrading, modernizing of Medicinal Plants supply chain and creating/optimizing market linkages and value addition.
- Quality standardization, Good Collection Practices and Good Agricultural Practices for Medicinal Plants.
- Information, Education and Communication - through seminars, trainings and exposure visits promote capacity building and human resource development through appropriate inter-state and international exposure. Promote publication of documents, monographs, technical bulletins, documentaries, brochures, posters, other publicity materials, etc.
- Strengthen NMPB so as to more efficiently co-ordinate all matters related to medicinal plants and function as a clearinghouse of information on medicinal plants including their occurrence, usage, ethno-botanical uses, cultivation practices, Post - harvest practices, markets etc. Institutional Strengthening of SMPBs and creating regional/facilitation centres/Centres of Excellence to optimize the strategic reach of the AYUSH systems.
- Promote mainstreaming of medicinal plants in climate change mitigation strategies & promote regeneration/afforestation of medicinal plant tree species towards carbon sequestration.
- Take steps to meet India's international obligations in the context of medicinal plant biodiversity and promote bilateral/international cooperation.

3. STRATEGY

The scheme is proposed to be implemented during XII Plan period from 2014-15 onwards to facilitate conservation and maintenance of wild populations of Medicinal Plants for long term sustainability by adopting the following strategy :-

- a) Strengthen the Medicinal Plant Conservation Areas (MPCAs) by systematic survey, geo referencing of existing natural population of medicinal and native aromatic species having medicinal use.
- b) Enhance conservation through *in-situ* and *ex-situ* resource augmentation and artificial re-generation of local populations of medicinal and aromatic plant species.
- c) Expand area under medicinal and aromatic plants species of medicinal values linked with creation of nurseries to maintain good quality propagation material.
- d) Promote R & D to address the technology gaps particularly with respect to quality, documentation, identification of substitutes for important medicinal plants including RET listed plants and species with high demand in trade and bio-activity guided phyto-chemical studies, etc.
- e) Improve production, post-harvest technologies, and certification mechanisms for quality standards, Good Agricultural Practices (GAP), Good Field Collection Practices (GFCP) and Good Storage Practices (GSP) value addition and marketing infrastructure.
- f) Stay abreast of International Developments impacting conservation, availability, trade, quality assurance of medicinal plants.
- g) Provide livelihoods and economic benefit to forest dwellers, cultivators, local healers and other stakeholders.

3.1 National Medicinal Plants Board

The Medicinal Plants Board was setup under a Government Resolution notified on 24th November 2000 under the Chairmanship of Union Health & Family Welfare

Minister. The objective of establishing a Board was to establish an agency which would be responsible for coordination of all matters relating to medicinal plants. The Board has the function of coordinating with Ministries/Department/Organizations /State/UT Governments for development of medicinal plants in general and specifically in the following fields: -

- Assessment of demand/supply position relating to medicinal plants both within the country & abroad.
- Advise the concerned Ministries/Department/Organizations/States/ UTs Governments on policy matters relating to schemes and programs for development of medicinal plants.
- Provide guidance in the formulation of proposals, schemes and programs etc. to be taken by agencies having access to land for cultivation and infrastructure for collection, storage transportation of medicinal plants.
- Identification, inventorization and quantification of medicinal plants.
- Promotion of *ex-situ* and *in-situ* cultivation and conservation of medicinal Plants.
- Promotion of co-operative effort among collectors and growers and assisting them to store, transport and market their products respectively.
- Setting up of data base on medicinal plants, dissemination of information and facilitating prevention of patents on plants used in traditional systems.
- Matter relating to import/export of raw material, as well as value added products either as medicine, food supplements or as herbal cosmetics including adoption of better techniques for marketing of products to increase their reputation for quality and reliability in the country and abroad.
- Undertaking and awarding Scientific, Technological research and cost-effectiveness studies.
- Development of protocols for cultivation and control.
- Encouraging the protection of Patent Rights and IPR.

4. Components of the Scheme

4.1 Conservation of Medicinal Plants through multi-pronged strategy

4.1.1 *In-situ* conservation

A) Medicinal Plants Conservation and Development Areas (MPCDAs)

Objectives

In-situ conservation of important medicinal plants in their natural habitats by setting up MPCDAs, as well as strengthening/up gradation of existing Medicinal Plants Conservation Areas (MPCAs) through survey inventory, documentation, protection, and main streaming medicinal plants in habitat management approaches.

Activities

- a Setting up Medicinal Plants Conservation and Development Areas(MPCDAs) through survey, documentation of existing natural population of medicinal and aromatic plants, geo referencing. This would include:
 - As certaining threat status of various medicinal plant species traditionally obtained from the wild.
 - Identifying major causes of threat to the populations of threat ened species and possible remedy.
 - Drawing up of action plan for conservation and sustainable utilization of important medicinal plant species.
 - Stakeholders capacity building, documentation (including a good quality pictorial directory), hosting on website, conducting pilot research studies etc. for sustainable utilization, engaging services of qualified taxonomists and other necessary professionals for the purpose by the concerned State Agency/SMPB, preparation of case studies, promoting conservation values/ sustainability.
- b. Revisiting/ Reviewing/ documentation in respect of previously designated

MPCAs (established more than three years back under different schemes) for further development like up gradation, improving protection, documentation, communication/dissemination linking with area management plan, geo referencing, engaging professionals on short term basis, capacity Building, Community mobilization, hosting on website, piloting studies on utilization/ sustainability issues etc.

- c. Mainstreaming medicinal plant conservation in management approaches based on sound silvicultural/management principles, conducting systematic survey of local medicinal and aromatics plants with medicinal value, and incorporating sound scientific principles for their management in the Working/ Management Plans and its effective communication to Stakeholders. These management plans should also include details of MPCDAs, where they are constituted.

Eligibility

State Forest/Wildlife Department/Forest Development Corporation/Federations/ National and State level Research Organization/ Universities.

Non-Government/ Voluntary Organizations with expertise in the field (subject to the recommendation of concerned forest department.).

Coverage

On an average an MPCDA should extend over an area of 200 ha. though smaller areas of important medicinal plants bio-diversity including sacred groves can also be considered for MPCDAs.

Norms of Assistance

- To set up MPCDAs, 100% central assistance @ 20,000/- per hectare will be provided.
- For up-gradation/reviewing/ strengthening of previously designated Medicinal Plants Conservation Area (MPCA) which were established more than three years ago under NMPB or other schemes in various states, assistance @ 5,000/- per ha. will be provided.

- For main streaming medicinal plant conservation in management approaches based on sound management/silvicultural principles, a lump sum support of up to Rs.1.5 Lakhs will be provided per Forest Division to the concerned Forest/ Wildlife Division.

Submission of Proposals

The proposals from the State Forest/Wild Life Department in this respect will be submitted to NMPB in the relevant proforma as at Annexure - III. In case proposal is submitted by Forest Division/Circle a copy of the same should invariably be marked to PCCF/Chief Wild Life Warden as well which will help in implementation and monitoring the project.

Management support

One project management Consultant and one Data Entry Operator will be permitted to be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state for the component.

B) *In-situ* resource augmentation

Objectives

- Assisted natural regeneration or artificial re-generation of local populations of medicinal and aromatic plant species for conservation of genetic diversity of medicinal plants, thereby complementing the other biodiversity preservation and climate change mitigation interventions being implemented by the country as part of its international obligations.

Activities

- *In-situ* resource augmentation of medicinal species through assisted natural regeneration. Artificial re-generation of local populations of medicinal and aromatic plant species is particularly important in case of species where wild populations have dwindled on account of habitat degradation, and unsustainable harvest. Active interest and engagement of rural communities in such a conservation program is instrumental to address sustainability of the medicinal plant sector as a whole, hence financial support will also be provided for community mobilization through entry point activities.

Eligibility

- State Forest/Wild Life Departments/Forest Development Corporation.
- Public Sector Corporations/Federations having the mandate to carry out such activities, Voluntary agencies/Non-Government Organisations with experience in the field (only for technical support and capacity building)
- National and State level Research Organisation/Universities with the agreement of Forest Department.

Norms of assistance

cost norms for *in-situ* resource augmentation and plantation of medicinal trees, shrubs, herbs, climbers and perennials are given in **Annexure-I**.

Submission of Proposals

The proposal from the State Forest/Wild Life Department will be submitted to NMPB in the relevant proforma as at **Annexure - III**. In case proposal is submitted by Forest Division/Circle a copy of the same should invariably be marked to PCCF/Chief Wild Life Warden which will help in monitoring the project during its implementation.

Management support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring etc.

4.1.2 *Ex-situ* Conservation

Objective

Ex situ conservation of medicinal plants species is a complementary action to conserve the genetic diversity of medicinal plant species, thereby reducing pressure on wild habitats and augmenting raw material availability. For many species wild population shaved windled to critical levels and viable populations of these species are not available for initiating in situ conservation action. *Ex-situ* conservation/

plantation of medicinal plants will be a reliable seed source and also serve as field gene banks. This will also help in engaging larger number of stakeholders in production and regeneration of important medicinal plants and aromatic species of medicinal value.

Activities

- For expanding area under medicinal plants and aromatic species of medicinal value. Plantations of medicinal plants would be raised in lands outside designated forests. These plantations may be in blocks, strips, boundaries, marginal lands, agro-forestry models etc., in the countryside as well as urban / periurban locations.
- Such plantations would be raised by organisations having ownership / long term lease of lands and requisite technical competence either in-house or hired/outsourced.

Eligibility

- State Forest Departments/Social Forestry Divisions/State Wild Life Departments.
- Forest Development Corporations/Federations/SMPBs/Integrated Tribal Development Corporations/SC/ST Corporations (in the SC/ST lands)/Municipal bodies/ Housing Societies/PSUs/Voluntary Organisations with experience in the field provided they have the required technical competence.
- Scientific Organizations and AYUSH Institutes and other Government Agencies having the mandate/ capacity and interest in the field of medicinal plants.
- Corporate Sector (including reputed AYUSH manufacturers) in partnership with land owners and Panchayats Van Panchayats/ BMCs/ JFMCs will be considered for project based support subject to forming an SPV and demonstrating commitment by contributing at least ₹ 5.00 lakh rupees to an initial corpus to be dedicated for this purpose out of which at least ₹ 3.75 lakhs will be contributed by the corporate partner.

Norms of assistance

The cost norms for ex-situ plantation of medicinal trees, shrubs, herbs, climbers and perennials is given in **Annexure- I**.

- The Corporate Sector (including AYUSH manufacturers of repute) can also be supported for raising ex-situ plantations, including as components in boundary plantations, strip plantation, agro forestry, etc., with adoption of GAP & GFCP. For this purpose a Special Purpose Vehicle (SPV) involving the reputed AYUSH manufacturer and Panchayats or land owners will be formed. Rs.5 Lakh will be provided as initial corpus fund out of which at least 75% will be contributed by the concerned Corporate Sector. Financial support from NMPB will be considered in project mode and transferred to a separate bank account to be opened in the name of the SPV. Such proposals will be supported in project mode.

Submission of Proposals

The proposal from the State Forest/Wild Life Department will be submitted to NMPB in the relevant proforma as at **Annexure - III**. In case proposal is submitted by Forest Division/Circle, a copy of the same should invariably be marked to PCCF/Chief Wild Life Warden which will help in monitoring the project during its implementation. The proposals by the corporate sector will be submitted to NMPB as well as to SMPB concerned concurrently. The SMPB will render its inputs, if any, within a period of three weeks of receipt of the proposals to the NMPB as well as to the organization concerned, failing which the proposal will be put up for consideration of the PSC/ SFC.

Management support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state.

4.1.3 Engaging Eco Task Force for rehabilitation of critical Medicinal Plant Habitats

Objective

To secure reverse/acute degradation of natural habitats in various parts of the country along with eco-restoration through plantation of medicinal and aromatic plants.

Activities

The natural habitat of various important medicinal plants are facing high degradation threats. In order to mitigate such threats, Eco-Task Forces have been successfully engaged to secure reverse/acute degradation of natural habitats in various parts of the country. It is therefore, proposed to commission services of Eco-Task forces involving Ex-servicemen/Territorial Army. This effort is to be initiated in a project mode to be approved by the SFC. The concerned State Forest Department, Ministry of Defence and Ministry of Environment and Forests will be consulted for taking up any such initiative. Proposals under this component should have a plantation of at least 60% of the area with native species of medicinal plants.

Eligibility

Eco Task Forces set up in different parts of the country.

Coverage

At least 400 hectares per Eco Task Force per annum will be taken up.

Norms of Assistance

The cost norm for this activity will be project based.

Submission of Proposal

The proposals from States will be received by NMPB which will organize a tripartite initial consultation with MoEF and Army/ Headquarters before duly considering the project.

Management support

The project management Consultant along with one Data Entry Operator will be permitted to be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and rendering technical support.

4.2 Support to Joint Forest Management Committees (JFMCs)/ Panchayats/Van Panchayats/SHGs/BMCs for setting of local cluster for value addition, drying, warehousing and augmenting marketing infrastructure, etc.

Objectives

There is a need to channelize production and promote sustainable supply of medicinal plants, through capacity building of JFMCs/Van Panchayat/ Panchayats/ local SHGs/BMCs about the medicinal plants & aromatic species of medicinal value that are locally available for encouraging sustainable harvest, adoption of good collection practices, proper post-harvest handling, marketing and regeneration of NTFPs, etc. This activity will provide livelihood augmentation to local and forest fringe communities.

Activities

- Support will be provided for creation of facilities (including equipments for value addition through drying, de-stoning, cleaning, grading, pulverizing, processing, powdering, billeting and packaging, extracting, warehousing, etc. Capacity building through training programs and exposure visits on Good Collection Practices, Cultivation Practices and Organic Certification.
- Marketing support will be provided for organizations of stakeholders/ buyer-seller meets at Forest Development Agency (FDA) District/ Division level, Entrepreneurship development for micro and small enterprises (training).
- Packaging/handling equipment, testing facilities created in individual JFMC/ BMC or pooled facilities catering to more than one JFMC/ BMC/village/ Panchayats will be supported.
- Support will be provided for limited resource augmentation and production

of seedlings of medicinal plants & aromatic species of medicinal value, if not supported under any other components of the Scheme.

- Capacity building of primary collectors, women Self Help group (SHG), Public Sector Corporations dealing with NTFC, Tribal Welfare Department and frontline Forestry Personnel duly recommended by Local Forest Department/ SMPB.
- Generation of livelihoods through collection of medicinal plants needs to necessarily be linked with marketing of the produce so collected. In order to facilitate the collector's livelihood, support needs to be provided in the interregnum between collection and actual marketing which will be recoverable from the final payment made for the produce by the organisation like the Forest Development Corporation or any other agency implementing the scheme. For this it is desirable that working capital should be earmarked by the state government for the implementing agency. NMPB would contribute 50% of the amount so provided by the state government as working capital.
- The JFMCs/ Panchayats/Village Institution's resources can be pooled for collective activities/interventions at common strategic nodal locations involving a number of such local institutions of various villages. Thus the concerned Departments/Agencies in their proposals can consider a cluster approach (where feasible) so that investment made in a unit can actually have a ripple beneficial effect on adjoining JFMCs/Panchayats/Hamlets, etc. and the project resource can be pooled to create strategically located collective processing or other common facilities.

Eligibility

- Joint Forest Management Committees through FDAs/Forest Departments.
- Panchayat/Van Panchayats/BMCs/ Eco development committees.
- Other state co-operative/corporate bodies in-charge of medicinal Plants collections and trade.
- Reputed NGOs/ Academic organisations with a demonstrable track record (only for activities like community mobilization, hand holding, capacity building, exposure visits, market linkages etc.)

Norms of assistance

The assistance will be based on proposals received from the eligible agencies through the Forest Development Agencies (FDAs)/BMCs and will be limited to a maximum of Rs.15.00 lakhs per JFMC/Van Panchayats/BMCs. The project proposal should be consolidated at the level of FDA/District and forwarded to the State Government/SMPB. The proposal should be formulated keeping in view the following details:-

- The size of area to which JFMCs/Van Panchayat has access for collection of medicinal plants.
- The species details of medicinal plants being traditionally traded in local/village hatts/mandies and weekly markets in various seasons of the year.
- Local stakeholders involved in collection of medicinal plants and likely to benefit from the project.
- Dependence of community on local traditional Vaidya's, medicinal plants for their healthcare needs.
- Availability of good NGO partners for community capacity building and hand holding.
- Details of the infrastructure of trade centres, processing units, if any present in the area.
- Availability of other alternative livelihood opportunities to the members of the JFMCs/BMCs/SHGs etc.
- Potential for Resource augmentation Sustainable Collection and Market Linkage.

Submission of Proposals

The proposal from the eligible agencies in the relevant proforma as at **Annexure - III** will be submitted through State Forest/Wild Life Department to NMPB. In case proposal is submitted by Forest Division/Circle a copy of the same

should invariably be marked to PCCF/Chief Wild Life Warden which will help in monitoring the project during its implementation.

Management support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state.

4.3 Research, Technology Development and Quality Assurance

4.3.1 Research & Development

Objectives

Development of medicinal plant sector in the country is suffering from scattered and inadequate research on various crucial aspects. The research results need to be consolidated, gaps identified and new initiatives taken to address such research needs.

Activities

- (a) Research and Technology Development in the following areas can be supported in project mode:
- Traceability of raw drugs from harvest to consumption level.
 - Germination and seed treatment protocols and certification.
 - Bio-prospecting, population assessments and conservation biology of Medicinal Plants and Medicinal Aromatic Species (MASs).
 - Collection, compilation, documentation, validation and digitization of published scientific information on various aspects of selected Medicinal Plants and their ASU & H formulations and preparations of comprehensive monographs thereof.
 - Identification of substitutes/adulterants for traded medicinal plants using pharmacognostic, pharmacological and molecular parameters for their inclusion in Pharmacopoeia.

- Finding substitutes for RET listed medicinal plants and finding use of sustainable alternative plant parts.
- Research aimed at lowering cost of cultivation and production of extracts, phytochemicals, natural colours, flavours and fragrances by using latest R&D technologies.
- Bio-activity Guided Fractionation.
- Development of DNA barcoding, spectrometry HPLC methods etc. for phyto-constituents (preferably the bio-actives/marker compounds) and validation of these methods.
- Study of phyto-chemical variations within available genotypes, chemotypes, ecotypes etc., development of post-harvest treatment, search for elite quality germplasm and development of quality planting material for mass scale propagation.
- Establishment of quality standards in respect of norms related to toxicity and heavy metal content to increase acceptability of botanicals in the International market.
- The impact of invasive species on habitats of native medicinal plants and foreign matter on the safety and efficacy of medicinal plants including MASs in their habitat.
- Development of Biotechnological Techniques (BT) & Information Technology (IT) based tools applications related to Medicinal plants.
- Ethno-medicinal documentation and exploration.
- Marketing, econometrics policies/ regulatory issues related to Medicinal Plants.
- Establishing National and regional raw drug repositories for references.
- Study the impact of environmental changes like global warming and topographical variations in medicinal plants.
- Setting up of national and regional Botanical Reference Standards (BRS).
- Development of improved planting materials, germ plasm bank, development of improved cultivars etc.

- Any other emerging issues or suggestions rendered by SFC.
- (b) M.Phil/ Ph.D/ Post-Doctoral Fellowship programme on subjects related to medicinal plants through various Educational/ Research Institutions in the country, will be supported. Applications will be screened by the Project Screening Committee of NMPB, which will also finalise the emoluments based on prevailing arrangements in other similar Institutions. NMPB will also engage directly a limited number of JRF/SRF/Research Assistants, etc. (upto five) as per UGC/DST norms for specific projects while allowing them to enrol in academic institutions to pursue doctoral/other studies. The engagement and emoluments will be finalised by Project Screening Committee on research and bring this to the notice of SFC.

Eligibility

- R&D Institutions under CSIR, ICAR, ICFRE, ICMR, DBT, DST, Councils of Department of AYUSH etc.
- Universities recognised by the UGC.
- Industry both in public as well as private sector with R&D facilities.
- Non-government Organisations/Voluntary Organisations, with demonstrated expertise and infrastructure.
- Government funded institutes/colleges with demonstrable track record infrastructure and expertise.

Norms of Assistance

R&D Institutions/Universities in the public sector/Government Aided colleges etc. will be eligible for 100% assistance. However, organizations/labs/Institutions in private sector will be eligible for 50% assistance.

Submission of Proposals

The proposals for R&D will be invited so that strategic research in critical areas is assigned to competent organizations/ scientific professionals. The

eligible organization can apply directly to NMPB in the relevant proforma as at **Annexure - IV** where the proposal will go through scrutiny by the Project Screening Committee (PSC) before being considered for approval by SFC. Prior to placing before the PSC, wherever appropriate the research proposal can first be referred to subject expert by NMPB for taking expert's opinion on quality of the proposals. For such scrutiny a fee of Rs. 1500/- per proposal will be paid to the domain expert by the NMPB for examination and comments.

Management Support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state.

4.3.2 Quality Assurance

Objectives

Today globally companies are looking for traceability of raw materials to their source, as it is obvious that the quality of the end product can only be as good as the quality of the components that go into that product. Hence the importance of maintaining good standards while collecting, cultivating and post-harvest handling of the raw material cannot be over emphasized.

4.3.2.1 Promotion of Good Practices

- For India to become a global hub in medicinal plants processing, we need to list out the challenges faced by the sector. One of the most important stakeholders is the group of intermediaries who are a very important part of the supply chain from collectors / cultivators to the end users of the raw material. These intermediaries are largely in the private sector and deal with bulk handling of raw material from procurement to storage and sale in the mandies. This is the stage at which there are maximum chances of contamination of the raw material, due to lack of general hygiene. Elimination of such sources of contamination is imperative for tackling the issues of microbial overload in herbal products. In order to do so, extensive capacity building of the intermediaries is required. There is a need to create awareness about maintenance of high standards

of hygiene amongst collectors, cultivators, other raw material handlers and traders. This capacity building should be an on-going process through a series of stakeholder meetings, workshops, seminars etc. A strategy will be initiated for registration/devising regulation of important intermediaries in the Market Supply Chain of medicinal plants. This will be done by providing support in a project mode, to appropriate agencies.

- In addition to this, we need to evolve norms for proper handling of raw material i.e. what constitutes good practice as far as raw drug handling is concerned. Also there needs to be in place a system of self-regulation through peer groups in mandies. Consultancies studies will be commissioned for this purpose. This will also be addressed through focussed projects through SFC approval.
- Presently testing is by and large limited to the finished products. Industry has always held that in the absence of supply of contamination free raw material, it is not fair to expect the products to stand up to rigorous testing. Hence, maintaining a chain of practices to ensure good quality of raw material will create a win-win situation for the producers / traders on the one hand by ensuring better prices and the manufacturers on the other by ensuring greater market access. This will also be supported in a consultancy/project mode.

In order, to more effectively address the above challenges the following measures will also be taken in project/consultancy mode:

- a. Development of agro-techniques of selected medicinal plants.
- b. Protection of Good agricultural practices (GAP), Good Field Collection Practices (GFCP), Good Harvesting Practices (GHP) & Post Harvesting Practices, Good Storage Practices (GSP). The work done by QCI for GAP & GFCP in the 11th Plan will be taken forward towards actual field implementation in project mode.
- c. Support to testing laboratories, reimbursement of testing charges to stakeholders.
- d. Development of certification protocols for sustainable harvesting of seeds, planting materials and raw drugs from the wild in project mode.
- e. Other measures for Quality certification programmes as necessary.

4.3.2.2 Raw Drug Repositories

Another important aspect of quality is the true botanical identity of the herb. To ensure proper identity, there is a need to establish multiple Raw Drug Repositories (RDR), which can supply certified samples of Indian medicinal plants on cost basis, to act as Reference Standards.

Phytochemical reference standards (PRS) are required for assay purposes. There is a need to create a mechanism in India for consistent supply / sale of PRS required by various Pharmacopoeias for quality assessment of Indian medicinal plants.

For this purpose, it is essential to establish multiple Raw Drug Repositories, in different areas of the country. Each RDR could be encouraged to develop proficiency / core competence, in a few of the above listed scientific areas.

The RDR's should ideally work on development of "Key Distinguishing Characters" (KDC) for Indian medicinal plants so that they can be distinguished from their look alike / adulterants. Some of the techniques are:

- Pharmacognosy parameters like Macroscopy (organoleptic characters)
- Microscopy (Anatomy and powder microscopy), TLC, HPLC etc.
- DNA barcoding and fingerprinting
- Detection of characteristic/marker compounds
- Fingerprinting using new techniques like LC-MS-MS and NMR profile etc.

Norms of Assistance

For national repository of rawdrugs /BRS total assistance admissible is Rs. 10 crores, while for regional raw drug repositories it is Rs. 5 crores each to Govt. Organizations.

4.4 Awareness Building, Exposure Visits, Education and Capacity Building of Stakeholders through Information Education and Communication (IEC) strategy:

Medicinal plant sector involves an array of stakeholders varying from resource managers, cultivators, gatherers, supply chain intermediaries, traders, local

healers, researchers to manufactures and exporters. It is necessary to disseminate information on different aspects of medicinal plants like harvesting from wild, cultivation technologies, manufacturing, proper handling of raw material, trade, etc. among various target groups about the importance of development and management through an appropriate outreach strategy, Capacity building, appropriate recognition, incentivisation etc

Activities

- Publicity through regular participation in Exhibitions/Fairs
- Aushadi Vanaspati Mitra Program (AVM)
- Organizing Workshops/Seminars/Conferences/ Arogya Fair etc.
- Setting up of Facilitation Centres
- Medicinal Plant Species specific/Campaigns
- Systematic use of Multimedia and other appropriate communication tools.
- To meet liabilities / obligations of contractual farming cases from the previous Scheme
- Publication of Periodicals/Magazines and Newsletters
- Setting up and operation of Web Portal.
- Training and Capacity Building initiatives.

4.4.1. Participation in Exhibition/Fairs and Publicity Materials

To promote the message of Indian Medicinal Plants it is essential to participate in International/National/State Level Exhibitions/Fairs associating all important stake holder groups in the country. Besides, Trade fairs or Medicinal Plants Expo, etc. may also be supported or organized by NMPB, to raise awareness on the importance of medicinal plants among the stakeholders and general public.

Activities

- Participation in Exhibitions/Fairs with a focus on botanicals at State, National

and International level. Industry and other stakeholders will be encouraged to participate in such expos. NMPB would also participate in such events.

- Developing Souvenirs, Pamphlets, Booklets for display and distribution. Organizing quiz shows for children and students, setting up of interactive kiosks and touch screens and development of role plays..
- Development of different types of herbal kits for distribution to visitors, farmers and other stakeholders.
- Launching mobile exhibitions or Aushadi Chetna Yatra for spreading the message of medicinal plants through role plays, audio visuals, expert advice on conservation, cultivation, uses etc. of medicinal plants.

Eligibility

NMPB, SMPB, Industry, R&D Institutions/Universities, Government Organizations including Govt. aided Institutions, Non-government Organizations/Voluntary organizations etc.

Pattern of Assistance

Expenditure incurred by the organizations for participation in fairs etc. would be reimbursed subject to prior permission being obtained from NMPB for participation by the concerned organization. Reimbursable items of expenditure would include, hire charges, stall fabrication, developing publicity material, travel and accommodation. Total financial implication for such participation per event will be Rs.1.00 Lakh for state level, Rs.2.00 Lakhs for National level and Rs.3.00 Lakhs for international level. For private organizations including Industry, the cost would be limited to 50% of the above or the actual expenditure whichever is less (which includes Travel, Accommodation, hire charges, stall fabrication, publicity, etc.) will be reimbursed. The other activities will be in project mode.

Submission of Proposals

Participation in fairs/ exhibitions being time bound need to be examined as and when the proposals are received. Often, by the time the proposals go through the process of screening by PSC and approval by SFC the dates for the events are

over. Hence, the CEO NMPB will be authorized to approve expenditure on such activities subject to a limit of Rs 30 lakhs per annum. All those proposals will be put up to PSC post-facto.

Eligible Organizations can apply to NMPB in the relevant proformas as at **Annexure - VI.**

4.4.2 Aushadhi Vanaspati Mitra Program (AVM)

This aims at recognizing initiatives of individuals /community/institutions involved in conservation/cultivation, post-harvest management, R&D, marketing etc. of MAPs. These should be exemplary and successful initiatives which are creative, sustainable and have helped in improving medicinal plant raw material availability.

Eligibility

SMPB or any other appropriate state level organization recommended by the concerned SMPB will organize such program of Aushadhi Vanaspati Mitra Program of the concerned state.

Norms of Assistance

A total of Rs. 2.00 lakhs will be provided to each state per year, towards meeting the expenditure for three cash awards (not exceeding Rs. 65,000/- put together) and for organization of the event and other logistics. The States may, if they so desire vary the amounts and number of awards depending on the ground realities.

Submission of Proposals

SMPBs can apply to NMPB in project mode where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

.4.3 Organization of Work Shops/Seminars/Conferences and participation in AROGYA Fairs

The department of AYUSH organizes Arogya fairs from time to time in different states of the country. NMPB is required to set up stalls and display material in such

fairs for which there is a need of a dedicated agency who would not only install Arogya stall but also engage in similar work in other such fairs, buyer/seller meets etc. The agency will be selected as per GFR.

Participation in fairs workshops/ Seminars is also a time bound activity and will be considered by the CEO subject to the overall limit of Rs 30 lakhs as detailed under para 4.4.1

Objectives

Provide a platform for dissemination of the latest information on Medicinal plants to various stakeholders

Activities

Organizing Seminar/Workshop/Conferences/Exhibition/Arogya Fairs at district, regional, state, national and international level for promotion and awareness of medicinal plants.

Eligibility

- Central and State Government organizations.
- Recognized academic/Research/Educational institutions including Government Aided Colleges.
- Registered professional and other philanthropic organizations working on non- profit basis.
- Registered Non-Government Organizations (NGO)/Voluntary Organizations/ Trusts with infrastructure and experience in the field of medicinal plants.

Norms of Assistance

The financial assistance would be limited to Rs.1.00 Lakh for organizing district level event, Rs. 2.00 lakh for State, Rs. 3.00 Lakhs for regional level, Rs. 5.00 Lakhs for National level and Rs.10.00 Lakhs for international level event.

Submission of Proposals

Eligible Organization can apply to NMPB in the relevant proforma as at **Annexure – VI** where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.4.4 Financial Obligations of Contractual Farming Activities of Previous Plan

During the previous plan Contractual Farming of medicinal plants was carried out by farmers in different States of country and there are some obligations in respect of these activities/projects. To meet such obligations a corpus of Rupee 10.00 Lakh or the actual payable amount to eligible farmer(s) in a state (whichever is less) will be released to concerned SMPB at a time for further disbursement to eligible farmer(s). The payable amount to eligible farmer(s) will be released by SMPB after satisfying the terms and conditions of the guidelines at their end and NMPB's direction in this regard. The concerned SMPB will in turn submit the utilization certificates to NMPB for the amount utilized. In states where these obligations are of more than Rs. 10 Lakh, the subsequent grant-in-aid will be released to concerned SMPB as soon as the UCs for the released grant-in-aid are liquidated and in this way the necessary grant-in-aid to such SMPB will be released till the settlement of these obligations.

4.4.5 Publication of Periodicals/Magazines and Newsletters

NMPB can undertake publication of books, periodicals etc. through credible organizations which have proven competence in the field.

Activities

- Publication of books on different aspects of medicinal plants.
- Publication of newsletters through outsourcing.
- Subscription/purchase of national and international magazines/ journal/ periodicals on importance of medicinal and aromatic plants with medicinal value.
- Newspaper/media advertisements on medicinal plants as and when required.

Eligibility

Proposals will be considered from organizations which have proven competence in the field concerned.

Norms of Assistance

100% assistance will be provided in project mode.

Submission of Proposals

Eligible Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before being considered for approval by Standing Finance Committee (SFC).

4.4.6 Setting up & Operation of Web Portal

This is a felt need as NMPB is time and again called upon by various stakeholders including Ministries of GOI for advice on issues for which in-house competence is lacking and also to create a transparent, open access information source for all stake holders. Interactive portals on medicinal plants accessible to various Stakeholders will be supported. This could include query based platforms covering important aspects like Database, documentation, geographical distribution, clusters, products and other related technical and scientific information. The Portal would be supported by a panel of experts on various aspects of medicinal plants from an array of areas ranging from, cultivation, conservation, IPR issues, emerging national and international trends, etc. Existing well established portals developed by other organizations can also be taken over, up scaled and maintained.

Eligibility

Proposal will be considered from organizations which have proven competence in the field concerned.

Norms of Assistance

- Experts will be provided a fixed remuneration in consultation with the PSC.

- Other cost relating to development, hosting and maintenance of the portal would be project based.

Submission of Proposals

Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before being considered for approval by Standing Finance Committee (SFC).

4.4.7. Training and Capacity Building

Training plays an important role in spreading best practices on conservation, cultivation, good agricultural practices, good field collection practices, post-harvest management, marketing etc. Trainings will be provided to various stakeholders like cultivators, conservationists, traders, supply chain intermediaries, policy makers and end users.

Activities

- To organise training programmes for capacity building of stakeholders on medicinal plants (including cultivation, conservation, GAPs, GFCPs, GMPs, Storage, PHM and Market Information).
- Demonstration of technologies developed by Institutions at farmers field/conservation areas and natural habitats.

Eligibility

- Central and State Government organizations.
- Recognized Research/Academic/Educational institutions
- Registered professional and other philanthropic organizations working on non-profit basis.
- Registered Non-Government Organizations (NGO)/Voluntary Organizations/Trusts with infrastructure and specific experience in the field of medicinal plants

Norms of Assistance

- Rs. 2,000/- per trainee for a minimum of two days within the state and Rs. 5,000/- per trainee outside the state will be provided which will include exposure visits.
- For officers training/exposure visit within the State Rs. 5,000/- per trainee and outside their state the cost will be limited to Rs. 10,000 per trainee.
- Travel cost will be additional to the above cost.

Submission of Proposals

Eligible Organizations can apply to NMPB in the relevant proforma as at **Annexure - VI** where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.4.8 Facilitation Centers:

Development of medicinal plants requires an effective institutional mechanism for technology transfer on crops and varieties that can be grown in an agro climatic zone, the soil suitability for a particular crop, the cultivation practices, sources of seed and quality planting material. Farmers/ growers have felt need for hand holding support so that medicinal plants as a crop diversification option may pick up to the desired level.

Activities

- The Facilitation Centres (FCs) will provide a service window for growers of Medicinal Plants for supporting cultivation, provide handholding support to stakeholders in terms of technology dissemination, trainings, data compilation and maintenance etc.,. The Facilitation Centers will work in close co-ordination with the concerned State Medicinal Plants Boards (SMPB) and also provide Training in the formulation of projects of Medicinal Plants Cultivation and Development.
- Authentication of quality raw materials on the basis of Taxonomic identification and chemical parameters.

- Organisation of Stakeholders Meets
- Publication and dissemination of scheme guidelines, information on Agro-techniques, markets, prices etc. especially in local languages.
- To help in production of quality planting material by various agencies including Forest Department, NGOs and the private nurseries.
- Making available testing facilities for the material produced under NMPB schemes, where such facilities exist within the facilitation centres.

In the districts where Agriculture Technology Management Agency (ATMA) have a presence, they should also be involved in the technology dissemination and capacity building exercises.

Pattern of Assistance

The cost per Facilitation Center will be Rs.50.00 Lakhs for a period of three years.

S.No.	Particulars		Years			Total Amount (₹ in lacs)
			Ist	Ist	Ist	
1.	Training	No. of Trainings (No.)	5	5	5	
		No. of trainees (No.)	150	150	150	9.00
		Total amount @ ₹ 2000 per trainee for a minimum of 2 days duration/exposure visits within the State (₹ in lakhs)				
2.	Exposure visits @ Rs. 5000/- per trainee	-	-	-	5.00	
3.	Stake holders meet (Workshop) (₹ in lacs)	2.00	2.00	2.00	6.00	
4.	(a) Publication of pamphlets, technical literature, Periodicals (including translation in the local languages)	2.00	2.00	2.00	6.00	
5.	Staff- (Project Assistant/ PDF-1) @ 15,000/- (Data Entry Operator-1) @10,000/-	3.00	3.00	3.00	9.00	

S.No.	Particulars				
	Activities	Years			Total Amount (₹ in lacs)
		1st	1st	1st	
6.	Mobility Support	1.00	1.00	1.00	3.00
7.	Institutional charges, (Ls)				2.00
8.	Kisan Call Centre	2.00	2.00	2.00	6.00
9.	Contingency	1.00	1.00	2.00	4.00
	Total				50.00

Note: The above table is indicative. Need based change within different heads, with due justification, will be permitted subject to approval by the PSC and SFC.

Eligibility

Departments of State Agriculture Universities, National and State Level Research Institutions, Non-profit making/philanthropic organizations doing considerable work on medicinal plants or related activities, with sound track record will be eligible.

Coordination with SMPB/Regional Centers

The Facilitation Center will work in close coordination with the SMPBs/Regional Centers. Maintaining Germ Plasm banks or the raising of QPM through the FC or appropriate scientific partners identified by FCs, if considered necessary, will be demand based and will be proposed as a separate project, for consideration of PSC and SFC.

The project proposal covering the above key parameters/ costing with minor variations depending upon local situations are permissible.

Performance Monitoring

The institution will also put in place an internal monitoring mechanism to review the progress.

Submission of Proposals

Eligible Organizations can apply to NMPB in the relevant proformas where the

proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

Management Support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state.

4.5 Promotion of Herbal Gardens

Herbal Gardens of various kind will be promoted under the scheme to create awareness about traditional usage of medicinal plants. This would include Herbal Gardens of National and State importance as well as at the level of Institutions, Schools, Universities, Colleges and Homes.

Eligibility

- Government Organizations, Universities, Research Institutes, Government Aided Colleges and Schools.
- Non-government Organizations (NGOs), Public Sector Undertakings, Federations, Co-operatives, and Societies including Housing Societies etc.

4.5.1. Home Herbal Gardens

Encouraging herbal gardens in the homes is a good way to promote use of medicinal plants for primary health care at the household level.

Activities

- Around 20 Medicinal and Aromatic species of which around 10 species (which in addition to medicinal plants could also include a few aromatic/food plants), based on locality specific need and demand will be distributed to interested households. A note on each species, usage and benefit of each species will be provided to the beneficiary by the implementing agency.
- A Database of all such households, including photographic documentation at

various stages of implementation will be submitted to NMPB along with a write-up on the process/approach adopted, benefit accrued and the sustainability mechanism.

- The implementing agency will take steps for raising awareness in the identified locality.
- In case of dense urban localities potted plants and terrace rearing of medicinal plants should be encouraged.
- These initiatives should be dovetailed with activities like Swachh Bharat, use of bio fertilizers, vermicompost etc.

Norms of Assistance

Financial assistance of Rs. 2500/- per Home Herbal Garden including cost of raising seedling, transportation, awareness raising, documentation, development, dissemination and use of publicity material, folk theatre, special campaigns, etc.

Submission of Proposals

Eligible Organizations can apply to NMPB in the relevant proformas as at **Annexure – V** where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.5.2 School Herbal Garden

Setting up of herbal gardens in schools is a good way of reaching the minds of children and make them acquainted with the commonly available and frequently used medicinal plants.

Activities

- Schools will be encouraged to set up herbal gardens with in their school complex. Schools can have separate plots to make up a total of 500 sq.m. for 10 – 15 species of medicinal plants including tree species.
- Schools will be responsible for maintenance of the Herbal Gardens including

irrigation with the active involvement of the students and parent-teacher associations/ NGOs and also make special arrangements during school vacation period. Students will be involved in labelling the plants, watering, weeding etc. which will enhance the knowledge of the students about the benefits and uses of the species nurtured by them.

- The material from School Herbal Gardens could be utilized for further propagation.

Norms of Assistance

Assistance will be given @ Rs.25,000/- per school for an area of 500 sq. m. first year for establishment and up to Rs.7,000/- per annum per school as maintenance cost for the next four years. In case, the schools are proposing area for the School Herbal Garden, which is more or lesser than 500 sq.m., assistance can be considered on pro rata basis based on the justification provided.

Submission of Proposals

Eligible Organizations can apply to NMPB through SMPB in the relevant proforma as at **Annexure – V** where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.5.3 Institutional/Public Herbal Gardens

To sensitize the AYUSH Professional College students/public at large about the usage of medicinal plants based on indigenous knowledge in colleges, universities, hospitals, other places of educational/ recreation/ public importance, assistance will be provided for planning and establishing larger herbal gardens.

Activities

- Establishment of herbal garden with medicinal plants and aromatic plants with medicinal value considering the importance of species/varieties of concerned areas.
- Use of proper cultivation practices
- Walking trails, signages etc. to be established in the garden.

- Proper documentation, data collection, harvest and post-harvest management operations to be a part of the herbal garden.
- Material harvested could be used for value addition or further propagation.

Norms of Assistance

- The activities supported would include land development, site protection, setting up irrigation facilities and procurement of basic planting material, laying of beds, planting, initial maintenance, signages, walking trails etc. @ Rs.3 lakhs per ha. for establishment.
- Thereafter annual maintenance of the Herbal Garden @ Rs. 60,000/- per year per ha. for a maximum of four years.

Submission of Proposals

Eligible Organizations can apply to NMPB in the relevant proforma as at **Annexure - V** where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.5.4 Herbal Gardens of State and National Importance

A few Herbal Gardens of National Importance will be supported in various Eco-regions of the country in project mode. Similarly, Herbal Gardens of State importance can be established to promote and popularize medicinal plants in an organized manner on a bigger scale. These type of gardens will be established at important or prominent places like the Herbal Gardens at President's/Governor's Estates in the past and will be supported for maintenance for a longer period. Similarly, Herbal Gardens can be created in State Secretariats, Institutions of National importance, prominent tourism spots, Defense establishments, Railways, Corporations and Municipalities, etc. in project mode. 2 – 4 such Herbal Gardens will be supported in each state at sites notified by the state government specifically for this purpose in consultation with NMPB.

Activities

Establishment and maintenance of herbal gardens, keeping in view all the required modalities like walking trails, signages, landscaping, planting in beds and proper

documentation, etc. Use of herbal gardens in supplying propagation/raw material will also be explored.

Norms of Assistance

The proposal received in a project mode will be examined at PSC level and financial assistance will be provided as per the actual requirement with the approval of SFC, NMPB.

Submission of Proposals

Eligible Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

Management Support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state.

4.6. Other Promotional Activities

Support for establishing nursery and development of Quality Planting Material/ Germ Plasm Banks

Activities

Support for establishing nursery as a part of any project proposal will be provided

Norms of Assistance

For creation of nursery covering an area of 1 ha Rs. 6.25 Lakhs per unit to be given in two installments. The assistance will be to the extent of 100% to public sector/SHGs and 50% of the cost subject to a ceiling of Rs.3.125 Lakhs in private sector. The nursery will have appropriate infrastructure facility (net house, beds, vermi-compost, signage, irrigation system) to hold 50,000 to 70,000 plants. The organization must have a sustainability plan.

Submission of Proposals

Eligible Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.7. Other Interventions

4.7.1 Bilateral/International cooperation and collaboration with International Agencies

Ministry of AYUSH is exploring bilateral and international collaboration in the field of medicinal plants with other countries. MOUs for bilateral Collaboration in the field of medicinal plants has already been developed for NMPB which could be appropriately fine-tuned for country specific needs for collaboration requirements. In addition, Collaboration will be explored with international agencies like FAO, World Bank, Asian Development Bank (ADB), UNDP, TRAFFIC, GEF, etc. for mainstreaming of medicinal plant development strategies.

The traditional knowledge based on genetic resources needs to be brought under international best practices on TK & GRs like Access and Benefit Sharing (ABS), Prior Informed Consent (PIC), etc. There are international agreements and protocols to deal with all of these issues, which are constantly evolving and we need to, not only keep abreast of all such developments but also get them tailored to suit India's interest provided we are in a position to put forth our point of view at the correct time. It is evident that the National Medicinal Plant Board (NMPB) should have a dedicated mechanism to carry out requisite spadework to enable it to forge linkages with likeminded countries and render meaningful inputs to argue our case at the relevant international forums, like the meetings of the Conference of Parties (CoPs) of the Convention on Biodiversity (CBD) especially the current discussions on the ongoing program of work, access and benefit sharing issues under the Nagoya Protocol, trans-boundary issues under the Cartagena Protocol on biosafety etc.

Activities

- Participation in meetings of the relevant agencies at the international level.

- Exchange visits of experts with countries of interest especially those having similar biogeography as India.
- Participation in reputed international seminars/exhibitions on botanicals such as Ingredients Russia, Food ingredient China, Vita Foods South America, Canadian Health Food Association, International Food Ingredients and Additives (IFIA), Japan, Supply Side West, CPHI, World Wide. A list of important events will be drawn up after the approval by the SFC. This would also entail subsidizing industry desirous of such participation on reimbursement basis.
- Setting up information centers on medicinal plants in Indian Missions abroad.
- Providing financial assistance for acquiring international certification.
- Subsidizing specific market promoting activities like product registrations, GRAS (Generally Recognized as Safe) affirmation, international certifications, positive listing of Indian botanicals in the importing countries (viz. ARTG of TGA) etc.
- Resolving issues of botanical ingredients which have been illogically banned by some international regulatory bodies.
- Commissioning studies on international regulations in the medicinal plants sector as knowledge about this is scarce at present.

Eligibility

Proposals from Industry and reputed agencies having experience in international regulation on medicinal plants will be considered in project mode for commissioning studies.

Norms of Assistance

Expenditure incurred by the Industry organizations for participation in international exhibitions/ fairs etc. would be reimbursed subject to prior permission being obtained from NMPB for participation by the concerned organization. Reimbursable items of expenditure would include, hire charges, stalls fabrication, developing publicity material, travel and accommodation. Reimbursement would be limited to

50% of the expenditure or Rs. 3.00 lakhs whichever is less. Other activities will be supported in project mode with 100% assistance to Public Sector and 50% of the project cost to the private sector. NMPB can also lead delegations/participate in these events.

a) Setting up of information centers in Indian Missions abroad

Information Centers for Medicinal Plants are a good way to create awareness of Indian medicinal plants. The extent of financial support for this purpose will be determined on country-basis on the recommendation of the concerned Indian Embassy, as per actual financial implication.

The proposals in project mode formulated by NMPB will be examined and approved by SFC.

(b) Commissioning studies on Specific aspects of medicinal plants

Objectives

To keep pace with the increasing trend in demand for medicinal plants' raw materials, it is necessary to 'periodically update the information on various aspects like production, collection, supply & marketing. Such updating will be done by commissioning subject specific studies from time to time Support for collection of statistical information related with various aspects of medicinal plants may be provided to SMPB or other agencies identified having competence in this area by NMPB or the States.

Major areas of studies

An illustrative list of themes is as below:-

- Developing a data base of National and Regional Traders of medicinal plants and initiate work towards their registrations.
- Developing a data base of Farmers/cultivators.
- Demand and Supply of Medicinal plants

- Livelihood/yield studies
- Supply Chain Mapping
- Rationalization of Transit Pass system
- Consolidation of Yield
- Whole sale Price Data
- Developing case studies and success stories

Such studies would be awarded as per GFR provisions.

Norms for assistance

Project based proposals Will be considered by PSC/SFC.

4.7.2. Marketing

Market Information Services are characterized by lack of domain information on techniques and commercial opportunities, absence of Resource Centers with a regional MAP crop focus and little or no access to international markets. Currently marketing of MAPs happens through Mandis & commodity boards, Agricultural produce marketing committees etc. There are numerous intermediaries. There are examples from states like Uttarakhand where the State Forest Development Corporation have started both fixed and floating mandis which procure MAPs from the doorstep of gatherers thus preventing exploitation and also ensuring remunerative prices.

The following steps will be taken up:

In order to cater to the domestic market needs of ASU industry, promotion of primary producer companies (PPCs) would be taken-up in a focused manner. These organizations would then be brought into the foreground for marketing of their produce (either cultivated or collected from wild).

- Promotion and information dissemination through IT dedicated mechanisms for procurement of MAPs.

- Networked AgriMandis for MAPs
- Database of Cultivators
- Contract Extractions (PHM)
- Speciality Warehousing & Supply Chain development
- Integration of all Portals with techno commercial information
- Creating an on line MAPs Trade Exchange
- Integration with Krishak Call Centers, KVKs etc

a) Marketing Intervention

Currently marketing of Medicinal plant produce happens through Mandis and other whole sale markets. Trade is rather opaque and information on prices, arrivals and other trends are not easily accessible to farmers/growers. The following steps will be initiated in order to fill this gap.

- Documenting trade practices.
- Generating information on wholesale prices, arrivals and trends in different markets to benefit both growers and buyers.
- Establishing communication network for speedy collection and dissemination of market data for its efficient and timely utilization.
- Preparing farmer's advisories and issuing the same for the Benefit of farmers towards optimizing returns.
- Developing Databases of Cultivators and Cultivars.
- Integrating and mainstreaming of Medicinal Plants through call centres including Kisan call centres initiatives of Ministry of Agriculture.
- Putting in place an appropriate pricing regime in respect of produce sourced from wild v/s cultivation in favour of cultivated material so as to encourage cultivation and reduce pressure on the natural resources.
- Streamlining of HS Codes.

Eligibility

Proposals from reputed agencies having experience in in the field on medicinal plants will be considered in project mode for commissioning studies.

Submission of proposals

Eligible Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

b) Minimum Support Price (MSP)

In order to supplement the efforts of state governments to encourage sustainable collection of medicinal plants, NMPB would support State agencies engaged in procurement of medicinal plants to the extent of 25% of the amount paid by the agency to the collectors.

- Such support from NMPB will be provided to State Governments which have a definite mechanism for providing MSP support for medicinal plants.
- The support of MSP for medicinal plants however will not be automatic but would be considered on a case to case basis in project mode based on the steps taken by State govt. and which are likely to support or result in aiding to help conservation & sustainable livelihoods.
- The mount of MSP support would be released in two instalments subject to the states demonstrating that this measure has a positive impact on conservation & livelihood generation and the material thus produced is used by industry.

Management Support

One project management Consultant along with one Data Entry Operator will be engaged for providing support at NMPB level for activities relating to scrutiny, implementation, monitoring and technical support to the state.

4.7.3 Medicinal Plant Species Specific Campaign including use of Multimedia

Species Specific Campaigns will be launched Nationally or at State level for valuable medicinal plants like, Pipli, Chirata, RET species, Amla, Moringa etc. to

promote usage and planting including in institutions, schools, homes, etc.. The campaigns will also identify barriers to wide availability and use of such species and seek to address the same. The media publicity both print and electronic would also be a part of the campaign and would be organized by both SMPB and NMPB. Multimedia campaigns for important medicinal plants and its products through radio, TV and print would be taken up to provide information on the importance of medical plants in daily life. For this purpose TV spots would be developed through selected agencies and be telecast on TV, radio and outdoor hoardings, etc. Besides, talk shows and other programs on radio & TV and preparation of documentaries/case studies etc. would be promoted.

Eligibility

- SMPBs and other State Government organizations.
- Recognized academic/Research/Educational institutions
- Registered professional, NGOs and other philanthropic Organizations working on non- profit basis with activities/experience in the field of medicinal plants.

Norms of Assistance

For Medicinal Plant Species specific campaign, financial assistance will be provided to the eligible organisations in project mode.

Submission of Proposals

Eligible Organizations can apply to NMPB where the proposal will go through scrutiny by the Project Screening Committee (PSC) before approval by Standing Finance Committee (SFC).

4.8. Institutional Strengthening

4.8.1. Strengthening of State Medicinal Plant Boards (SMPB)

- The SMPBs are expected to synergise various interventions by other State agencies related to Medicinal Plants. In order to encourage the states to have an independent office of the SMPB it is proposed that an annual recurring

grant of Rs.50 lakhs per annum will be provided to those SMPBs which have a separate budget head for salaries of the staff while those SMPBs which do not have such a provision will be provided a grant of Rs.40.00 lakhs per annum on recurring basis. The assistance/budget will be provided towards remuneration of staff (including contractual), to meet the expenditure on recurring and non-recurring office expenses, purchase of equipment, office maintenance mobility support and miscellaneous expenditure including TA/POL, printing/publicity, meeting/conferences, engaging subject matter specialist/ statistical unit etc. In the interest of co-ordination and synergy, NMPB will also direct the States to employ suitable resources/consultants for specific purposes like preparing database of traders, cultivations, compilation of yield data, demand and supply of medicinal plants from different sources like forest department & cultivators, case studies, publication, participation in events related to medicinal plants, exposure visits for stake holders etc. NMPB may also promote special studies to evaluate functioning of SMPBs from time to time. An indicative break-up of head-wise support to SMPB is given in **Annexure – II**.

- SMPBs will also eligible for 1.5% of the cost of the projects sanctioned/ released to the state in the year as monitoring charges depending upon the performance of SMPBs.
- SMPBs are required to submit annual action plans indicating the various activities and programmes they intend to carry out in the State including monitoring
- SMPBs are required to work in close coordination with regional centres/ Centers of excellence and Facilitation Centres.

4.8.2. Establishing Regional Centres of NMPB (within existing Government Institutions, Corporations, Centres of Excellence, etc.) in different Geographic Zones.

Considering the topographical spread and valuable traditional knowledge on medicinal plants in various parts of the country, the success of AYUSH system in the national context actually depends on region and area specific inputs and active participation of regional units in the implementation of the scheme. Coordination with states in respect of NMPB schemes for each region is currently constrained

and harm-strung by the absence of adequate outreach in various regions of the country. Hence, there is a need to set up the regional centres. However no significant infrastructure needs to be created, instead such Regional Centres will be set up within the existing Institutions of ICAR, CSIR, ICFRE etc. in various eco- regions of the country through signing of MOUs by NMPB with the approval of the SFC. The State Medicinal Plants Boards (SMPBs) in a geographic region of the country will also be mentored by these Regional/Zonal Centres. The regional centre will be actively engaged in the meetings on technical matters of the SMPBs.

It is proposed to set up six such centres in existing regional institutions, and will have the following coverage:-

- a) East - Bihar, Jharkhand, Odisha, West Bengal
- b) West- Goa, Gujarat, Maharashtra, Rajasthan, Dadra & Nagar Haveli and Daman & Diu
- c) North- Delhi, Chandigarh, Haryana, HP, J&K, Punjab, Uttarakhand, U.P.
- d) South- Andhra Pradesh, Kerala, Karnataka, Tamil Nadu, Andaman & Nicobar, Lakshadweep, Puducherry, Telangana.
- e) Central- Chattisgarh, MP.
- f) Northeast- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura.

Selection of institutions as regional centres

Research and extension organisations in the above mentioned regions will be identified by open advertisement in Newspapers. The selection of regional centres in different institutions shall be undertaken through a committee of experts which will be constituted as and when required. The support to these regional centres shall be in project mode and shall be decided with the approval of the Standing Finance Committee.

Pattern of financial Assistance:

100% assistance (in project mode) for Government Departments and Organizations including Govt. aided institutions (Institutes getting substantial aid), Universities, Research Institutes etc.

Some of the Regional Centres/Facilitation Centres of repute actively engaged in medicinal plants related activities and having adequate expertise & infrastructure will be declared as Centre of Excellence.

5. Administrative and Financial Arrangements of NMPB

The NMPB part of its constitution is expected to be assisted by the five inter sectorial committees to fulfil its core mandate viz., i) Committee on Cultivation of Medicinal Plants including Conservation of rare and endangered species, ii) Committee on Research, iii) Committee on Demand and Supply, iv) Committee on Patents/IPR and v) Committee on Export/Import involving representatives from Ministry of Environment and Forest, Ministry of Tribal Affairs, Ministry of Agriculture, Ministry of Commerce, Department of Science and Technology and representative of export agency, etc.

5.1 Project Screening Committees (PSC)

Two Project Screening Committees (PSCs) shall be constituted for considering the project proposals received in the Board. The Composition of the Committee may be altered and different committee may be constituted depending upon the activities under the Scheme to enlist the most appropriate professions for appraising and monitoring the activities under the each Committees will be chaired by an official member designated by Secretary (AYUSH) as chairperson.

The Project Screening Committee relating to "Research & Development" will have the following composition:

(i)	Chief Executive Officer, National Medicinal Plants Board or his representative	Member Secretary
(ii)	Representative from Botanical Survey of India.	Member
(iii)	Representative from ICAR.	Member
(iv)	Representative from CSIR.	Member
(v)	Representative from D/o AYUSH	Member
(vi)	Representative from D/o Biotechnology	Member
(vii)	Representative of North Eastern Council, Shillong	Member
(viii)	Director General/representative of CCRAS	Member

(ix)	Director/representative of CDRI, Lucknow	Member
(x)	Representative of ICMR, New Dehi	Member
(xi)	Domain experts (From Govt./Non-Government) – Two	Member

The Project Screening Committee relating to other projects will have the following composition:

(i)	Chief Executive Officer, National Medicinal Plants Board or his representative	Member Secretary
(ii)	Representative from Botanical Survey of India.	Member
(iii)	Representative from ICAR.	Member
(iv)	Representative from CSIR.	Member
(v)	Representative from D/o AYUSH	Member
(vi)	Representative from D/o Biotechnology	Member
(vii)	Representative of North Eastern Council, Shillong	Member
(viii)	Domain experts (From Govt./Non-Government) – Two	Member

5.2 Standing Finance Committee (SFC)

The Board is assisted by Standing Finance Committee (SFC) with following members:

- i) Secretary (AYUSH), Chairperson.
- ii) Additional Secretary and Financial Advisor or representative, Ministry of Health & Family Welfare.
- iii) Joint Secretary or representative, Deptt. Science and Industrial Research.
- iv) Joint Secretary or representative, Deptt. of Biotechnology.
- v) Joint Secretary or representative, Deptt. Agriculture Research and Education.
- vi) Joint Secretary or representative, Ministry of Environment & Forests.

- vii) Joint Secretary or Mission Director or representative, National Horticulture Mission, Department of Agriculture & Cooperation.
- viii) Representative of Ayurvedic Industry.
- ix) Representative of Exporters of medicinal/herbal products.
- x) Representative of Growers Associations/Federations.
- xi) Representative of Ministry of Development of North Eastern Region, Government of India, New Delhi.
- xii) Representative of North Eastern Council, Shillong.
- xiii) Domain Experts nominated by Secretary AYUSH (R&D, Cultivation, post-harvest management and marketing) - Two
- xiv) Chief Executive Officer, NMPB - Member Secretary.

The chairman of the SFC will have authority to invite special invitees, representatives from organizations engaged in R&D, quality control, planning and other related disciplines in medicinal plants sector.

The Standing Finance Committee (SFC) shall have the following functions for this scheme:

- I. To consider and approve any financial proposal which is to be included for release of grants.
- II. To consider and recommend all proposals for creation of new posts.
- III. To consider and approve components of individual projects for which cost norms have not been prescribed and approve revision of the existing cost norms.
- IV. Anything other than the components provided in the guidelines that the Board may refer.
- V. Any alterations in the guidelines based on new emerging facts/situations can be decided by SFC.

- VI. SFC is empowered to approve special intervention for managing any unforeseen/ emergent requirement.
- VII. SFC can also constitute Empowered Monitoring Committee (EMC) /Sub-committee (SC) and delegate power to CEO, NMPB for any administrative/ financial issues.

Members of PSC and SFC (other than those from NMPB and Ministry of AYUSH) will be eligible for sitting fee of Rs. 2000/- for each meeting of PSC/ SFC.

6. Procedure for processing project proposal for approval

- 1) All project proposals will be submitted to the NMPB. Once these are received in the Board, they will undergo initial scrutiny and then be placed before the concerned Project Screening Committee (PSC) of the Board. The proposals reviewed & recommended by the PSC will be placed before the Standing Finance Committee (SFC) for final approval.
- 2) Other than, in case, when organizations are submitting their proposals through the concerned SMPBs, the SMPBs will have to render their inputs within a period of three weeks of receipt of the proposals. If they do not offer any specific inputs to NMPB within the time limit, it will be presumed that SMPBs agree with the proposals and will provide necessary support to the implementing agency, if the project is approved by the SFC.
- 3) The Board will be free to take expert opinion on project proposals from any individual/agency wherever necessary.
- 4) The institutions proposing projects are eligible to levy institutional charges, subject to a maximum of 10% of the total cost of the scheme.
- 5) Once the Board approves a new project, its sanction will be conveyed by the Board to the host institution the sanction letter shall convey expenditure sanction in various broad heads viz. staff, equipment, works, recurring contingencies, etc., as finally approved in each case.

7. Implementation and monitoring

- All project proposal where the duration is one year should generally commence implementation within 3 months of release of first instalment of grant, failing which the sanctions accorded can be withdrawn. For other project proposals of duration of more than one year also normally the implementation has to start within 3 months otherwise the PI should share the justification for delay in implementation of the project.
- The Principal Investigator /Project in-charge (PI) shall submit annual progress report to the Board. The Annual report must contain details about the work done, achievements, results, etc.
- Release of funds can be withheld in the event of non-receipt of utilization certificate and progress reports in time or unsatisfactory progress of work, for ongoing or any previous project approved to the agency.
- On completion of the project, the PI shall submit to the National Medicinal Plants Board a final report in the prescribed proforma, which shall be examined by the concerned programme officer of the Board, for evaluating the project results, their significance and follow-up required therein.
- All publications (books, research papers, popular articles) brought out under the project supported by NMPB shall duly acknowledge the support of NMPB.

General conditions

- i) The project proposals may normally be of 3 years duration. However, in Coordinated/network projects, the project period could be a maximum of 5 years at the discretion of the SFC. The projects of MPCDAs, *In-Situ* Resource Augmentation, Ex-Situ Conservation, Eco-Task Force and creation of Herbal Gardens (other than Home Herbal Gardens) will also be of five years duration. Extension of the project period beyond the approved tenure will be considered with the approval PSC on merit and justification for each proposal.
- ii) Scientists, teachers, officers with relevant academic background, appropriately

qualified NGO would be eligible to become PI/ Co-PI. In case the PI is working in Govt. Organisation they should have at least 3 years left to superannuate.

- iii) Any incremental scientific, technical and supporting staff will be on contract basis and their salaries, expenditure on equipments, recurring contingencies, TA (PI and staff) etc. will be met out of the project grant. The emoluments will be as per the DST pattern or as decided by the SFC.
- iv) The project implemented through private R&D companies/ organizations should comply with the terms and conditions of IPR protection and will be required to sign MoU to safeguard government interest.
- v) Any patent filed will be in the joint ownership of NMPB and the concerned organisation/PI.
- vi) In case of NGOs, the agency must have an experience of at least 3 years and good track record in the related field evidenced by the earlier experience and achievements. Also the agency must have qualified key resource persons to successfully implement the project. They will also be required to furnish a list of the projects for which they have received funding during the last five years along with the sources thereof and the tangible outcomes from such works. The NGOs/Companies will also be required to sign a Bond.
- vii) All NGO's should submit land certificate for ownership of land (in respect of herbal garden) and a certificate for genuineness from Registrar of Co-operative Society/ Deputy Commissioner/other concerned civil authority.
- viii) All projects should spell out a clear exit strategy indicating the proposed mechanism for maintenance of assets created.
- ix) The PI shall enjoy the free domain selection of Co-PI and other staff. The appointment will not be regular in nature, but restricted to the project/scheme on contract basis.
- x) In case of transfer/leaving of PI, Co-PI will hold the charge of the project and will perform the duties of PI. In case there is no Co-PI, the host institute will suggest the name of suitable PI to handle the project. In case of transfer of the PI and the earlier organisation not having appropriate resource person to handle the project the project could be shifted to the institution on the request

of the PI concerned. Such decisions will be taken by CEO, NMPB on case to case basis and brought to notice of PSC for information.

- xi) For important projects under implementation which may require technical input from the PSC the PI may be called for presentation from time to time by PSC so that best value could be obtained from such ongoing works.
- xii) Under non-recurring head, financial assistance could be provided for only selected, essential and specialized items of equipments required for project works, for modification of existing structure so for undertaking petty works.
- xiii) The implementing institution, without approval of the CEO, NMPB, shall not re-appropriate funds among different heads of expenditures of a scheme, except in case of recurring contingencies.
- xiv) Component towards rental value of land/lease rent shall not exceed 10% of project cost.
- xv) Expenses towards manpower for supervision, and other technical input shall be as per requirement.
- xvi) Grant-in-aid will be further subjected to the Terms and Conditions as indicated elsewhere in the guidelines or in the letter of sanction.
- xvii) It will invariably be the sole duty of the PI and his organization to abide by all laws while implementing the project.
- xviii) Cost norms for activities in high alpine regions and trans Himalayan regions could be upto 1 ½ times of otherwise prescribed norms. This could be decided by the SFC on a case to case basis.
- xix) For any other components in the Scheme for which specific costs, norms have not been given, these will be considered by SFC in project mode.
- xx) Within approved project period, grants, released in a year will be deemed to be carried forward to the next year if not fully utilized in the initial year.
- xxi) In a need based approach to enable response to changing situations SFC

may decide to incorporate additional activities within the overall outlay of the Scheme.

- xxii) Proformas and terms and conditions shall be uploaded on the NMPB website. The same will also be reviewed/fine-tuned from time to time by the PSC and shall be dully intimated to the SFC.
- xxiii) Periodic progress reports received from the PI will be reviewed by the concerned programme officer in the NMPB so as to decide the progress is satisfactory or there are any shortfall or any course correction is needed for which feedback has to be given to the implementing organization.
- xxiv) An annual increase of 10% of the outlay of the sanctioned amount will be provided for conservation & Resource augmentation projects.

8. Monitoring and Evaluation

I. Monitoring and Evaluation by the State Medicinal Plants Boards.

The State Medicinal Plant Boards (where they are themselves not the implementing agency) can be involved in monitoring the projects at the field level through their own set of experts for mentoring and suggesting corrective measures. SMPBs are eligible for 1.5% of project cost / released in a year as management support funds. The SMPBs can approach NMPB for offering their willingness for undertaking this assignments. Therefore, field mentoring and monitoring of all projects can be undertaken by SMPB's and for this purpose, the services of retired officers of Forests/ Horticulture/ Agriculture departments, scientists etc. may be hired for this purpose within this grant by the SMPB.

II. Third Party Monitoring

Third party monitoring is important for the success of any scheme being implemented at the national level. There could be two types of arrangements – either through the system of experts or hiring an agency. One or more National Level Agencies with adequate manpower and infrastructure will be engaged by NMPB to monitor the projects. In addition NMPB may also constitute short term mentoring cum monitoring teams from time to time for specific projects, as felt necessary.

III. Chief Technical Advisers for Mentoring

NMPB will draw up a list of experts and nominate theme wise / species wise experts as Chief Technical Advisers (CTAs) on important themes related to medicinal plants. The CTAs will be asked from time to time to visit States/ Project implementation locations to provide hand-holding support on their area of expertise to the states/ implementing agencies and for providing such services, CTAs will be reimbursed AC II tier/ Economy Class Air fare and local travelling expenses, Boarding/ lodging charges under Rs. 5,000/- per day (on production of actual receipts) and Rs. 2,000/- per diem for their services. However, such hand holding assignments (excluding travel time from their HQ) will be of short duration (3 days or less) after which CTAs will submit the reports to NMPB, for each such assignment.

AT A GLANCE

Appendix

IMPORTANT COST NORMS FOR COMPONENT ASSISTANCE

S. No.	Component	Cost	Remarks
1	<i>In-situ</i> conservation		
	A) Establishment of Medicinal Plants Conservation and Development Areas (MPC-DAs)	Rs. 20,000 per hectare	100% Central Assistance
	B) Revisit and upgradation of MPCA	Rs. 5000/- per hectare	100% Assistance
	C) Assistance for mainstreaming Medicinal Plants in Management/Working Plans	Rs. 1.5 lakh per forest Division/ Wildlife Division	100% Assistance
	B) <i>in-situ</i> resource augmentation	Cost norms of MoE&F under National Afforestation Programme	100% Assistance See Annexure - I
2	<i>Ex-situ</i> conservation		
	i) <i>ex-situ</i> conservation	Cost norms of MoE&F under CSS National Afforestation Programme	As per para 4.1.2 See Annexure - I
3.	Eco Task Force for rehabilitation of critical medicinal plant habitats		
	Eco Task Force	Project based	100% assistance to the eligible organization
4.	Support to JFMC/ Panchayats/Van Panchayats/ SHGs		
	Value addition, drying, warehousing and augmenting marketing infrastructure etc.	Rs. 15 lakhs per JFMC/Panchayats/Van Panchayats/SHGs/BMCs	100% assistance per JFMC/ Panchayats/Van Panchayats/ SHGs/BMCs
5.	Research, Technology Development and Quality Assurance		
	i) R&D Projects on theme areas	Project based	100% assistance for Govt. Institutions/ PSUs, Govt. Aided Institutions etc. and Non-profit making Philanthropic Organizations with requisite expertise. 50% assistance for projects received from private sector organizations

	ii) Network research projects involving two or more institutions	Project based	100% assistance for Govt. Institutions/ PSUs, Govt. Aided Institutions etc. and Non-profit making Philanthropic Organizations with requisite expertise. 50% assistance for projects-received from private sector organizations
	iii) Raw drug repository of medicinal plants	Rs. 10 crores for national raw drugs repository and Rs. 5 crores each for regional raw drug repositories	100% assistance to Govt. Institutions/PSUs. For private organizations assistance would be decided by SFC in project mode
	ESTABLISHING QUALITY STANDARDS AND CERTIFICATION and other interventions not specifically mentioned elsewhere.	Project based	100% assistance.
6	Awareness Building, Exposure Visits, Education and Capacity Building of Stakeholders through IEC		
	Training and Capacity Building Programmes for field staff of Forest Dept., Institutions, Universities, Horticulture Dept., Agriculture Dept., Growers and Collectors	a) Rs. 2,000/- per trainee (farmer) for a minimum of 2 days within the state b) Rs. 5,000/- per head for exposure visits to other states. c) The expenditure on officers training within the State will be Rs. 5,000/- per officer and outside the State the cost would be restricted to Rs. 10,000/- per officer (Travel cost will be additional)	100% Assistance 1. Travel cost will be limited to 3 rd AC train fares per participants. However, for Govt. Servants it will be as per entitlement. 2. For places not connected by Rail, travel by available modes will be permitted as approved by the PSC/ SFC.

	Workshops/ Seminar/ Arogya	<p>a) Rs. 1.00 lakh for District level,</p> <p>b) Rs. 2.00 lakhs for State level,</p> <p>c) Rs. 3.00 lakhs for Regional level,</p> <p>d) Rs. 5.00 lakhs for National level</p> <p>e) Rs. 10.00 lakhs for International level.</p>	100% assistance
	Participation in exhibition/ fair	<p>For participation by other Agencies</p> <p>a) Rs. 1.00 lakh for State level,</p> <p>b) Rs. 2.00 lakhs for National level</p> <p>c) Rs. 3.00 lakhs for International level</p>	<p>100% assistance for Govt. Organizations</p> <p>For Private organizations including industries 50% of the prescribed cost or actual expenditure whichever is less (which includes expenditure on Travel, accommodation, Hire charges, stall fabrication, etc.) will be reimbursed.</p> <p>Participation by NMPB will be as per the actuals.</p>
7	PROMOTION OF HERBAL GARDENS		
	Herbal Gardens of State and National Importance	As per the project proposal	100% assistance
	Institutional/ Public Herbal Garden	<p>a) Rs. 3.00 lakhs per hectare for establishment</p> <p>b) Annual maintenance of the Herbal Garden @ upto Rs. 60,000/- per year per ha. for next four years.</p>	100% assistance
	School Herbal Gardens	<p>a) Rs. 25,000/- per school for an area of 500 sqm.</p> <p>b) Up to Rs. 7,000/- per annum/ per school for maintenance for next 4 years</p>	100% assistance
	Home Herbal Gardens	Rs. 2500/- per HHG.	100% assistance

8	MANAGEMENT SUPPORT	Upto 5% of the outlay under the scheme to NMPB	This will include salary and Admn. Expenses of NMPB incl. TE, OE, appointment of Consultants for each component, monitoring, publicity, advertising etc.
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Annexure - I

COST NORMS FOR IN-SITU RESOURCE AUGMENTATION, EX-SITU CONSERVATION AND PLANTATION OF MEDICINAL TREES, HERBS AND PERENIALS

**(Adopted from Operational Guidelines of National Afforestation Programme
of Ministry of Environment & Forests)**

S.No.	Model/ Intervention	Plantation including Maintenance	Soil & Moisture Conservation (15% of Plantation cost)	M&E, Micro-planning, fencing, Awareness raising (10% of plantation cost)	Overheads (10% of Plantation cost)	Entry Point Activities (Fixed)	Total
1.	Aided Natural Re-generation (200 plants/hectare)	9750	1460	975	975	4000	17160
2.	Artificial Regeneration (1100 Plants/Hectares)	17100	2565	1710	1710	4000	27085
3.	Mixed Plantations of trees having MFP and medicinal value (1100 plants/hectares)	17100	2565	1710	1710	4000	27085
4.	Regeneration of perennial herbs and shrubs of medicinal value (2000 plants/hectares)	20400	3060	2040	2040	4000	31540

1. The number of plants per hectare are admissible to the costing indicated above. The project proposal envisaging any change in the plantation density would be eligible for a corresponding prorata change in the cost norms. The concerned State Govt. agency shall have to certify that due regard has been given to the agro-climatic factors while preparing the project.
2. The cost norms above have been worked out at the wage rate of Rs. 75.00 per day. Escalation in the cost will be allowed to State Governments only after ensuring that their approved wage rate in the State exceeds the limit of Rs.

75.00 per day. The increase in the cost norms would be proportionate to the increase in the wages. In case the wage rate is less than Rs. 75.00 per day, the cost per hectare would be less (on pro rata basis) than the rates proposed in the scheme.

3. While distributing the cost, total expenditure on the following items together may not exceed 20% of the plantation cost:
 - i) Overheads including staff/establishment/vehicles etc. (not to exceed 10%)
 - ii) Concurrent monitoring and evaluation (not to exceed 2%)
 - iii) Micro-planning (not to exceed 2%)
 - iv) Fencing (not to exceed 5%). For projects requiring higher allocation for fencing, funds to the extent 10% of plantation cost may be authorized by suitably reducing the allocation under item (i) above.
 - v) Awareness raising (not to exceed 1%)
4. Implements would be purchased from within the overheads. The watch and ward component over the 5 years after plantation would be allowed as part of maintenance personnel deployed for maintenance would also be made responsible for watch and ward.
5. Savings under any items above could be used for the activities listed in items other than (i). For example, savings for fencing and overheads, could be used for extension/Entry point activity.
6. The sites which are more challenging like higher elevations, refractory, saline, alkaline and acidic lands, very heavy weed infested, rain shadow areas, cold and hot arid areas, areas requiring soil replacement and critical irrigations supplements etc., allowance of 25% over similar treatment model shall be permitted. Details of such problematic areas along with justification should be provided. Cost norms for alpine / trans himalayan region will be one and half times of the project cost.

7. Also for improved planting technology like use of tissue culture, clonal seedlings etc., allowance of 25% over similar treatment model shall be permitted. Details of improved technology adopted should be given.

Annexure - II

Indicative Head-wise Expenditure of grant for Maintenance of Nucleus Centre of SMPBs having Budget head for salaries of the Officer/staff etc. from the State Government concerned*.

Table - 1

S.No.	Items	Rs. (in lakhs)
1.	Provision for Consultants (5 No.) on Contractual Basis Specialist in Medicinal Plants, Botany, Taxonomy, Forestry & Agriculture (1 each)	15.00
2.	Provision of Contractual (Supporting) Staff – (5 No.) Accountant, Office Assistant (2), Secretarial Assistant, Peon Messenger	7.00
3.	Office Expenses	4.00
4.	Meeting/conferences/Seminar	6.00
5.	Publicity/Printing	6.00
6.	Mobility Support /POL	3.00
7.	Data maintenance/ documentation, purchase of books	4.00
8.	Recurring expenses on office equipment	2.00
9.	Contingency	3.00
	Total	50.00

* Can be altered in accordance to State specific needs.

Indicative Head-wise Expenditure of grant for Maintenance of Nucleus Centre of SMPBs not having Budget head for salaries of the Officer/staff etc. from the State Government concerned*

Table - 2

S.No.	Items	Rs. (in lakhs)
1.	Provision for Consultants (3 No.) on Contractual Basis Specialist in Medicinal Plants, Botany, Taxonomy (1 each)	10.00
2.	Contractual (supporting) Staff – (4 No.) Office Assistant/Account Assistants (2), Secretarial Assistant, Peon/ Messenger	4.00
3.	Office Expenses	4.00
4.	Meeting/conferences/Seminar	5.00
5.	Publicity/Printing	6.00
6.	Mobility Support /POL	3.00
7.	Data maintenance/ documentation, purchase of books	4.00
8.	Recurring expenses on office equipment	2.00
9.	Contingency	2.00
	Total	40.00

* Can be altered in accordance to State specific needs.

Note: It is indicated that the Head-wise budget break-up is as per the demand raised by SMPBs.

ANNEXURE- III

FORMAT FOR SEEKING FINANCIAL ASSISTANCE FORM MPCDAs, IN-SITU/ EX-SITU CONSERVATION, RESOURCE AUGMENTATION AND JFMC COMPONENTS OF THE SCHEME

PART – I: - GENERAL DETAILS

1. Title of the Project.
2. Name of the organization with full address, telephone, fax, e-mail ID.
3. Status
4. Registration number and date (for NGOs and Companies)
5. Audited income and expenditure details of last five years (for NGOs/companies only along with Articles of Associations and Memorandum of Association)
6. Name of Principal Project Investigator (PI) and Co-PI (with address for correspondence including landline, mobile no., fax and e-mail address)
7. Introduction, Concept and justification of the project (Detailed project report)
8. Project Period:
9. Details of infrastructure available with the organization (building, equipment, vehicles etc.):
10. Physical and financial requirement along with timelines:
11. Internal Monitoring and evaluation mechanism:
12. Benefits from the projects- tangible and intangible:
13. Summary of the work particularly in medicinal plants sector undertaken by the organization /PI in the last 3 years.
14. Other sources of financial assistance received by the applicant/organization if any so, furnish details.

15. Details of financial assistance already received from the Board, if any may be given in the following proforma:

Year	Amount of grant	Purpose in brief	Total expenses incurred	Amount of Grant utilized	Has utilization certificate- been accepted by the Board	Remarks

16. Detailed Bio-data (including details of published work) of PI & Co-PI

Note :

- i) Proof of land ownership/leasehold and market mechanism (wherever applicable) to be submitted.
- ii) Costing pattern to be provided in the form of schedule of rates as applicable.
- iii) Supporting documents including map (where applicable) must be attached.

Certified that:

- i) The organization shall abide by all the 'Terms and Conditions' of the grant stipulated in the operational guidelines of the scheme of NMPB, Ministry of AYUSH, Government of India.
- ii) All records and reports related to the project have been maintained separately and shall be shown and furnished as and when required by the Ministry of AYUSH or its authorized representatives.
- iii) Project shall be open for evaluation of physical progress and utilization of funds at the discretion of Ministry of AYUSH.
- iv) The undersigned shall be responsible for the authenticity of the information and documents furnished in the application and proposal.
- v) Ministry of AYUSH shall have the right to recover the grant or take legal

action against the organization for any default or deviation from the terms and conditions of sanction of grant.

- vi) No financial assistance/grant has been sought and or obtained from any Central or State Govt. organization for the same purpose.
- vii) It is certified that all applicable laws/rules and legal provisions will be followed while implementing the project.
- viii) It is also certified that the project proposal is formulated as per the relevant provisions/ clauses of the guidelines of the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants.

Date:

Signature of Authorized Authority

PART –II: TECHNICAL DETAILS OF THE PROJECT PROPOSAL FOR MPCDAs:

1. Objectives and justification.
2. Project area - geographical spread including GPS details, District(s), Forest division(s), blocks, compartments (with maps).
3. Information on preliminary base line survey of medicinal plants in the area under study (inventorisation).
4. Status of the forest/area under study and conservation measures like fencing guards, patrolling etc. specific biotic pressures like grazing, fire, illicit collection of medicinal plants.
5. Information on availability/status of:
 - i) Medicinal plants in general
 - ii) Endangered species (listed in Indian Red Data Book (RDB), CITES etc.)
 - iii) Medicinal plants prioritized by Medicinal Plants Board.

- iv) Information on the status of MFP including medicinal plants with regards to: a) Availability in the area under study, b) Collection by authorized/unauthorized agencies-the tribals and cooperatives etc., c) Item wise details of the MFP including total revenue.
- v) Flagship species of medicinal plants of conservation concern.
- 6. Activities proposed under the project viz. threat assessment, inventorisat ion, periodic floristic studies, capacity building, nursery development and sustainable harvest etc.
- 7. Work Plan and schedule of operations/timelines for each activity.
- 8. Technical man power
 - (i) Full time
 - (ii) Part time (like Taxonomist or other consultants)
- 9. How community is sought to be involved in conservation (community composition of the area).
- 10. Benefit sharing arrangements. (as/if applicable)
- 11. Expected outcomes towards conservation and income generation of the community. (as/if applicable)
- 12. Financial outlays for various activities (Recurring, Non-recurring).
- 13. Exit strategy/sustainability.

General Conditions and Undertakings

- i. For the proposed works Agency has to give an undertaking that project area has not been covered/is not proposed to be covered under any other scheme of Central or State Government.
- ii. Necessary financial support will be provided for maintenance of the assets created under the project after the project period.
- iii. Annual report will be submitted by the Project Investigator.

- iv. The State Government should nominate a senior officer to act as a Nodal Officer.
- v. It will be our responsibility for regular and periodic monitoring, and to fully cooperate with the monitoring agency engaged by NMPB.

Signature of the Principal Investigator

Dated:

Signature of the Head of the Department/Institution

PART-II : FOR IN-SITU/ EX-SITU CONSERVATION AND RESOURCE AUGMENTATION:

1. Objective
2. Justification
3. Project area – geographical spread including GPS details, District(s), Forest division(s), blocks, compartments, Joint Forest Management Committees (JFMCs/VSSs) (with maps)
4. Forest types, status of rare, endangered and threatened species of medicinal plants, their occurrence etc.
5. Collection, species –wise (quantity and value)
6. Infrastructure of herbal mandies, markets, industries in the area.
7. Activities with conservation/plantation model proposed and physical targets (consolidated as well as district/division-wise) for each year during the project period.
8. Species of medicinal plant(s) and area to be covered under project.
9. Work Plan – six monthly outputs/targets.
10. Details of Stake holder participation, benefit sharing with the JFMCs/VSSs.
11. Financial outlays (activity and year-wise).

12. Financial assistance sought from NMPB and the contribution to be provided by the Organization seeking assistance-Activity-wise break-up (For PSUs only).
13. Expected outcomes towards income generation of the community.
14. Linkage with Industry/trade (MoU with trade/industry, if any).
15. Exit strategy/sustainability.

General Conditions and Undertakings

- i. The State Government should give an undertaking that project area has not been covered/is not proposed to be covered under the National Afforestation Programme (NAP) of NAEB or under any other scheme of Central or State Government.
- ii. Cost norms followed, indicating clearly the wage rate in the State, number of plants per hectare and the period for which maintenance is provided in the project (NAEB cost norms will be adopted for NMPB schemes).
- iii. Necessary provisions has been made/will be made in the Working Plan to permit harvesting of plant parts (roots, barks etc.) available under the project.
- iv. Necessary financial support will be provided for maintenance of the assets created under the project after the project period.
- v. Annual report will be submitted by the Project Investigator.
- vi. The State will nominate a senior officer to act as a Nodal Officer.
- vii. It will be our responsibility for regular and periodic monitoring, and to fully cooperate with the monitoring agency engaged by NMPB.

Signature of the Principal Investigator

Dated:

Signature of the Head of the Department/Institution

PART-II : FOR SUPPORT TO JFMCs/PANCHAYATS/ VAN PACHAYATS/ SHGS/BMCs:

1. Title of the project
2. Objective
3. Justification
4. Medicinal plants resource scenario in the state
 - i) Species in the state and their geographical occurrence.
 - ii) Collection –species, volumes and value.
 - iii) Districts, Division and JFMCs/VSS from where collected.
 - iv) Infrastructure of mandies, trade centres, manufacturing units.
 - v) Socio–economic profile–dependence of people in NTFP and medicinal plants.
 - vi) Local consumption–traditional healers, vaidyas etc.(volume if available)
5. List of JFMCs/Panchayats proposed to be covered along with justification of short-listing the JFMCs.
6. Existing infrastructure of storage, market yards, machinery, if present in the project area.
7. Name of the places in which drying sheds, godown, mandies, processing work to be developed.
8. Project activities (physical targets, consolidated and district/division wise).
9. Detailed break-up of the physical infrastructure of godowns, dry yards etc. alongwith sizes capacity proposed and the list of machinery/equipment proposed together with their costs.
10. Financial outlays for each activity (year-wise).

11. Is any micro and small enterprise proposed, and if so, what will be its structure, composition.
12. Market linkage (MoUs, if any).
13. Additional income to JFMC members.
14. Outputs and outcomes.
15. Exit strategy and sustainability.

General Conditions and Undertakings

- i. The State Government should give an undertaking that project area has not been covered/is not proposed to be covered under the National Afforestation Programme (NAP) of NAEB or under any other scheme of Central or State Government.
- ii. Cost norms followed, indicating clearly the wage rate in the State, number of plants per hectare and the period for which maintenance is provided in the project (NAEB cost norms will be adopted for NMPB schemes).
- iii. Necessary provisions has been made/will be made in the Working Plan to permit harvesting of plant parts (roots, barks etc.) available under the project. Necessary financial support will be provided for maintenance of the assets created under the project after the project period.
- iv. Annual progress report will be submitted by the Project Investigator.
- v. The State Government will nominate a senior officer to act as a Nodal Officer.
- vi. It will be our responsibility for regular and periodic monitoring, and to fully cooperate with the monitoring agency engaged by NMPB.

Signature of the Principal Investigator

Dated:

Signature of the Head of the Department/Institution

National Medicinal Plants Board
Ministry of AYUSH

**Proforma For Submission of Project Proposals on Research, Technology
Development and Quality Assurance**

(To be filled by the applicant)

PART I: GENERAL INFORMATION

1. Project Title:

2. Name of the Institute/University/Organisation submitting the Project Proposal:
.....

3. State:

4. Status of the Organization (University/Public /Govt. Aided/ Pvt. Sector/NGO):
.....

- 5.. Registration No. with date and PAN / TAN/ TIN Nos. :
.....

(The NGOs and Companies will be required to submit their Articles of Association, Memorandum of Association and Annual reports with audited records of last 3 years)

6. Name and designation of the Executive Authority of the Institute/University forwarding the application:

7. Category of the Project (Please tick):.R&D/ Technology development/ Quality Assurance/ others

8. Specific Area/ Field of project:

9. Name(s) of plant species to be studied

10. Duration:Years.....

11. Total Cost (Rs.)

12. Details of projects supported earlier by NMPB (whether completed/ not completed) with details of equipment acquired.

13. Is the project Single Institutional or Multi-Institutional (S/M):

14. If the project is multi-institutional/ Network mode, please furnish the following:

 Name of Project Coordinator and participating institutes with complete address and responsible person (PI of the leading partner shall act as the project coordinator):

 Affiliation:

 Address:

15. Scope of application indicating anticipated product and processes

16. Deliverables and outcome anticipated.

17. Project Summary with keywords (Not to exceed one page. Please use separate sheet).

PART II: PARTICULARS OF INVESTIGATORS

(One or more co-investigators are preferred in every project. Inclusion of co-investigator(s) is mandatory for all the project)

18. Principal Investigator:

Name:

Date of Birth: Sex (M/F):

Designation:.....

Department:

Expertise/Area of research interest of PI:

Institute/University:.....

Address:

.....PIN:.....

Telephone:..... Fax:.....

E-mail:.....

Mobile No.:

Number of research projects (along with details) being handled at present:.....

Work done (Competence of PI in specific area proposed)

19.1 Co-Investigator - 1: (same details as for the Project Investigator)

19.2 Co-Investigator - 2 (Same details as for the Project Investigator)

PART III: TECHNICAL DETAILS OF PROJECT

(Under the following heads on separate sheets)

20. Introduction (not to exceed 2 pages or 1000 words)
 - 18.1 Origin of the proposal
 - 18.2 (a) Rationale of the study supported by cited literature (b) Hypothesis (c) Key questions.
 - 18.5 Current status of research and development in the subject (both international and national status)
 - 18.6 The relevance and expected outcome of the proposed study
 - 18.7 Translational potential of Research findings, any potential outcome/ result is expected.
 - 18.8 Preliminary work done so far
21. Specific objectives (should be written in bulleted form, a short paragraph indicating the methods to be followed for achieving the objective and verifiable indicators of progress should follow for each specific objective)
22. Work Plan: should not exceed 3-4 pages (the section can be divided according to the specific aims and under each specific aim, the following should be stated clearly as sub headings with relevant flow chart).
 - 22.1 Work plan/ Time lines (methodology/experimental design to accomplish the stated objectives)
 - 23.2 Connectivity of the participating institutions and investigators (in case of multi-institutional projects only)
 - 24.3 Alternate strategies (if the proposed experimental design or method does not Work, please indicate alternate strategy)

25. Time frame: (Please provide quantifiable outputs in bulleted form)

Period of study	Achievable targets
6 Months	
12 Month	
18 Months	
24 Months	
30 Months	
36 Months	

PART IV: BUDGET PARTICULARS

Budget in Rupees

A. Non-Recurring (e.g. equipments, accessories, etc.)

S.No.	Item	Year 1	Year 2	Year 3	Total Cost (₹ in lakhs)

Sub-Total(A)

B. Recurring

B.1 Manpower

S.No.	Position and Numbers	Consolidated Emolument	Year 1	Year 2	Year 3	Total Cost (₹ in lakhs)

Sub-Total(B.1) =

B.2 Consumables

S.No.	Item	Quantity	Year 1	Year 2	Year 3	Total Cost (₹ in lakhs)

Sub-Total(B.2) =

Other items	Consolidated Emolument	Year 1	Year 2	Year 3	Total Cost (₹ in lakhs)
B.3 Travel					
B.4 Contingency					
B.5 Overhead/ Institutional charges (If applicable)					
Sub-total of B (B.1+B.2+B.3+B.4+B.5)					
Grand Total (A + B)					

Note: Please give justification for each head and sub-head separately mentioned in the above table.

Financial Year: April to March

In case of multi-institutional project, the budget estimate to be given separately for each institution.

C. Budget–component-wise–contribution by the organization (only in case of private R&D institute/ Industry) and the budget being sought from NMPB.

PART V: EXISTING FACILITIES

Resources and additional information

1. Laboratory:
 - a. Manpower
 - b. Equipments
2. Other resources such as clinical material, animal house facility, glass house. Experimental garden, pilot plant facility etc.

PART VI: DECLARATION/CERTIFICATION

It is certified that

- a) There search work proposed in the scheme/project does not in any way duplicate the work already done or being carried out elsewhere on the subject.
- b) The same project proposal has not been submitted to any other agency nor shall be submitted for financial support.
- c) The emoluments for the manpower proposed are those admissible as per the approved emoluments of NMPB.
- d) If the project involves the utilization of genetically engineered organisms, we agree to submit an application through our Institutional Biosafety Committee. We also declare that while conducting experiments, the Biosafety Guidelines of the concerned departments would be followed in total.
- e) If the project involves field trials/experiments exchange of specimens, etc. we will ensure that ethical clearances would be taken from concerned ethical Committees/Competent authorities and the same would be conveyed to NMPB before implementing the project.
- f) It is agreed that any research out come or intellectual property right(s) on the invention(s) arising out of the project shall be in accordance with the decision of NMPB, Ministry of AYUSH.
- g) The institute/university agrees that the equipment, other basic facilities and such other administrative facilities will be extended to investigator(s) throughout the duration of the project.
- h) The Institute/organisation assumes to undertake the financial and other management responsibilities of the project.

- i) The organization shall abide by all the 'Terms and Conditions' of the grant-in-aid stipulated in the operational guidelines of the scheme.
- j) All records and reports related to the project have been maintained separately and shall be shown and furnished as and when required by the NMPB, Ministry of AYUSH or its authorized representatives.
- k) Project shall be open for evaluation of physical progress and utilization off undsat the discretion of Ministry of AYUSH.
- l) The undersigned shall be responsible for the authenticity of the information and documents furnished in the application and proposal.
- m) Ministry of AYUSH shall have the right to recover the grant or take legal action against the organization for any default or deviation from the terms and conditions of sanction of grant.
- n) No financial assistance/grant has been sought and or obtained from any Central or State Govt. organization for the same purpose.
- o) All related provisions of Biological Diversity Act 2002 and other relevant rules, regulations and notification shall be complied with.
- p) The undersigned shall be responsible to ensure that all applicable laws/rules and legal provisions are followed.
- q) It is also certified that the project proposal is formulated as per the relevant provisions/ clauses of the guidelines of the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants and if the Project is approved, the PI would sign Agreement in the prescribed format as given at part-VIII.

Signature of Principal Investigator:

Date:

Signature of Co-Investigator

Date:

Signature of Co-Investigator

Date:

Signature of Project Coordinator

Signature of Executive

Authority (applicable only for multi-institutional projects) or Head of Institute/ University with Date :

PART VII: PROFORMA FOR BIOGRAPHICAL SKETCH OF INVESTIGATORS

Provide the following information for the key personnel in the order listed on PART II.

Follow this format for each person. Do Not Exceed Three Pages

Name:

Designation :

Area of Research expertise:

Department/Institute/University:

Date of Birth :Sex (M/F)

SC/ST/ OBC :

Contact details:-

A. Education(Post-Graduation onwards & Professional Career)

Sl No.	InstitutionPlace	Degree Awarded	Year	Fieldof Study/ Specializa-tion

Position and Honors

Position and Employment (Starting with the most recent employment)

SINo.	Institution Place	Position	From(Date)	To (date)

Honors/Awards

ProfessionalExperience and Training relevant to the Project

B. Publications (Numbers only)

Books:.....Research Papers, Reports :.....General
articles:..... Patents :Others (Please specify) :.....
..... Selected peer-reviewed publications (Ten
best publications in chronological order)

Research Support for ongoing Research Projects (with copies of sanction orders.)

SI No.	Title of Project	Funding Agency	Amount	Date of sanction and Duration

Completed Research Projects (State only major projects of last 3 years)

SI No.	Title of Project	Funding Agency	Amount	Date of completion

Place:

Signature of Investigator

Date:

PART VIII: PROFORMA OF AGREEMENT

(TO BE SIGNED BY PROJECT INVESTIGATORS AFTER APPROVAL OF PROJECT)

This Agreement is made and entered into on this -----day of -----, 20---
-- BETWEEN the National Medicinal Plants Board (NMPB), Ministry of AYUSH,
Government of India, having its office address at Room No. 306, AYUSH Bhawan,
B-Block, CGO Complex, INA, New Delhi – 110023 hereinafter called “NMPB”
(which expression shall wherever the context so admits include its successors and
assignees) of the First Part

ANDJ

.....(Name of the Organization)(Give full
address of the Head Office)..... engaged
in research, development and other promotional activities relating to medicinal
plants, hereinafter called “the Grantee” (which expression shall wherever the
context so admits include its successors and permitted assignees) of the Second
Part

WHEREAS NMPB operates a scheme entitled “Central Sector Scheme for
Conservation, Development and Sustainable Management of Medicinal Plants”
(hereinafter called “Its Scheme”) to support innovative research, development and
promotional activities on medicinal plants

AND WHEREAS the Grantee has submitted a project entitled (Title
of the Project)..... to NMPB for grants-in-aid (hereinafter called
“the Project”) which has been scrutinized and modified wherever necessary by
the Project Screening Committee (PSC) and the Standing Finance Committee
(SFC) of the scheme constituted by NMPB for the specific purpose and the Grantee
has accepted the modifications in the Project.

AND WHEREAS NMPB has approved the Project and agreed to provide support
in the form of grants-in-aid to the extent stated in **Annexure-A** on the terms and
conditions contained hereinafter in this Agreement

WHEREAS the Grantee has agreed to enter into an agreement with NMPB for
undertaking the Project on the terms and conditions referred to above.

Now, therefore, in consideration of NMPB agreeing to provide grants-in-aid for the Project, the Parties hereto agree as follows:

1. (a) DEFINITIONS

That unless the context otherwise requires, for the purposes of this agreement the following words shall mean as under:

- (i) "Agreement" means this agreement together with the annexures which form part of this agreement.
 - (ii) "PSC" means Project Screening Committee constituted by NMPB.
 - (iii) "SFC" means Standing Finance Committee constituted by NMPB.
 - (iv) "PMC" means the Project Monitoring Committee appointed by NMPB as referred to in clause 4 of this Agreement.
 - (v) "Project" means the project as approved by NMPB for providing grants-in-aid under the scheme. A copy of the Project is annexed at **Annexure- B**.
- (b) All Annexures (viz. Annexures 1 to 2) to this Agreement shall be integral part of this agreement.

2. RESPONSIBILITIES OF THE "GRANTEE" ORGANISATION

- (a) That the Organization shall:
- (i) carry out the activities of the Project as outlined in the project document, including the amendments effected thereto, and conform to the specified outputs, milestones, minimum work programmes and targets as approved by the PSC/ SFC.
 - (ii) Meet the expenditure on the Project activities to the extent as agreed to, through its own sources, as per details given in **Annexure 1**;
 - (iii) Maintain a separate account for the project funds and receipts, if any;
 - (iv) To submit an audited statement of accounts along with utilization certificate and expenditure details for each financial year to NMPB within 6 months of closure of the financial year;

- (v) To permit the PMC access to project area or the premises, at all times, where the Project activity is being/shall be carried out and provide all information and produce or make available the concerned records for inspection and monitoring of the Project activity, required by the PMC or other authorized representative of NMPB.
- (vi) Utilize the funds sanctioned by NMPB for the Project activities only for the purposes as specified in the Project;
- (vii) Abide by the decision of NMPB, based on assessment of the progress in the Project by PMC, or any other body/ committee assigned by NMPB to modify the objectives, outputs, milestones, targets, funding as also the foreclosure of the Project or of its components;
- (viii) Acknowledge the assistance of NMPB while publishing in any manner the details of the project, its progress or its success, subject to provisions of *subclause (v) of clause 5* below and to furnish copies of such publication to NMPB.

(b) The Grantee Organization acknowledges and agrees that:

- (i) The duties, responsibilities and functions assigned or entrusted to it as specified in the Project document shall be deemed to be the role, duties and responsibilities assigned and entrusted under this Agreement and any delay, failure or default in performance of Grantee regarding its duties as specified in the Project document shall be deemed to be a default under this Agreement;
- (ii) The Grantee Organization shall at all times indemnify and keep indemnified NMPB against any claims or suites in respect of any losses, damages or compensation payable in consequences of any accident, death or injury sustained by its (Grantee's) employees or by any other third Party resulting from or by any act, omission or operation conducted by or on behalf of Grantee.
- (iii) The Grantee shall at all times indemnify and keep indemnified NMPB against all claims/damages etc. by any infringement of any Intellectual Property Rights (IPR) while doing its responsibilities/work under the Project and this Agreement;

- (iv) The Grantee shall notify NMPB of any material change in its status and/or shareholding, as the case may be in particular where such change would impact on performance of obligations under the Project and this Agreement; and
- (v) The Grantee agrees and acknowledges that the time for completion of project, as set-forth here, is the essence of the Agreement and Grantee shall accordingly undertake the Performance of Work hereunder with the objective of achieving the project implementation and completion within the time schedule set-forth in Project document.
- (vi) Handling of patents as per terms & conditions of the grants.

3. FINANCIAL ARRANGEMENTS

That the financial arrangements under this Agreement shall provide:

- (i) that the total estimated cost of the Project as mutually agreed shall be Rs.....lakhs (Rupees only);
- (ii) the detailed year wise and head wise breakup of the financial support by NMPB and agreed contribution by the Grantee shall be as given in **Annexure 1**. Release of funds shall be subject to completion of minimum work programmes and satisfactory progress against the milestones specified in the Project as determined by NMPB and on submission of statement of accounts/audited statement of accounts and utilization certificates as provided for in subclause (a) (iv) of clause 2;
- (iii) the Grantee shall ensure that the funds of the Project are actually utilized only for the Project and as expressly provided in this Agreement. Re-appropriation/ Revalidation of funds from one budget head to another shall not be effected by the Grantee without the specified written approval of NMPB, communicated directly by NMPB;
- (iv) the Grantee shall immediately refund any funds out of grants-in-aid disbursed to it for the Project remaining unutilized with it on foreclosure/termination/ completion of the Project to NMPB along with detailed accounts of funds received, utilized and unutilized balance returned. These provisions shall apply, *mutatis mutandis*, to any component of the Project decided to be foreclosed. In case the termination of the Project is by the Grantee, in terms

of provisions of *subclause of clause 9*, the refund of funds shall be in respect of funds remaining unutilized as on the date of notice by the Grantee;

- (v) the provision of grants-in-aid to the Grantee does not create any liability, explicit or implicit, on NMPB in respect of the manpower engaged in the Project.

4. PROJECT MONITORING COMMITTEE

A Project Monitoring Committee (PMC)/ PSC appointed by NMPB shall monitor achievements of the defined objective(s) of the Project. The functions of the PMC shall be:

- (i) To monitor the progress of the Project in conformity with the milestones, targets and objectives as contained in the Agreement;
- (ii) To keep track of funding from any other source to the Grantee for this particular project;
- (iii) based on the foregoing, to assess and suggest
 - a) closing or dropping or modifying any of the components of the Project, within the overall approved objectives, budget and timeframe,
 - b) inclusion of additional industrial/institutional partner(s), if the Grantee requests involvement of such partner(s), in the overall interest of the Project, and
 - c) revision of the funding support to the Grantee;
- (iv) To advise on issues related to publications and securing of IPR; and
- (v) To advise on any other matter as referred it to by NMPB.

5. RESULTS OF THE PROJECT

- (i) The deliverables from the Project are defined and included in the Project document.
- (ii) The intellectual property generated from the Project shall be the joint property of the Grantee and NMPB.

- (iii) It is the responsibility of the Grantee to protect any intellectual property rights that may result from the Project. The Grantee shall also bear expenditure involved in protecting such intellectual property.
- (iv) The Grantee shall not assign or transfer the IPR/knowledge generated from the Project to any third party directly or indirectly without written consent from NMPB.
- (v) Any publication in journals, presentation in seminars in respect of the IPR emanating from the Project is prohibited until such publication/presentation is first reviewed from the point of protection of IPR by NMPB and a written permission is issued by NMPB. These publications shall be in the name of the concerned research workers, and the fact that the work has been carried out with support from NMPB shall be duly acknowledged.

6. PROJECT DURATION

The Project duration shall be years effective from the date of release of funds by NMPB which shall be effected only after signing of this Agreement by both the parties. It shall be the endeavor of the Grantee to complete the Project within the stipulated period. In case NMPB as recommended by the PSC/SFC feels that it is desirable to undertake further developmental work on the outcome of the Project which requires additional financial commitment and extension of the stipulated project schedule, the Grantee shall submit the extension request or a separate Project proposal with full justification for consideration under the scheme. In such a case, the Grantee will have to execute a supplementary agreement laying down the terms, conditions and financial arrangements of such further research work and issues relating to the intellectual property right generated by such further work.

7. COMPLETION

The Project shall be deemed to have been successfully completed as & when so assessed by NMPB. In case, during the tenure of the Project it is found that the Project or any Project component is not likely to lead to successful completion, NMPB may decide to foreclose the Project or the Project component as warranted. The decision of NMPB shall be final in all respects. However, if the Grantee would like to continue the project at its own cost, it

would be able to do so without restrictions from NMPB after complying with the relevant provisions.

8. EFFECTIVE DATE, TENURE AND TERMINATION OF THE AGREEMENT

- (i) The Agreement shall be effective from the date of its signing by both the Parties (if the Agreement is signed through circulation by Post, the date on which NMPB signs the Agreement shall be considered as effective). The Agreement shall be valid for -----* years. It can be extended if agreed to by both the parties. The Letter of Intent to this effect shall be issued by NMPB.
- (ii) The Agreement duly signed by both the Parties shall remain in the custody of NMPB and a copy of the Agreement duly authenticated by NMPB shall be provided to the Grantee.
- (iii) The Grantee may, before the completion of the Project, terminate this Agreement by giving three months notice in writing to NMPB. NMPB may also terminate the Agreement by written notice to the Grantee committing breach of any term of this Agreement and either not rectifying it to the satisfaction of NMPB or not satisfying in NMPB about its inevitability within a specified period.

9. FORCE MAJEURE

The Parties shall not be held responsible for non-fulfillment of their respective obligations in successful completion of the Project under this Agreement due to the exigency of one or more of the force majeure event such as but not limited to acts of God, War, Flood, Earthquakes, Strikes not confined to the premises of the party, Lockouts beyond the control of the party claiming force majeure, Epidemics, Riots, Civil Commotions etc. lying beyond the reasonable control of and not brought about at the instance of the Party claiming to be affected by such event and which has caused the non-performance or delay in performance; provided on the occurrence and cessation of any such event the party affected thereby shall give a notice in writing to the other party within one month of such occurrence or cessation. If the force majeure conditions continue beyond six months, the parties shall jointly decide about the future course of action on the Project. The validity of the claim of force majeure by the Grantee shall be determined by NMPB after due enquiry and the decision of NMPB in this regard shall be final.

10. ARBITRATION

In case of any dispute, Secretary (AYUSH) or his nominee shall be the Arbitration authority.

11. NOTICES AND JURISDICTION

- (i) Subject to the provisions of *clause 10* hereof, the Courts at New Delhi shall have exclusive jurisdiction in all matters concerning this Agreement including any matter arising out of the arbitration proceedings or any award made therein.

IN WITNESS WHEREOF the parties hereto through its duly authorized representatives have signed this Agreement on the day, month and year mentioned hereinbefore.

Parties

For and on behalf of the President of India

Signature

Name

Designation

Seal

Witnesses

- 1. Signature

Name

Address

- 2. Signature

Name

Address

For and on behalf of the Grantee duly authorized vide Resolution No.

and dated of the Board of Directors of Grantee

Signature

Name

Designation

Seal

Witnesses

1. Signature

Name

Address

2. Signature

Name

Address

BUDGET DETAILS

(Once the project is approved by NMPB, the budget details will be communicated to the Grantee, thus revised budget details agreed to by the parties shall be annexed here as Annexure 1)

Annexure – B

Complete Project document with amendments like approved budget, approved timelines (which will also be communicated to the Grantee), and any other amendments communicated to the Grantee by NMPB.

(This document should be bound as part of the Agreement and labeled as Annexure 2 and should not be submitted as a separate document.

Minimum work programme/ milestones/ timelines shall have to be specifically mentioned)

PROFORMA FOR PROJECT PROPOSAL RELATING TO HERBAL GARDEN

PART – I

1. Title of the Project.
2. Name of the organization with full address, telephone, fax and e-mail ID.
3. Status.
4. Registration number and date (for NGO, Trusts and Companies). NGOs and companies should also send the Articles of Association, Memorandum of Association and Annual Report.
5. Name of the Principal Investigator/Project Leader and Co -PIs and their full address.
6. Brief introduction of concept and justification of the project (The detailed project report should contain the profile of the project area, objectives, problem identification, suggested solutions and alternatives along with anticipated physical and financial benefits, outcomes both in terms of products and process, sustainability mechanism.
7. Project period.
8. Detailed infrastructure available:
 - (i) Land details (Location, Extent, Ownership, Area etc.)
 - (ii) Agri-accessories
 - (iii) Manpower
 - (iv) Experience

9. Physical targets and financial outlays.
10. Outcome/ Benefits from the project (both tangible and intangible).
11. Internal monitoring and evaluation mechanism.
12. Summary of similar work particularly in medicinal plants sector undertaken by the organization /PI in the last 3 years.
13. Other sources of financial assistance received by the applicant/organization if any so, furnish details.
14. Details of financial assistance already received from the Board, if any may be given in the following proforma:

Year	Amount of grant	Purpose in brief	Total expenses incurred
Amount of grant utilized	Has utilization certificate been accepted by the Board	Remark	

15. Detailed Bio-data (including details of published work) of PI & Co-PI

Note:

- i) Proof of land ownership/leasehold and market mechanism (wherever applicable) to be submitted.
- ii) Detailed maintenance mechanism beyond the duration of project and Sustainability Mechanism for Herbal Garden.
- iii) Costing pattern to be provided in the form of schedule of rates as applicable.
- iv) Supporting documents including map (where applicable) must be attached.

16. Certified that:

- i) The organization shall abide by all the 'Terms and Conditions' of the

grant stipulated in the operational guidelines of the scheme of NMPB, Ministry of AYUSH, Government of India.

- ii) All records and reports related to the project have been maintained separately and shall be shown and furnished as and when required by the Ministry of AYUSH or its authorized representatives.
- iii) Project shall be open for evaluation of physical progress and utilization of funds at the discretion of Ministry of AYUSH.
- iv) The undersigned shall be responsible for the authenticity of the information and documents furnished in the application and proposal.
- v) Ministry of AYUSH shall have the right to recover the grant or take legal action against the organization for any default or deviation from the terms and conditions of sanction of grant.
- vi) No financial assistance/grant has been sought and or obtained from any Central or State Govt. organization.
- vii) It is certified that all applicable laws/rules and legal provisions are followed while preparing the project proposal for this purpose.
- viii) It is also certified that the project proposal is formulated as per the relevant provisions/ clauses of the guidelines of the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants.

Date:

**Signature of Authorised Authority
and Head of the Institution**

PART – II TECHNICAL DETAILS OF THE PROJECT

1. Description of the problem.
2. Alternatives strategies possible.

3. Objectives of the project
4. Suggested solutions.
5. Project coverage in geographical spread, demography and socio – economic profile of the area (wherever required).
6. Work Plan (Year-wise)
7. Likely impact on the adjoining area and society.
8. Exit strategy/sustainability.
9. Suggested parameters for monitoring during and after the project.
10. List and no. of species of Medicinal Plants proposed for Herbal Garden.

Note: In case, the organization wishes to engage the expertise from the government organization/ national labs/ institute for the overall project duration, written consents from the competent authority of the organization/ lab/ institute is required to be obtained before submitting the proposal.

Retired professionals can be engaged in the project as per the norms of the organization, provided they are actively engaged with them in the field-implementation nature of projects and would not be allowed to be associated as and when required for the activity implementation.

Signature of the Project Leader

Signature of the Head of the Organization

Annexure-VI

PROFORMA FOR PROJECT PROPOSAL RELATING TO SEMINARS/ SYMPOSIUM/ CONFERENCES/ WORKSHOPS/ CAPACITY BUILDING/ TRAINING PROGRAMMES

To be filled in by the Organizing Secretary or any authorized official and counter signed by the Executive Authority of the parent organization. All applications for grant of financial assistance should be furnished to NMPB, completed in all respect with all details in the prescribed proforma at least four months before the date of commencement of the Seminar/ Symposium/ Conference/ Workshop/ Training Programmes.

1. Title of Seminar/Symposium/Conference/Workshop/Nature of Training Programme:
2. Name of Scientific Association/ Body/ Society/ Institution organizing the event and seeking financial assistance and its status with Regn. No. etc:
3. Name, designation and address of Organising Secretary & Convener with Pin Code including telephone/ Mobile/ Fax/ e-mail address:
4. Place and tentative dates for organising Seminar/ Symposium/ Conference/ Workshop/ Training:
5. Grant requested from NMPB:
6. Work Plan (including Awareness/ Education/ Communication):
7. Physical targets, six monthly milestones (for training and capacity building the details of the Resource persons the target group to be trained , the details including the duration and number of training programmes and trainees and the subject matter of the training programme be clearly mentioned):
8. Course content (please specify day-wise with indicative schedule of lectures/ practical sessions:
9. Whether any such conference/ seminar/ workshop /training sponsored by the NMPB or any other agency conducted earlier and its details:

10. Financial outlays (detailed break up of recurring and non-recurring components):
11. Expertise available with the organization. (If certain expertise/skills are to be outsourced name the institutions/experts along with their consent):
12. Outputs and outcomes (both tangible and intangible), incremental incomes, employment, number of beneficiaries, gender development etc. (Wherever applicable):
13. (a) Indicate important areas/ topics/ tentative key speakers/ resource persons etc. along with likely list of participants. Indicate confirmed speakers of eminent (National & International):
- (b) In what way is the Seminar/ Symposium/ Conference/ Workshop/ Trainings expected to contribute to the existing knowledge, particularly in respect of Medicinal Plants sector:
- (c) Has any Association/ Chapter received any earlier grant from NMPB during the last three years for organising Seminar/ Symposium/ Workshop/ Training? If so, give details year-wise and quote the NMPB letter No. and date, in tabular form under the following heads:

Name of the Association	Year	Amount	Letter No. and date	Purpose	Name of the Seminar/ Symposium	Whether U.C. and report submitted
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- (d) Whether UC and other related documents submitted and accepted by NMPB.
- (e) What are the tangible benefits that have resulted from previous Seminar/ Symposium/ Workshop/ Training?
- (f) What is the total expenditure anticipated? Please give head-wise details:
- (g) Clearance obtained from the administrative Ministry, Ministry of Home Affairs and Ministry of External Affairs (in case of international events, keeping in view GOI guidelines on the subject):

14. Details of grant requested/ received from other agencies like DST, DBT, CSIR, UGC, INSA, NAMS and ICAR for the proposed Seminar/ Symposium/ Conference/ Workshop:

Name of Agency	Grant requested	Grant received or expected	Items for which grant has been asked for

15. (a) Please indicate the number of NMPB nominees/ nominees of other organization for participation in the Seminar/ Symposium/ Conference/ Workshop/ Training :

16. Any other relevant information:

Certified that:

- i) The organization shall abide by all the 'Terms and Conditions' of the grant stipulated in the operational guidelines of the scheme of NMPB, Ministry of AYUSH, Government of India.
- ii) All records and reports related to the project have been maintained separately and shall be shown and furnished as and when required by the Ministry of AYUSH or its authorized representatives.
- iii) Project shall be open for evaluation of physical progress and utilization of funds at the discretion of Ministry of AYUSH.
- iv) The undersigned shall be responsible for the authenticity of the information and documents furnished in the application and proposal.
- v) Ministry of AYUSH shall have the right to recover the grant or take legal action against the organization for any default or deviation from the terms and conditions of sanction of grant.
- vi) No financial assistance/grant has been sought and or obtained from any Central or State Govt. organization.
- vii) It is certified that all applicable laws/rules and legal provisions are followed while preparing the project proposal for this purpose.

viii) It is also certified that the project proposal is formulated as per the relevant provisions/ clauses of the guidelines of the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants.

Enclosures:

**Signature of
Organising Secretary/ Official
with Stamp**

**Signature of
Head of the Institution
with Stamp**

PROFORMA FOR PROJECT PROPOSAL RELATING TO SCHOOL HERBAL GARDENS AND HOME HERBAL GARDENS

1. Title of the Project:
2. Name & address of the Project Investigator/organization with full address, telephone, fax and e-mail ID:
3. Status of the Institution (Govt./Non Govt.) If an NGO (Copy of registration certificate to enclose):
4. Registration number & data (for NGOs, Trusts & Companies), NGOs and companies should also send the Articles of Association, Memorandum of Association & Annual report:
5. Organization or body responsible for the maintenance of the Institution, its Composition and Details:
6. Present activities of organization:
7. Details regarding existing infrastructure:
8. Details of prior experience in the field of Medicinal Plants sector, if any:
9. Total land including patches available (for School Herbal Garden) with the institution area wise and where located (whether inside or outside the campus) and details :
10. No. of Schools/ Home Herbal Garden proposed (Enclose list with name, addresses and Tel. Nos. and copy of MoUs)/ consent:
11. Details of medicinal plants along with no. of sapling of each species proposed to be grown under the project (10 to 15 species from the prioritized list of NMPB):
12. Details of awareness activities planned for the project:
13. Certificate for maintenance mechanism after the project period is over (to enclose):
14. Details of other financial resources if any for implementation of the project:

15. Whether any grant has been sanctioned by any other of Central or state/UT Govt. for the same purpose for which the financial assistance is now sought? If yes, Details thereof?

Certified that:

- i) The organization shall abide by all the 'Terms and Conditions' of the grant stipulated in the operational guidelines of the scheme of NMPB, Ministry of AYUSH, Government of India.
- ii) All records and reports related to the project have been maintained separately and shall be shown and furnished as and when required by the Ministry of AYUSH or its authorized representatives.
- iii) Project shall be open for evaluation of physical progress and utilization of funds at the discretion of Ministry of AYUSH.
- iv) The undersigned shall be responsible for the authenticity of the information and documents furnished in the application and proposal.
- v) Ministry of AYUSH shall have the right to recover the grant or take legal action against the organization for any default or deviation from the terms and conditions of sanction of grant.
- vi) No financial assistance/grant has been sought and or obtained from any Central or State Govt. organization.
- vii) It is certified that all applicable laws/rules and legal provisions are followed while preparing the project proposal for this purpose.
- viii) It is also certified that the project proposal is formulated as per the relevant provisions/ clauses of the guidelines of the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants.

**Signature of the authorized office Bearer
of the Institution (along with Name,
designation and Office SEAL)
Telephone/FAX No.**

Proforma for Submission of Annual Progress Report

1. Title & Project number
2. Name of Principal Investigator and Co - PIs (With Address & Tel. No., E-mail IDs)
3. Date of Commencement of the project
4. Area of activity (please specify the component)
5. Total Amount of sanction along with period (years)
6. Amount of last instalment & date received
7. Period of Annual report (submitted annually)
8. Details to be provided as per the project objectives and relevant achievements vis-à-vis the targets.
9. Details of work done with Statistical parameters should be submitted in the relevant format (format I for components MPCDAs, *In-situ* resource augmentation and *Ex-situ* conservation and format II for livelihood/JFMCs)
 - a) Please indicate physical targets achieved with reference to objectives.
 - b) Detail of activities undertaken/ targets achieved
 - c) Indicate names of medicinal species studied / planted (wherever applicable) along with area covered / planted
10. Works that remains to be done under the project.
11. Modification/deletion in objectives, targets/milestones/timelines, if any, (with reason and details of approval given by NMPB).
12. Assets acquired, if any during the period (under report):
13. Expenditure incurred during the period under report:

14. Meeting/seminar/training attended/organized during the period along with brief note on presentation made, if any
15. Research publications done, extension material prepared, if any (submit copies)
 - a) Details of extension material (Brochure/Posters)
 - b) Details of Research papers-
 - i) Presented in seminar/conference
 - ii) Published in any Indian Journals
 - iii) Published in any Index/ National/ International Journals
16. Special achievements, if any (Incremental knowledge, patents, incomes etc.)
17. Any suggestion for growth and development of the sector (only in the final report)

Dated:

Signature (Principal Investigator) with Seal

Place:

Signature of the Head of the Organisation (with Seal)

Format - I

Details of work carried out under projects of MPCDAs/ in-situ resource augmentation/ ex-situ conservation

1. Project area viz., Topography, GPS location (to be clearly marked on the map)
2. Objectives
3. Methodology (Conservation/ Plantation model)
4. Name of range, Division/Village/ Block/District/MPCDA
5. Physical and financial target and achievements thereof;
6. Employment generation (highlight BPL, SC/ST communities) –
 - a. Mandays
 - b. Women employment
7. Training and capacity building including workshop (Date, Venue and Nos. of participants/beneficiaries may also be highlighted).
8. Tangible & intangible benefits from the project
9. Photographs of the project area/medicinal plants conservation along with medicinal plants species.
10. Information in respect of projects on MPCDAs components:-
 - a. Baseline data of medicinal plants in the study area
 - b. Factors responsible for endangerment of medicinal plants in the project area
 - c. Measures adopted for conservation in study area
 - d. Medicinal plants conserved under MPCDAs as per table given below (if applicable):-

S.no.	Site with GPS locations i.e. latitude, longitude and altitude	Botanical name of the medicinal plant(s)	Vernacular name/ trade and local name	Medicinal plants population (i.e. frequency, density, abundance)	Area covered (in hectare)	status as per IUCN/ RED data book/ CITES

- e. Endemic species of medicinal plants conserved
 - f. Medicinal plants used in marketing and trade
 - g. Special achievement in improvement of medicinal plants diversity
11. Information in respect of projects on *in-situ* resource augmentation/ ex-situ conservations component (if applicable) :-
- a. Measures adopted for *in-situ* resource augmentation/ ex-situ conservations in study area
 - b. The species of medicinal plants covered under *in-situ* resource augmentation/ ex-situ conservations in forest range/ division

S.no.	Site with GPS locations i.e. latitude, longitude and altitude	Botanical name of the medicinal plant(s)	Vernacular name/ trade and local name	No. of medicinal plants regenerated (Naturally/ artificially)	Area covered (in hectare)	Produce, if any

12. Details of raw drug produced and income generated.

13. Any other information not covered above.

Dated:

Signature (Principal Investigator) with Seal

Place:

Signature of the Head of the Organisation (with Seal)

Format – II

Technical details of work carried out under project of JFMCs/ Panchayats/ Van Panchayat/ SHGs

1. Project area and details of JFMCs/JFMCs/ Panchayats/ Van Panchayat/ SHGs
2. Objectives
3. Medicinal plants resource scenario in the state
 - i) Dependence of people on these species for livelihoods etc.
 - ii) Collection – species, volumes and value.
 - iii) Infrastructure of mandies, trade centres, manufacturing units.
 - iv) Local consumption – traditional healers, vaidyas etc. (volume if available)
 - v) Species of medicinal plants occurring in the project area
4. Traditional practices in handling, collection and post harvesting practices of medicinal plants/produce.
5. Details of infrastructure i.e. godowns, Mandi, drying sheds, processing units developed as per project proposal
6. Layout/ Photographs of the godowns, drying sheds, processing units, raw drug material collected medicinal plants species etc.
7. Additional income to JFMC members, accrued from the project
8. Market linkage (MoUs, if any).
9. Physical and financial target and achievements thereof;
10. Employment generation (highlight BPL, SC/ST communities) –
 - a. Mandays
 - b. Women employment

11. Training and capacity building including workshop (Date, venue and no. of participants & no. of beneficiaries may also be highlighted)
12. Tangible & intangible benefits from the project
13. Special achievement in improvement in raw drug production
14. Any other information not covered above
15. Summary of the work carried out

Dated:

Signature (Principal Investigator) with Seal

Place:

Signature of the Head of the Organisation (with Seal)

FORMAT FOR UTILISATIONS CERTIFICATE

Form GFR 19-A

[See Government of India's Decision 212 (1)]

Form of utilization Certificate

S. no.	Letter no. and date	Amount	Certified that out of Rs. _____ (_____) of grant-in-aid sanctioned during the year 20__/___ in favour of _____ under this Ministry/Department letter no given in the margin and Rs. _____/- on account of unspent balance of the previous year, a sum of Rs _____/- has been utilized for the purpose of _____ for which it was sanctioned and that the balance of Rs. _____/- remaining unutilized at the end of the year has been surrendered to government (vide no.) will be adjusted towards the grant-in-aid payable during the next year
--------	---------------------	--------	--

2. Certified that I have satisfied myself that the conditions on which the grant-in-aid was sanctioned have been duly fulfilled/are being fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned.

Date _____

Place _____

Kinds of checks exercised

- 1.
- 2.
- 3.

**Signature of Govt.
Auditor/Chartered Accountant
Stamp:
Date:**

**Signature of Principal
Investigator
Designation
Seal
Date**

Proforma 'B'

**FORMAT FOR ANNUAL STATEMENT OF ACCOUNTS TO ACCOMPANY
REQUEST FOR RELEASE OF NEXT INSTALLMENT (YEAR MEANS FINANCIAL
YEAR i.e. 1st APRIL TO 31st MARCH OF NEXT YEAR)**

1. Sanction letter No. : _____
2. Total Project Cost. : Rs. _____
3. Sanction/Revised Project cost (if applicable) : Rs. _____
4. Date of Commencement of Project : _____
5. Statement of Expenditure : _____

S. No.	Sanctioned/ Heads	Funds released in ₹	Expenditure incurred			Balance as on (Date)	Requirement of Funds upto 31 st March	Remarks
			1 st Year	2 nd Year	3 rd Year			
1.	Outsourcing expenses of staff/ fellowships/ wages etc.							
2.	Equipment/ Machinery/ Drying shed							
3.	Consumables							
4.	TA/DA							
5.	a. Conservation/ Plantation/ Nursery/QPM							
	b. Plantation including Maintenance							
	c. Soil & Moisture Conservation							
	d. M&E, Micro-planning, Fencing, Awareness Raising							
	e. Overheads							

	f. Entry Point Activities							
6.	Other Projects (Training/ Capacity Building/ Herbal Garden etc.) (as per breakup of the project cost approved)							
7.	Publicity material/ Reports							
8.	Monitoring Expenditure							
9.	Other expenses viz. (marketing linkage, buyer-seller meetings etc., please specify)							
10.	Institutional charges							
11.	Contingencies							
	Total							

* Details of accrued interest on the unspent balance grant (refundable) may also be reflected separately in the UC & SOE.

Signature of Principal Investigator with date

(Seal)

Signature of Head Institution with date

(Seal)

Signature of Authorized Auditor / Comptroller/ CA with date

(Seal)

National Medicinal Plants Board

TERMS & CONDITIONS OF FINANCIAL ASSISTANCE (GRANT)

1. The institution/organization/Principal Investigator (PI) would maintain a separate statement of Accounts/register. The organization has to maintain an account in Nationalized Bank. The accounts should be operated jointly by two office-bearers. The grant-in-aid will be released through FDA/SFDAs/FDCs in respect of forestry projects and for other projects the Grant-in-aid will be released through the Institute/organisation concerned.
2. The grantee (NGOs) will execute a bond on Rs. 100/- stamp paper in the prescribed proforma at **Annexure -VIII** with two sureties to the effect that the grantee will abide by all the conditions of the grant. In the event of any failure to comply with these conditions or committing any breach of the bond, the grantee with sureties individually and jointly will be liable to refund to the Government of India the entire amount of the grant together with interest at such rate as is stipulated in the Bond. The requirement of furnishing two sureties will not be necessary if the grantee institution/organisation is a Society registered under the Societies Registration Act-1860 or a Cooperative Society. When the bond is also signed by two sureties both of them should be solvent and owner of such assets of value not less than the amount of the Bond as can be attached and sold in execution of a court's decree. This fact should be certified by the District Magistrate or other equivalent authority on the body of the bond.
3. The project for which grant in aid is being sought should commence implementation within a period of 3 months from the date of receipt of grants.
4. If the grant or any part thereof is to be utilised for a purpose other than that for which it is sanctioned, prior approval of the Board should be obtained by the grantee.
5. The payment of the grant-in-aid will be made by this Board through crossed demand draft/RTGS/ECS mode after all the requirements mentioned in this sanction letter have been fulfilled by the grantee.

6. For those PI, who have undertaken NMPB supported projects unsatisfactorily then, project proposals of such PI will not be considered for funding from NMPB for consecutive 3 years after finalisation of the project.
7. Interest generated on the grant-in-aid released by NMPB will need to be refunded to NMPB or adjusted against future releases within the overall amount sanctioned under the project.
8. The payment of grant is subject to the following conditions:
 - a) Submission of agency and bank details.
 - b) Pre-receipt of the grant-in-aid amount.
 - c) The grantee shall furnish a certificate that the person signing the undertaking is duly authorised to operate upon and bind the funds of the grantee organisation.
 - d) The grantee shall furnish a certificate that the grantee is not involved in any court proceedings relating to the account or conduct of any of its office bearers. A certificate to the effect that the institution is not involved in corrupt practices should also be furnished.
 - e) The grantee shall furnish a certificate to the effect that it has not been sanctioned grant-in-aid for the same purpose by any other agency of Central Government/State Government during the same period.
 - f) The grantee will not, with out the prior sanction of the Government of India, dispose of, or divert the use for any other purpose of permanent and semi- permanent assets that may be created or acquired out of the grant. If and when such body is dissolved the assets are to be reverted to the Government.
 - g) Accounts of the grantee should also be open for the test check and regular audit of the comptroller and Auditor General of India at their discretion.
 - h) No portion of the grant shall be utilized for furtherance of a political movement prejudicial to the security of the nation.
 - i) Grantee Organization/Institutes should submit an undertaking in writing that the grantee agrees to be governed by the conditions of the grant mentioned in this Annexure and the sanction letter.

- j) Private and voluntary organisations receiving recurring grant-in-aid to the tune of Rs.5.00 lacs and above shall submit 5 copies of their Annual Reports including audited Statement of Accounts (English or Hindi) along with soft copy with in six months of the close of the financial year.
 - k) At the end of the year the grantee shall have to submit five (05) copies of Annual Progress Report (Mentioning physical and financial targets achieved) along with the Utilisation Certificate (UC) and audited statement of Accounts failing which grant shall be stopped.
9. Acceptance of UCs will be subject to the following:
- a) The grantee shall maintain a register of all assets acquired out of this grant as per GFR. This register is required to be maintained separately in respect of such sanction and two copies of the same duly signed by the grantee be furnished to this Board annually.
 - b) The Register of assets maintained by the grantee should be available for scrutiny by audit or any other person authorized in this behalf by this Ministry.
 - c) The grantee should forward to NMPB a Utilization Certificate in form 19-A of GFR along with the Audited Statement of Accounts both of which should be duly certified by a Chartered Accountant/Government Auditor and counter signed by PI soon as possible after the close of the financial year and in any case not later than six months of its closing
10. The cost of computer including UPS and all accessories should be minimum and reasonable and as per the prevalent market rate.
11. Rates of wages applicable for carrying out various works proposed in the projects would be to the extent of prevailing schedule of rates in the State/UTs/Central Government Institutes.
12. The voluntary organizations have to furnish documentary proof in support of land ownership. The Government organizations have to indicate details about status of land.
13. For extension activities like training, seminar, workshop etc. payment

towards boarding lodging and transport, the admissible limit would be as per Government of India norms

14. Resource persons may be paid honorarium and TA/DA as per existing Government of India norms.
15. Expenses on equipment(s) should be need based. Further, in case the institution/organization is already having the same equipment(s); purchase of the equipment(s) for that project shall be avoided as far as possible.
16. Salary on contractual staff should be kept to the minimum. The emoluments to the contractual staff under the R&D projects or other projects shall be as per the norms of the DST/ CSIR.
17. Regular/permanent or hired staff of the institute/organization working as Principal Investigator/ Co-PI will not be eligible for payment of salary from this grant.
18. Sub contracting within the project is not permissible.
19. Other terms and conditions will be those as applicable in State/Central Government institutes as the case may be.
20. PI has to certify that all applicable laws/rules and legal provisions are followed while preparing the project proposal.
21. It is also to be certified that the project proposal is formulated as per the relevant provisions/ clauses of the guidelines of the Central Sector Scheme for Conservation, Development and Sustainable Management of Medicinal Plants.
22. Any patent filed or accepted as an outcome of NMPB's funded project(s) shall be the joint property of the NMPB and the grantee organisation. Any commercialisation of the patent shall be done only with the explicit approval of NMPB.

Project No. _____

Prescribed Format:

BOND

This bond made on the _____ day of _____ two thousand two _____ between _____ society/ trust/ NGO registered under the Societies Registration Act, 1860 and having its office at _____ in the State of _____ hereinafter called the 'obliger' (which expression shall unless excluded by or repugnant to the context be deemed to include its successors-in-interest) of the First part and the President of India , (hereafter called 'The Government') of the Second part; Whereas at the request of the obliger, the Government have sanctioned a grant-in-aid of _____ (Rupees _____) vide their letter No. _____ dated _____ (hereinafter referred to as the said letter) which forms an integral part of these presents and a copy whereof is annexed hereto and marked with the letter 'A' for the purpose of and on condition of the obliger executing a bond in favour of the Government on the terms and conditions and the manner hereinafter contained which the obliger has agreed to do.

Now, this Bond witnesses and it is hereby agreed and declared as follows:

- 1) That the obliger shall utilize the said grant-in-aid of Rs. _____ (Rupees _____) only for the purpose specified in the said letter and for no other purpose whatsoever.
- 2) That the obliger shall abide by all the norms and conditions specified in the said letter and the General Financial Rules 1963 and any orders or instructions that may be issued by Government from time to time.
- 3) That in the event of any failure on the part of the obliger to abide any of the terms and conditions of the grant-in-aid specified in the said letter or his committing any breach thereof the Government will be at liberty to order the obliger to

repay in full (forthwith entire grant-in-aid amounting to Rs. _____ (Rupees _____) only or any part thereof with interest thereon at the rate of twelve percent (12%) per annum and any order made by Government in this respect will be final and binding on the obliger forthwith and without any objection to pay the Government such sum not exceeding Rs. _____ (Rupees _____) only plus interest thereon as may be fixed by the Government and the decision of the Secretary to the Government of India in the Ministry of Health and Family Welfare about the amount so to be paid shall be final and conclusive.

- 4) The society/trust agrees and undertakes to surrender/pay to Government the monetary value of all such pecuniary or other benefits which it may receive or derive/have received or derived through/upon unauthorized use (such as letting out the premises for adequate or less than adequate consideration or use of the premises for any purpose other than that for which the grant was sanctioned) of the property/building created/acquired/constructed largely from out of Government Grant. The decision of the Secretary to the Government of India, Department of AYUSH in the Ministry of Health and Family Welfare as regards the monetary value aforementioned to be surrendered/paid to the Government of India will be final and binding in the Society/Trust.
- 5) Upon the obliger utilizing the Grant-in-aid only for the purpose specified in the said letter and abiding by fulfilling and performing all the terms and conditions of the said letter the above written obligation shall be void and of no effect but otherwise it shall be and remain in full force effect and virtue.

Provided always and it is hereby agreed and declared that the decision of the Secretary, Ministry of AYUSH as to whatever the obliger has or has not performed and observed the obligations and conditions herein before received shall be final and binding.

- 6) The stamp duty on the Bond shall be borne by the Government
IN WITNESS whereof these presents have been signed by Shri/
Smt. _____ and _____ for and
on behalf or the obliger and Shri/ Smt. _____
_____ for and on behalf of the President of India on the dates appearing
against their respective signatures.

Signed by:

1) Shri _____ dated: _____

2) Shri _____ dated: _____

1) Signature _____

2) Signature _____

1) Witness

Name and Address

2) Witness

Name and Address

by the Shri _____ dated
_____ for and behalf of the President of India in the presence of:

Signature _____

1) Witness

2) Witness



National Medicinal Plants Board

**Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homoeopathy
(AYUSH)**

Government of India

3rd Floor, AYUSH Bhawan B-Block
G.P.O. Complex, I.N.A., New Delhi-110023
Tel.: +91-11-24651824, 24651825
Fax: +91-11-24651827

Website: www.nmpb.nic.in | Email: info-nmpb@nic.in

Forest habitats in Bonnie camp MPCA



A. C. & E. Tidal forests are also popularly known as Mangrove forests.
B. D. & F. Number of canals found inside the MPCA.

Field activities as part of quantitative assessment of medicinal plants within Bonnie camp MPCA



Some of the important conservation concern medicinal plants in Bonnie camp MPCA



A. & B. *Nypa fruticans*, C. *Finlaysonia obovate*, D. *Heliotropium curssavicum*, E. *Trianthema portulacastrum*, F. *Suaeda maritima*

Some of the common medicinal plants found in Bonnie camp MPCA



A. *Aegialitis rotundifolia*, B. *Bruguiera cylindrical*, C. *Ceriops tagal*, D. *Coccinia indica*, E. *Xylocarpus granatum*, F. & G. *Acanthus ilicifolius*

Forest habitats in Dhotrey MPCA

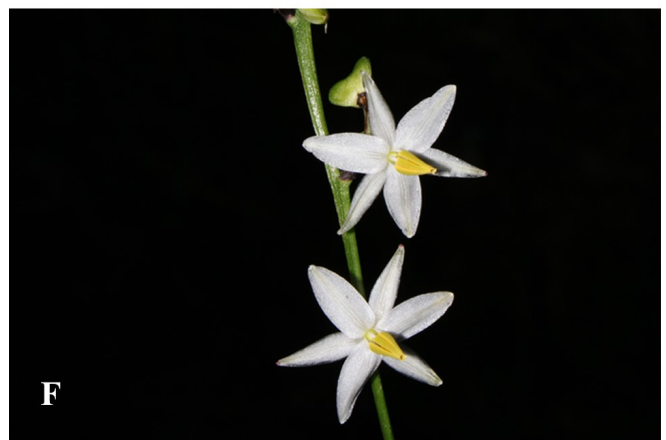


A. & B. Coniferous forest, C. Tropical rain forest, D. & E. Alpine forest, F. Tropical evergreen forest

Field activities as part of qualitative and quantitative assessment of medicinal plants within Dhotrey MPCA

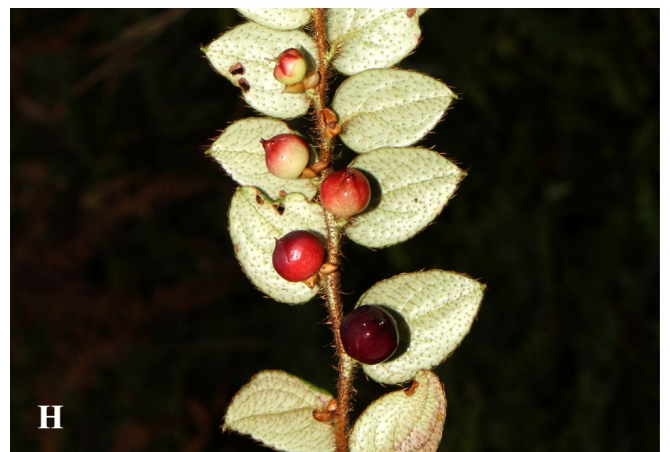


Some of the important conservation concern medicinal plants found in Dhotrey MPCA



A. *Hedychium thyrsiforme*, B. *Dendrobium chryseum*, C. *Elsholtzia flava*, D. *Geranium procurrens*, E & F. *Chlorophytum nepalense*, G. *Hypericum hookerianum*, H. *Eriocapitella vitifolia*

Some of the common medicinal plants found in Dhotrey MPCA



A & B. *Impatiens arguta*, C. *Impatiens stenantha*, D. *Lycoris radiata*, E. *Osbeckia stellata* var. *crinite*, F. *Symplocos glomerata*, G. *Gaultheria fragrantissima*, H. *Gaultheria nummularioides*

Some of the common medicinal plants found in Dhotrey MPCA



A. *Fagopyrum cymosum*, B. *Miscanthus nepalensis*, C. *Anaphalis contorta*, D. *Anaphalis margaritacea*, E. *Calceolaria Mexicana*, E. *Erythranthe nepalensis*

Forest habitats in Garpanchkot MPCA



A. Commonly found scrub forest, B. Tropical Moist deciduous forest, C&D. Tropical dry evergreen forest

Field activities as part of qualitative and quantitative assessment of medicinal plants within Garpanchkot MPCA



Some of the important conservation concern medicinal plants found in Garpanchkot MPCA



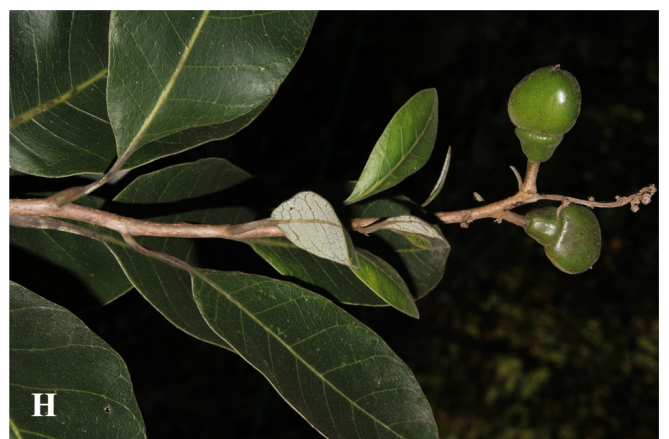
A. *Aristolochia indica*, B. *Wissadula periplocifolia*, C. *Dioscorea floribunda*,
D. *Diospyros montana* fruiting twig, E. *Ayenia herbacea* fruiting twig

Some of the common medicinal plants found in Garpanchkot MPCA



A. *Cleistanthus collinus*, B. *Eranthemum purpurascens*, C. *Butea monosperma* flowers, D. *Smilax ovalifolia*, E. *Olax scandens*, F. *Apluda mutica*

Some of the high traded medicinal plants found in Garpanchkot MPCA



A. *Helicteres isora*, B. *Terminalia chebula*, C. *Mucuna pruriens*, D. *Aegle marmelos*, E. *Andrographis paniculate*, F. *Phyllanthus emblica*, G. *Pseudarthria viscida*, H. *Semecarpus anacardium*

Forest habitats in Tonglu MPCA



A. & B. Montane Wet Temperate Forests, C. & D. Dry woodland forest, E. Open wet and with Scrub forest, F. Commonly found in Rhododendron forest

Field activities as part of qualitative and quantitative assessment of medicinal plants within Tonglu MPCA



Some of the important conservation concern medicinal plants found in Tonglu MPCA



A. *Impatiens hobsonii*, B. *Allium wallichii*, C. *Polygonatum oppositifolium*, D. *Schisandra grandiflora*, E. *Primula capitata*, F. *Paris polyphylla*, G. *Dendrobium longicornu*, H. *Aconitum ferox*

Some of the common medicinal plants found in Tonglu MPCA



A. *Acer campbellii*, B. *Griffitharia vestita*, C. *Lobelia montana*, D. *Aconitum palmatum*, E. *Swertia bimaculate*, F. *Elsholtzia fruticosa*

Different types of micro-habitats found inside MPCA



Different types of micro-habitats in and around MPCA



Conservation concern medicinal plants recorded in North Sevoke MPCA



Abelmoschus moschatus



***Aphanamixis polystachya* - branch and fruits**



***Piper lonchites* – branch & fruits**



***Stereospermum colais* - fruits and habit**

Conservation concern medicinal plants recorded in Sursuti MPCA



Oroxylum indicum - habit with fruits and seeds

Cinnamomum cecidodaphne



Gynocardia odorata - habit, branch, fruit and seeds



Cinnamomum bejolghota – habit and the floral branch

Conservation concern medicinal plants recorded in North Rajabhatkhawa MPCA



Dysoxylum binectariferum- branch & fruits *Piper sylvaticum* : habit and fruit spike



Michelia champaca- habit and flower

Chonemorpha fragrans
habit with fruits

Aphanamixis
polystachya

Important and prioritized medicinal plants of MPCAs



Cinnamomum cecedodaphne



Cinnamomum bejolghota



Piper sylvaticum



A fertile branche with fruiting spike of *P. Sylvaticum*



Momordica charantia



Tabernaemontana divaricata

Flagship species of MPCAs



Gynocardia odorata



Gynocardia odorata – branch, fruit and the tree



Abelmoschus moschatus



Aristolochia tagala

Important and prioritized medicinal plants of MPCAs



Piper longites



Sauropus androgynus



Dysoxylum sp



Dysoxylum binectariferum



Coffea bengalensis



Casearia vareca

Important and prioritized medicinal plants of MPCAs



Oroxylum indicum



Seed of Oroxylum indicum



Ficus mysorensis var. subrepanda



Laportea crenulata



Sarcandra sp



Otochilus sp

Medicinal plants recorded in the MPCAs



Important species collected from various MPCAs



Important species collected from various MPCAs



Important species collected with GPS coordinates during the vegetation survey



Survey in various MPCAs and the team



Vegetation survey and herbarium collection in North Sevoke MPCA



Survey and processing of herbarium specimens



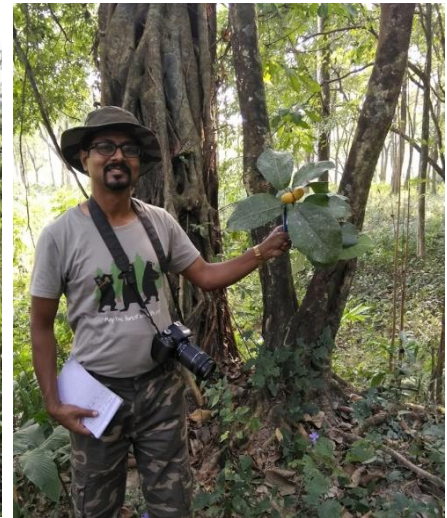
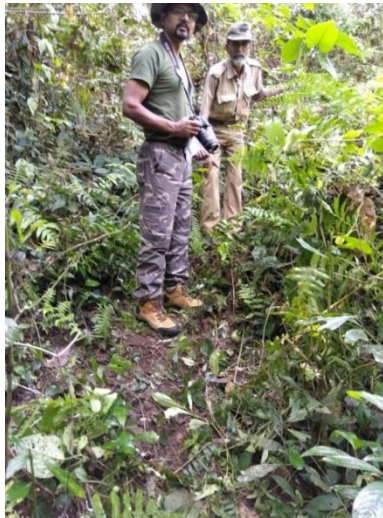
Team members during survey and collection of herbarium



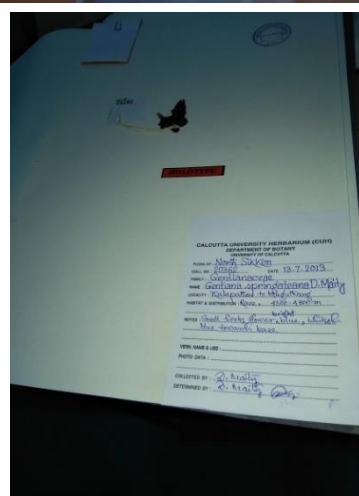
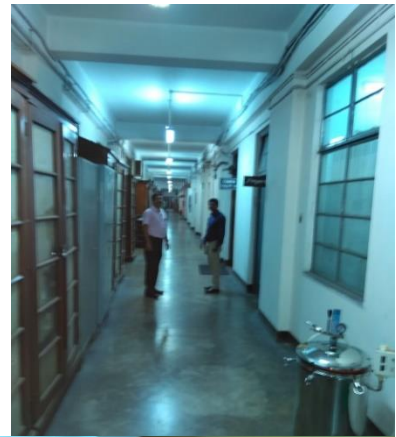
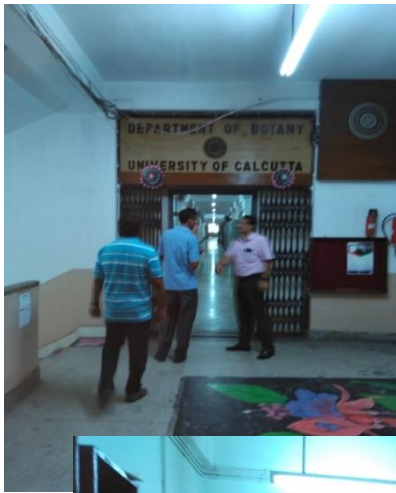
Survey in various MPCAs and herbarium processing



Survey in various MPCAs and herbarium processing



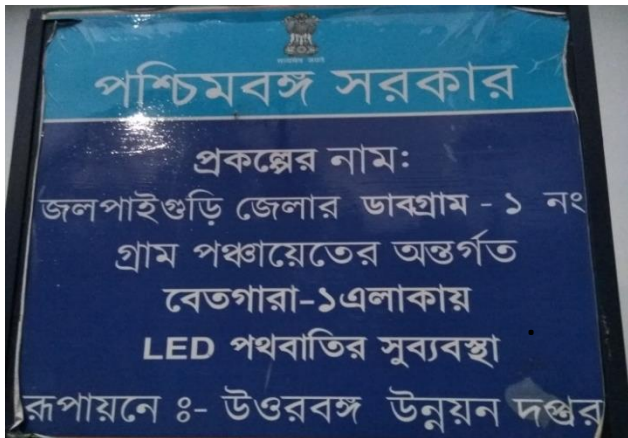
Visit to Calcutta University and interactions with the resource persons



Community interactions in the forest villages around MPCAs



Community interactions in the Forest villages around MPCAs



Large scale charcoal production from the fuel wood by the forest villagers near the Sevoke MPCA



Herbarium Processing, Mounting, Identification and Digitization



Herbarium Processing, Mounting, Identification and Digitization





This report has been prepared by

THE UNIVERSITY OF TRANS-DISCIPLINARY HEALTH SCIENCES AND TECHNOLOGY (TDU) - FOUNDATION FOR REVITALISATION OF LOCAL HEALTH TRADITIONS (FRLHT)

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