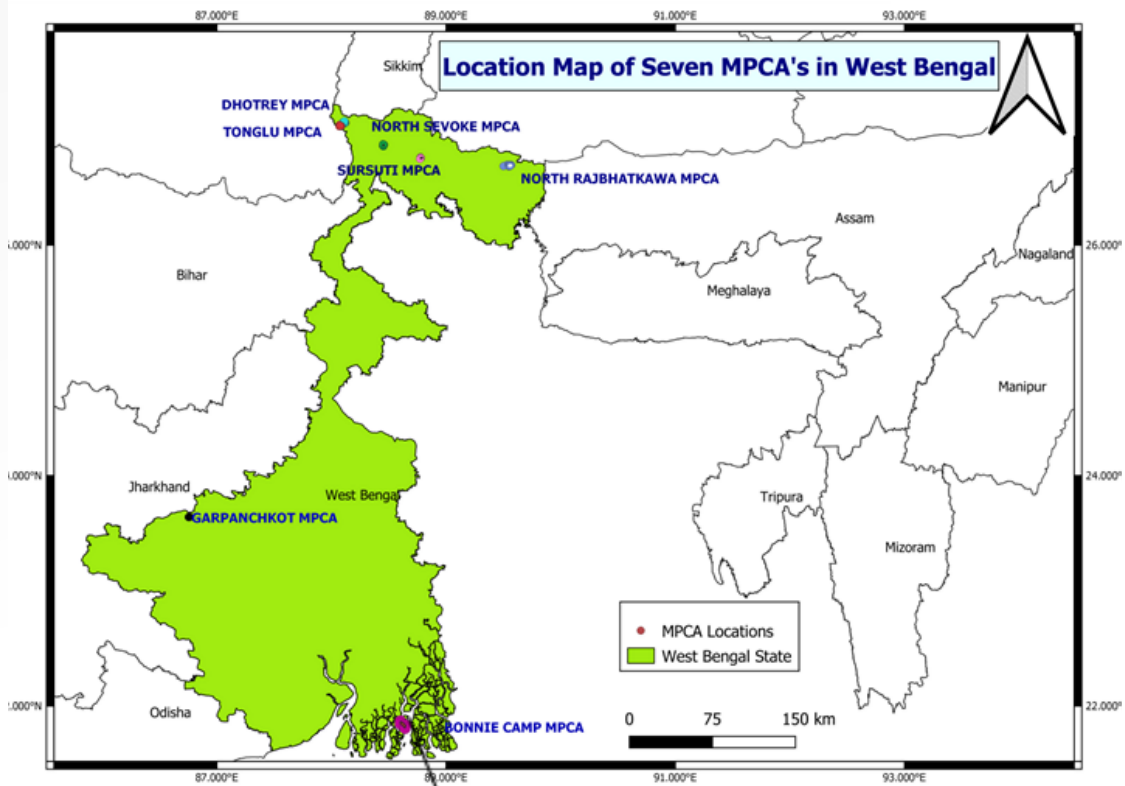


**BONNIE CAMP MEDICINAL PLANTS  
CONSERVATION AREA (MPCA)  
WEST BENGAL**

# Spatial Distribution Map of Bonnie Camp MPCA in West Bengal.



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Fig. No.1: Spatial distribution Map of Bonnie Camp demarcating the area under the MPCA.

## MPCA as an inventive tool for Forest Biodiversity Conservation in West Bengal

The state of West Bengal is blessed with varied phytogeography that allows it to host a diverse range of plants and animals. The state has 11, 879 sq. km of forested area of which 39.50% is under protected area network. In 2007-09, seven (7) Medicinal Plant Conservation Areas (MPCAs) were established in the State for promoting Conservation of Medicinal Plants and Traditional Knowledge for enhancing health and livelihood security of the surrounding indigenous communities. In the face of global warming and climate change the MPCA can act as buffers for carbon sequestration, habitat protection, gene pool conservation, health and poverty issues and other ecosystem services. Each MPCA can act as a permanent plot for future assessments on impact of climate change on forest ecosystems. Awareness regarding the objectives and presence of the MPCA's is of paramount importance to meet the Sustainable Development Goals (SDG) of UN. A pictorial guide book of the medicinal plants of the MPCA's and their IUCN status is a prerequisite for facilitating the conservation initiatives of every MPCA.

Of the 7 MPCA's in the State of West Bengal; three were established in North Bengal, namely North Sevoke, Sursuti and North Rajabathkhawa; two in Darjeeling Hills namely Dhotrey and Tonglu MPCA and two in South Bengal namely Bonnie Camp in Sundarbans and Garpanchakot in Purulia.

The Bonnie Camp MPCA has an area of 300 ha in the Raidighi Forest Range of Mathurapur II Block of 24- South Parganas Division of Sunderban Delta.

Table 1. Community, Phytogeographic, Climatic, Edaphic and Administrative profile of Bonnie Camp MPCA.

Community		
The people residing adjacent to the MPCA are mostly Bengali communities.	The major livelihood sources are fishing farming, Forest Dept. daily wage labour, small business, eco-tourism guide, small boat and launch service, teaching.	
Phytogeography and physical description		
Lat- N 21° 50' Long- E 88° 37' Elevation- 2-7m MSL Forest Type – As per Champion & Seth's Classification: 4B-Littoral and Tidal Swamp Forest Mangrove	Dominant tree species (as per IVI values) <i>Avicennia officinalis</i> L. <i>Avicennia alba</i> Blume. <i>Excoecaria agallocha</i> L. <i>Avicennia marina</i> (Forssk.) Vierh <i>Xylocarpus granatum</i> J.Koenig <i>Bruguiera gymnorhiza</i> (L.) Lam. <i>Sonneratia apetala</i> (L.) Engl. <i>Ceriops decandra</i> (Griff.) W. Theob. <i>Bruguiera cylindrical</i> (L.) Bl. <i>Sonneratia alba</i> J. Smith	
Climatic Condition		
Temperature in °C Max – 38 Min – 13.7	Average Rainfall (mm) 1924.2 unit	Spring- January to February Summer- March-May South West Monsoon- June-September. Winter –October to January.
Edaphic Condition		
Soils are of 5 main types: the mangroves have soft clay soil and hard clay, the inland soil is sandy clay, sandy soil and silty soil.		
Administrative		
The MPCA comes under the Reserve Forests category and was declared as Sundarikati Eco-Conservation Camp in Raidighi Range of Sunderban National Park.	The Forest department has a guest house and tiger watch tower adjacent to the MPCA. The Bonnie camp also has a nursery for sundari trees and has recently built a rescue centre for the alligators found in the waters of Sunderban	

The Bonnie camp MPCA harbours 95 medicinal plants. About 4 plants of this group are under the IUCN threatened category. A large number of plants have been reported as rare in this MPCA (Table 2)



Sl. No	Scientific Name	Family	Habit	Status
1	<i>Acanthus ilicifolius</i> L.	Acanthaceae	Herb	Rare
2	<i>Acanthus volubilis</i> Wall.	Acanthaceae	Herb	Rare
3	<i>Bruguiera cylindrica</i> (L.) Blume	Rhizophoraceae	Tree	Rare
4	<i>Caesalpinia crista</i> L.	Caesalpiaceae	Straggling shrub	Rare, NR
5	<i>Commelina longifolia</i> Lam.	Commelinaceae	Herb	Rare, NR
6	<i>Cyperus bulbosus</i> Vahl.	Cyperaceae	Herb	Rare, NR
7	<i>Finlaysonia obovata</i> Wall.	Asclepidaceae	Climber	Rare, NR
8	<i>Glinus oppositifolius</i> (L.) Aug. DC.	Molluginaceae	Herb	Rare, NR
9	<i>Heritiera fomes</i> Banks	Malvaceae	Tree	Rare
10	<i>Ipomoea sagittata</i> Poir.	Convolvulaceae	Climber	Rare, NR
11	<i>Leptochloa panicea</i> (Retzius) Ohwi	Poaceae	Herb	Rare, NR
12	<i>Leptopetalum biflorum</i> (L.) Neupane & N. Wikstr.	Rubiaceae	Herb	Rare, NR
13	<i>Lumnitzera racemosa</i> Willd.	Combretaceae	Small tree	Less common, vulnerable
14	<i>Nypa fruticans</i> Wurmb	Arecaceae	Tree	Rare, Vulnerable
15	<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	Climber	Less common, NR
16	<i>Oldenlandia attenuata</i> (Willd.) M.R. Almeida	Rubiaceae	Herb	Rare, NR
17	<i>Oldenlandia corymbosa</i> var. <i>linearis</i> (DC.) Verdc.	Rubiaceae	Herb	Rare, NR
18	<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	Climber	Less common, NR
19	<i>Rhizophora mucronata</i> Poir.	Rhizophoraceae	Tree	Rare
20	<i>Rothia indica</i> (L.) Druce	Fabaceae	Herb	Rare, NR
21	<i>Sarcolobus globosus</i> Wall.	Asclepidaceae	Climber	Rare
22	<i>Sonneratia alba</i> Griff.	Lythraceae	Tree	Rare, NR
23	<i>Sonneratia caseolaris</i> (L.) Engl.	Lythraceae	Tree	Rare, Endangered
24	<i>Sonneratia griffithii</i> Kurz	Lythraceae	Tree	Rare
25	<i>Suaeda nudiflora</i> (Willd.) Moq.	Amaranthaceae	Undershrub	Less common, NR
26	<i>Tamarix troupii</i> Hole	Tamaricaceae	Shrub	Rare, NR
27	<i>Thespesia populnea</i> (L.) Sol. ex Corrêa	Malvaceae	Tree	Rare
28	<i>Viscum orientale</i> Willd.	Viscaceae	Herb	Rare, NR
29	<i>Xylocarpus granatum</i> J. Koenig	Meliaceae	Tree	Less common, vulnerable
30	<i>Xylocarpus moluccensis</i> (Lam.) M. Roem.	Meliaceae	Tree	Rare

Rare (<50 plants), Less common (< 100 plants), Common (>500 plants), NR (Newly Recorded).

In Bonnie Camp MPCA which had about 41 newly reported species most of them had small population. *Sonneratia caseolaris* that is listed as endangered according to the IUCN category had less common occurrence in the MPCA. Also, *Nypa fruticans*, *Xylocarpus granatum* and *Lumnitzera racemosa* that are in the vulnerable category of IUCN Red list of species is found less commonly in the MPCA.

The community adjacent to the Bonnie Camp MPCA had very limited interaction with the MPCA due to the difficult access to the mangrove area that was frequently visited by Royal Bengal tiger and other wildlife. However, fuelwood, fruits and medicinal plant were occasionally collected from the areas adjoining the MPCA. Further people are also engaged in collection and trading of crabs (*Scylla serrata*) from the area. The medicinal plants growing in the neighbourhood of the MPCA are used

for treating ailments such as jaundice, diabetes, fever, hepatitis, joint pain, seizures, mental health, fish bite and bone prick, bone fracture, skin disease, arthritis, ulcer, stomach ailment and as food item (Table 3).

Table No. 3: Traditionally used medicinal plants in the neighbourhood of the Bonnie Camp MPCA.			
Botanical name	Local Name	Medicinal use	Local use/traded
<i>Acanthus illicifolius</i>	Horkocha	Plant used in treating asthma.	Locally used, Traded
<i>Aegiceras corniculatum</i>	Kholsi	Plant used to treat atherosclerosis, rheumatoid arthritis, asthma.	Locally used, Traded
<i>Alternanthera sessilis</i>	Dulchemo-dranga	Leaf used in treating hepatitis, chest problem, and as tonic and laxative.	Locally used, Traded
<i>Andrographis paniculata</i>	Kalomegh	Leaf juice used against jaundice and liver problem.	Locally used, Traded
<i>Avicennia alba</i>	Kalo Bain	Roots used to treat cuts and sores.	Locally used, Traded
<i>Avicennia officinalis</i>	Baen	The bark is used in rheumatism, paralysis, asthma, dyspepsia, stomach pain, tumours	locally used
<i>Bruguiera gymnorhiza</i>	Kakra	Leaves and roots used to treat diarrhoea, fever, diabetes, and pain.	Locally used, Traded
<i>Ceriops roxburghiana</i>	Goran	Bark used in gastrointestinal problem, blotting and dyspepsia.	Locally used, Traded
<i>Clitoria tarnetea</i>	Aparajita	Flower juice with milk given to children against cough and cold; seeds as purgative and roots against ulcer, dysentery.	Locally used, Traded
<i>Euphorbia hirta</i>	Bera dudhi/sag	Leaf used to treat stomach ulcer, bowel complaint and as astringent.	Locally used, Traded
<i>Excoecaria agallocha</i>	Gnewa	Latex used in wound, fish piercing; bark ash used against skin disease; Bark extract used in anxiety, headaches, insomnia and seizures.	Locally used, Traded
<i>Heriteria fomes</i>	Sundari	Root decoction used to treat mouth infection and toothache.	Locally used, Traded
<i>Nypa fruticans</i>	Golpata	Shoot juice with coconut milk used for skin disease.	Locally used, Traded
<i>Ocimum tenuiflorum</i>	Tulsi	Leaves with salt used for treating bloating (gas).	Locally used, Traded
<i>Phoenix palludosa</i>	Hetal	The fruit used as a tonic and restorative, and as analgesic to get relief from backache.	Locally used, Traded
<i>Rhizophora apiculata</i>	Gorjon	Used to treat pain, inflammation and reduce blood glucose level	Locally used
<i>Sonneratia caseolaris</i>	Chaak Keora	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.	Locally used
<i>Xanthium indicum</i>	Matha jota	Roots used to treat pain from fish bone prick.	Locally used
<i>Xylocarpus granatum</i>	Dhundul	Bark extract used in anxiety, headaches, insomnia and seizures.	Locally used

The fruits of *Sonneratia caseolaris* that is an endangered plant is used widely by the local people. This species requires nursery attention as it has a very small population in the Bonnie camp MPCA that acts as a **genepool** for such endangered species. Alternate livelihood sources can be generated by the local people by creating home nurseries of such medicinal plants. Further value addition to medicinal plant part can reduce extraction pressure on the local biodiversity and also improve local economy. The MPCA can act as a major ecological and economic tool for the sustainable development of surrounding areas specially with respect to various ecosystem services.

*Nypa fruticans* Wurm.



Common Name	Golpata
Family	Arecaceae
Habitat and Distribution	It is considered native to China, Bangladesh, India, Sri Lanka, the Andaman and Nicobar Islands, Myanmar, Cambodia, Thailand, Vietnam, Borneo, Java, Malaysia, Philippines, Sumatra, New Guinea, and Australia .
Ecology:	It is known to support a large number of fungi, and some are of host-specific .
Threat status	Vulnerable (VU)
Description	It is large, evergreen palm forming a loose clump of growth from a prostrate or subterranean stem. This stem branches at intervals to form individual clumps of large, erect leaves. Male and female flowers borne separately on the inflorescence. Produce woody nuta arranged in globular cluster on a single stalk.
Flowering and fruiting	Flowering December to June. The first flowering occurs 3- 4 years after germination.
Uses	Its leaves are used for thatching, umbrellas, sun hats, raincoats, baskets, mats and bags. Stalks are used as fuel and arrows. Sugar, alcohol and vinegar can be obtained from the plant. It has been traditionally used for the medicinal treatment of conditions such as <b>asthma, leprosy, rheumatism,</b> and pain.
Trade information	Locally traded for the leaves. The Nypa palm has a very high sugar-rich sap yield. Fermented into ethanol or butanol, the palm's large amount of sap may allow for the production of 6,480-15,600 liters (per year) of fuel per hectare
Propagation and cultivation	Seeds and dichotomus branching of rhizomes.



## *Sonneratia caseolaris* (L.) Engl



Common Name	Mangrove apple; Chakk Keora
Family	Lythraceae
Habitat and Distribution	Distributed in Bangladesh, Cambodia, China, India, Indonesia, Malaysia, Myanmar, Philippines, Thailand, northeast Australia, and Papua New Guinea. It is found in deep muddy soils at brackish backwaters of mangroves and upper reaches of tidal rivers with slow-moving water.
Ecology:	One of the first mangrove species to colonize riverbank and mudflats in new habitats. Flowers are visited by fruit bats, honeybirds, and large night-moths. It is the preferred local food plant for caterpillars of the moths. <i>Sonneratia caseolaris</i> (Ora / Chakk Keora) along with few other species appear as early colonizes in the successional process of Mangrove ecosystem in Sundarban. <i>Oryza coarctata</i> (Dhani) is followed by <i>Avicennia alba</i> (Bani), <i>A marina</i> , <i>Aegialitis roundifolia</i> (Tora), in the succession.
Threat status	Endangered (EN)
Description	It is a tree usually up to 15 m tall with brown to grey branches and slightly fissured on trunk and branches smooth waxy brown. It has underground roots as well as up to 1.5 m-tall upright, breathing roots (pneumatophores). The foliage is opposite, shortly-stalked leaves possess leathery leaf blades, oval to drop-shaped; flowering shoots bear dark red-petalled flowers, with numerous prominent pinkish-white stamens, filamentous and powderpuff-like when fully open. Its green fruits are round, leathery berries.
Flowering and fruiting	Flowering October to May. The flower is nocturnal, opening late in the evening and lasts for one night only.
Uses	Pneumatophores are used in the production of perfumes, hair products, aphrodisiacs, skin cosmetics, and soaps; used for making corks, fishing floats, shoe heels.
Trade information	Fruits collected and occasionally sold in the local market.
Propagation and cultivation	It is propagated by seed.



## *Xylocarpus granatum* J.Koenig



Latitude: 21° 50' 1" N  
 Longitude: 88° 3' 12" E  
 Elevation: 1.44 m  
 Accuracy: 1 m (50%)  
 Pitch: 83.4° (54.0°)  
 Time: 20-12-2020 11:25  
 Note: Bonnie CAMP MPCA, Pongulath Backside, North

Common Name	Mangrove Cannonball Tree , Dhundul
Family	Meliaceae
Habitat and Distribution	Found in tidal mud of mangrove swamps, especially towards their upper limits. It is widely distributed in coastal regions of the Old World tropics, from East Africa and Madagascar through tropical Asia, to tropical Australia and Polynesia.
Ecology:	<i>Xylocarpus granatum</i> is usually not found in pure stands and in association with other species such as <i>Excoecaria agallocha</i> , <i>Ceriops decandra</i> , <i>Xylocarpus mekongensis</i> etc in the community.
Threat status	Vulnerable (VU)
Description	Small to medium-sized tree; bark thin, smooth, whitish to yellow-brown, inner bark reddish pink. Leaves alternate, paripinnately compound, with 1–2 pairs of leaflets; stipules absent, thickened; leaflets elliptical or obovate. Inflorescence is axillary up to 6 cm long, often forked with indistinct main axis. Flowers functionally unisexual, regular, 4-merous; pedicel is thickened near the calyx; calyx lobed; petals free, oblong, creamy-white or pinkish; stamens 8, united into a tube and disk well developed, 8-lobed, red; ovary superior, 4-celled, style short and thick, stigma large. Fruit a globose and pendulous.
Flowering and fruiting	The fruits ripen in March and the species may have two flowering and fruiting times
Uses	It is traditionally used to treat various diseases including diarrhea, cholera, dysentery, fever, malaria, and viral infections.
Trade information	The bark is used only locally for tanning and dyeing purposes because natural supply is not abundant. The wood is of local importance only.
Propagation and cultivation	Seeds; In natural conditions, the seeds of <i>Xylocarpus granatum</i> float just below the water surface and are dispersed by water currents.

*Lumnitzera racemosa* Willd..



Common Name	White Teruntum; Kripal/ Kripa
Family	Combretaceae
Habitat and Distribution	It is native from Kenya in the western Indian Ocean, tropical & subtropical Asia to the western Pacific. Its range includes Mozambique, Tanzania, Kenya, Madagascar, Chagos Archipelago, Maldives, India, Sri Lanka, Andaman Islands, Nicobar Islands, Bangladesh, Myanmar, Thailand, Cambodia, Vietnam, southeast China, Hainan, Taiwan, Korea, South China Sea, Philippines, Peninsular Malaysia, Lesser Sunda Islands, New Guinea and New Caledonia. It grows in the higher part of the intertidal zone and is found both on beaches and lining the banks of creeks. It is a fast-growing, pioneering species.
Ecology:	Often found associated with <i>Ceriops</i> and <i>Avicennia</i> species.
Threat status	Vulnerable (VU)
Description	It is a small to medium-sized evergreen tree, growing to a maximum height of 37 m. It develops pneumatophores and often has stilt roots. The leaves are arranged spirally at the tips of the shoots; they are simple and obovate, with slightly toothed margins. The inflorescences grow in short spikes in the axils of the leaves or at the tips of the shoots. The flowers are small and white, and are followed by woody, flattened fruits containing a single seed.
Flowering and fruiting	It is a massive bloomer from mid-July to mid-August.
Uses	Used as fuel and also occasionally as poles for construction of buildings. Used locally as folk medicine to treat <b>inflammation</b> .
Trade information	Locally traded as fuel wood.
Propagation and cultivation	<i>Lumnitzera racemosa</i> is a non-viviparous evergreen mangrove tree species. Propagated with seeds.

*Phoenix paludosa* Roxb.



Common Name	Hental
Family	Areaceae
Habitat and Distribution	This is indigenous to coastal regions of India, Bangladesh, Myanmar, Thailand, Cambodia, Sumatra, Vietnam and peninsular Malaysia.
Ecology:	Pollination is entomophilic mostly the bees are the pollinating agent in mangroves; The monkeys usually break the plant and eat the meristem in wild.
Threat status	NE
Description	Perennial palm with slender, cylindrical, unbranched stem with distinct leaf scars. Leaves pinnately compound, waxy, glabrous, midrib strong, ending into strong sharp spine at apex, few pairs of lower segments modified into sharp spines. Inflorescence spadix peduncle branched, spathe boat shaped, yellow, spongy glabrous, deciduous. Flowers unisexual, Staminate flowers sessile. Sepals 3, gamosepalous, cup-shaped. Petals-3, polypetalous, ovate-lanceolate, entire and acute. Stamens 6, free, sessile. Pistillate flowers, sessile, erect, syncarpous, ovary superior, stigma 3, short. Fruit drupe, shining, black when ripe. Seeds woody, very hard on maturity.
Flowering and fruiting	Flowering May to June and Fruits ripe in the month of October.
Uses	Young leaves, meristem is used as helminthic. The meristem and fruits are edible for human as well as wild animals. Whole plant is used in construction of house. The walls of house are made up of stems covered with mud; honey made up of pollen grains of <i>Phoenix paludosa</i> is used as medicine for insomnia.
Trade information	Leaves are collected in bulk and sold for thatch making. Honey from the <i>Phoenix</i> forest fetch additional profits.
Propagation and cultivation	Seeds dispersal by means of tidal water flow. Seed germination is hypogeal.

*Rhizophora apiculata* Blume.



Common Name/ VN	Garjan
Family	Rhizophoraceae
Habitat and Distribution	It is distributed throughout Australia, India, Indonesia, Malaysia, New Caledonia, Papua New Guinea, the Philippines, the Solomon Islands, Sri Lanka, Taiwan, the Maldives, Thailand and Vietnam.
Ecology:	This species grows in association with <i>Avicennia alba</i> , <i>Ceriops decandra</i> etc; Flowers are self-compatible and usually wind pollinated;
Threat status	NE
Description	It reaches between 5 – 8 metres in height however has the potential to reach up to 30 – 40 metres. The dimensions of the trunk depend on the age of the plant. The trunk size is highly dependent on the nutrients in the soil as they will be the underlying factor for growth. Leaves elliptic to lanceolate; flowers sessile, 2 peduncles, calyx lobes 4, petals 4 narrowly oblong, stamens 12, style very short, hypocotyle.
Flowering and fruiting	June to August
Uses	It is exploited due to its availability and quality of timber. Besides the wood, the bark itself is also rich in a chemical Tannin commonly used to strengthen fishing lines, ropes and nets; bark also acts as a leather tanning and <b>antidote</b> to dysentery as well as <b>intestinal inflammation</b> .
Trade information	It is traded as firewood and particularly for charcoal made out of the woods, poles and tannin.
Propagation and cultivation	Propagates through viviparous propagules and stem cuttings.

## *Bruguiera gymnorhiza* (L.) Lam.



Common Name	Kakra
Family	Rhizophoraceae
Habitat and Distribution	It is one of the most widely distributed trees in the tropics, and occurs along the east coast of Africa, Madagascar, India, Myanmar, Thailand, Peninsular Malaysia, Singapore, throughout Indonesia, the Philippines, Papua New Guinea and northern Australia; grows in terrestrial, shoreline (mangrove forest, backshore and mudflat).
Ecology:	It is bird-pollinated and also pollinated by bees. Other residents of local mangrove swamps include mud-prawns ( <i>Upogebia africana</i> ) and various snails, of which the most conspicuous is <i>Cerithidium decollata</i> . Some dozens of individuals of this species will be found half-a-metre and more above ground level on each tree trunk.
Threat status	NE
Description	Tree up to about 10 m tall; crown conical at first but later more irregular; bark black, rough; Leaves opposite, crowded at the ends of branches, roughly elliptical, 60-120 x 20-60 mm; margins plain, not toothed or scalloped, slightly rolled under, tip pointed. but without a spine, base narrowed; with interpetiolar stipules that fall early. Flowers are mostly solitary, axillary, calyx tube, conical with striations red pink at maturity, petals bristly at apex, hypocotyle cylindrical, ca. 2 cm diameter and 20 cm long.
Flowering and fruiting	Flowering is mainly from January to March and fruiting from April to July.
Uses	Wood is used as high quality borers; used for timber, making boats, poles, fish traps and the frames of huts. The bark has been used for tanning. It also yields a black dye; leaves and bark is commonly used to treat diarrhea, fever, diabetes, pain.
Trade information	Traded for fuelwood and timber; the largest mangrove timber poles for house construction usually originate from <i>Bruguiera gymnorhiza</i> .
Propagation and cultivation	Natural regeneration of this species is usually very common. Viviparous propagules collected either from the trees or from the ground and they are equally viable.

*Avicennia officinalis* L.



Latitude: 21°49'50"N  
 Longitude: 88°37'18"E  
 Elevation: 2.48 m  
 Accuracy: 3.2 m  
 Azimuth: 65° (NE)  
 Pitch: 1.0° (-1.5°)  
 Time: 20-12-2020 10:24

Common Name	Kalo Bain
Family	Acanthaceae
Habitat and Distribution	<i>Avicennia officinalis</i> is found sporadically on the banks of rivers and rarely found near the sea. It prefers clay soil and usually found towards inland. The plant can be found in Iran, Bangladesh, Brunei, Cambodia, India, Indonesia, Malaysia, Myanmar, Papua New Guinea, the Philippines, Singapore, Sri Lanka, Thailand and Vietnam.
Ecology:	All its species exhibit crytovivipary, in which the embryo germinates within the fruit but does not enlarge sufficiently to break through the fruit wall. This is a pioneer mangrove tree species which plays significant ecological role in maintaining sustainable vegetation thereby protecting the coastal people from natural calamities.
Threat status	NE
Description	It is a medium size tree. Bark is yellowish-green in colour. It has thin, pencil-like pneumatophores. Obovate or oblong leaves, measuring up to 12.5 by 6 cm. Upper surface is covered with many glandular dots. Orange-yellow flowers measuring 10- 15 mm across, rancid smelling. Stamens are longer than the corolla, ovary covered with short dense hairs. Fruit is densely covered with short hairs.
Flowering and fruiting	Flowering during February – June and fruiting during March- August
Uses	The wood is used to construct boats, houses, and the bark and roots are used for tanning; bark is used for dyeing cloth and the ash used for washing the same. bitter fruits and seeds are edible after processing. Branches are used a cattle fodder; used to treat various ailments like rheumatism, paralysis, asthma, dyspepsia and tumors.
Trade information	Wood is locally collected and sold.
Propagation and cultivation	Propagated with fresh seeds, often have very high germination rate, typically more than 95%. Seeds imbibed with moisture will have radicle formation within 3 days.



## *Aegiceras corniculatum* (L.) Blanco



Common Name	Khalsi
Family	Primulaceae
Habitat and Distribution	It is distributed in Indo-Malesia, South East Asia to southern China, New Guinea and Australia. It survives and grows in a wide range of salinity and soil conditions. It is found in areas which are normal tidal inundated and on the fringe of tidal rivers or creeks.
Ecology:	The flowers are good source of nectar and pollinated by insects especially bees.
Threat status	NE
Description	A shrub or small tree, 1.5-7 m tall. Leaves obovate-oblong to obovate, pale green, shining above, glaucous beneath and entire. Petiole 3-6 mm long, stout. Flowers c. 1.5 cm across, usually white and fragrant. Calyx 6-7 mm long, deeply 5-lobed, twisted, glabrous, persistent. Corolla deeply 5-lobed, c twice as long as the calyx; Stamens 5; densely woolly at base; anthers long, transversely septate into many cells. Fruit cylindrical, reddish-brown, surrounded at base by persistent calyx.
Flowering and fruiting	Flowering and fruiting: February-May
Uses	Wood used for charcoal production. Young leaves are used as fodder. The saponin-containing bark is used as fish poisoning. Plant is used for the treatment of <b>inflammation, painful arthritis, rheumatism and asthma.</b>
Trade information	Fuel wood collected and sold locally. The honey produced from the flower of this species has high demand and value for its tastes, flavour and medicinal properties.
Propagation and cultivation	Fruit is dispersed by water and well adapted for the purpose. Germination is epigeal, crypto-viviparous in thin capsule. Embryo projects out of the skin of fruit as soon as it gets suitable substratum. Propagules collected and used in plantation program.

*Aegialitis rotundifolia* Roxb.



Common Name	Tora
Family	Plumbaginaceae
Habitat and Distribution	It is available in shorelines of the Andaman Sea and the Bay of Bengal, mangroves of Orissa and are endemic to the coastal parts of South Asia.
Ecology:	Occurs in muddy areas, even on sandy clay areas of mangroves. Common on sea ward margin of mangroves, thrive in high salinity zones. Pollination is entomophilous. The hermaphroditic flowers are pollinated by <i>Hymenoptera</i> , <i>Lepidoptera</i> , and <i>Diptera</i> . <i>Aegialitis rotundifolia</i> (Tora) along with few other species appear as early colonizes in the successional process of Mangrove ecosystem in Sundarban. <i>Oryza coarctata</i> (Dhani) is followed by <i>Avicennia alba</i> (Bani), <i>A marina</i> , <i>Aegialitis roundifolia</i> (Tora), in the succession.
Threat status	NE
Description	It is woody mangrove shrub or small tree that grow up to 2 to 3 m tall. The deciduous species have leafy stems with leathery leaves arranged alternately or spirally. The leaf margins are entire and have parallel veins
Flowering and fruiting	Flowering: September to December; Fruiting: January to May
Uses	Used in house construction particularly used as rua (wooden base for keeping thatching material such as paddy straw or leaves of <i>Phoenix paludosa</i> ). The leaves of this species is traditionally used as an <b>antidote</b> for insect bites and treatment of <b>pains</b> .
Trade information	Stems are collected and locally traded
Propagation and cultivation	Through seeds.



## Avicennia alba Blume.



Common Name	Kalo Baine/ KaloBani;
Family	Acanthaceae
Habitat and Distribution	It is found growing in coastal and estuarine locations in India, Southeast Asia, Australia, and Oceania.
Ecology:	It is a pioneering species, being one of the first to colonise new ground. Its widespread root system with large numbers of pneumatophores helps to stabilise new deposits of sediment. A number of invertebrates are associated with <i>A. alba</i> . The larvae of certain small moths, <i>Euopoicillia spp.</i> , feed on the flower buds and those of another moth, <i>Autoba alabastrata</i> , feed on the fruits. The leaves are eaten by beetles, <i>Monolepta spp.</i>
Threat status	NE
Description	It forms a low, dense bushy crown often branching near the base of the trunk. The shrub does not grow much height. The roots are shallow and send up a large number of pencil-shaped pneumatophores. The trunk has smooth, greenish-black bark that is finely fissured and does not flake. The dark green leaves have a silvery grey underside and grow in opposite pairs. The small, orange yellow flowers, borne in a racemose inflorescence, have four petals. The fruits are greyish-green capsules and conical in shape each contains a single seed.
Flowering and fruiting	Flowering: July to August ; Fruiting: August to October
Uses	The timber is used in the smoking of fish. An extract of the heartwood is used in herbal medicine to make a tonic, and the resin has been used in birth control.
Trade information	The tree is harvested from the wild for its timber and resin; seeds sold in local market.
Propagation and cultivation	Seeds are normally sown with the fruit cover removed. Fresh seeds often have very high germination rate, typically more than 95%. Seed that has imbibed moisture will usually have radicle formation within 3 days from sowing.

*Avicennia marina* (Forssk.) Vierh.



Common Name/ VN	Peyara baine / Peyara Bani
Family	Acanthaceae
Habitat and Distribution	It is distributed along Africa's east coast, south-west, south and south-east Asia, India, Australia, and northern parts of New Zealand. mangroves of the coastal Arabian Peninsula and Qatar and southern Iran along the Persian Gulf coast.
Ecology:	Found as mono-specific clumps or stands in highly saline muddy sand.
Threat status	Not Evaluated (NE)
Description	It grows as a shrub or tree to a height of 3 to 10 m in tropical regions. It has smooth light-grey bark made up of thin, stiff, brittle flakes. The leaves are thick, bright, glossy. As with other <i>Avicennia</i> species, it has aerial roots (pneumatophores) which allow the plant to absorb oxygen. These roots also anchor the plant during the frequent inundation of seawater in the soft substrate of tidal systems. The flowers range from white to a golden yellow colour, across, and occur in clusters of three to five. The fruit contains large cotyledons that surround the new stem of a seedling.
Flowering and fruiting	Flowering in February- June; Fruiting in March- August.
Uses	Bark is applied as a remedy for <b>syphilis</b> . The leaves are used as cattle fodder. The wood is strong, tough and durable and used as timber and furniture. Leaf and bark decoctions are used externally against <b>scabies</b> . The bark has been utilized commercially for tanning. It is a source of a reddish and brown dyes.
Trade information	Stems collected locally and sold as fuel wood.
Propagation and cultivation	Propagated with seeds; young seedlings grow best when they are in contact with fresh water, but growth diminishes soon under these conditions and is best in water with 10- 50% of full seawater salinity.

## UTILITY OF THIS PICTORIAL GUIDE

**Bonnie camp** Island is one among the network of 200 islands of Sundarban, which is the largest river-delta of the world. This unique ecosystem harbours the most important and magnificent mangrove that has immense value with respect to the climate regulation, carbon sink, livelihood for many local communities, fishing activity and protection of the shore lines against dangerous storms, flood and tidal waves.

This guide booklet will help one to know about the important mangrove plants, their global distribution, medicinal uses, issues, related to various threats to these plants and the dependence of local communities on the mangrove forest resources such as timber, medicines, tannin, dye, honey and many other non-timber forest products (NTFPs).

This book also provides a glimpse of the MPCA in a nutshell. It will allow quick identification of important medicinal plants through their photographs for the field staff from the Forest Department. The list of threatened and less commonly occurring species provides a blue print to the Forest Department for short listing species of conservation concern. The list of traditionally used medicinal plants can promote the sharing of traditional medicinal knowledge among the younger generation of residents neighbouring the MPCA, as well as for researchers, foresters, traders and others. The list of dominant tree species according to their Importance Value Index (IVI) gives a fair idea of the structure and composition of the community and tree species in the MPCA. Finally, this guide book can create awareness regarding the importance of MPCA and informed Biodiversity Conservation action programs of West Bengal.

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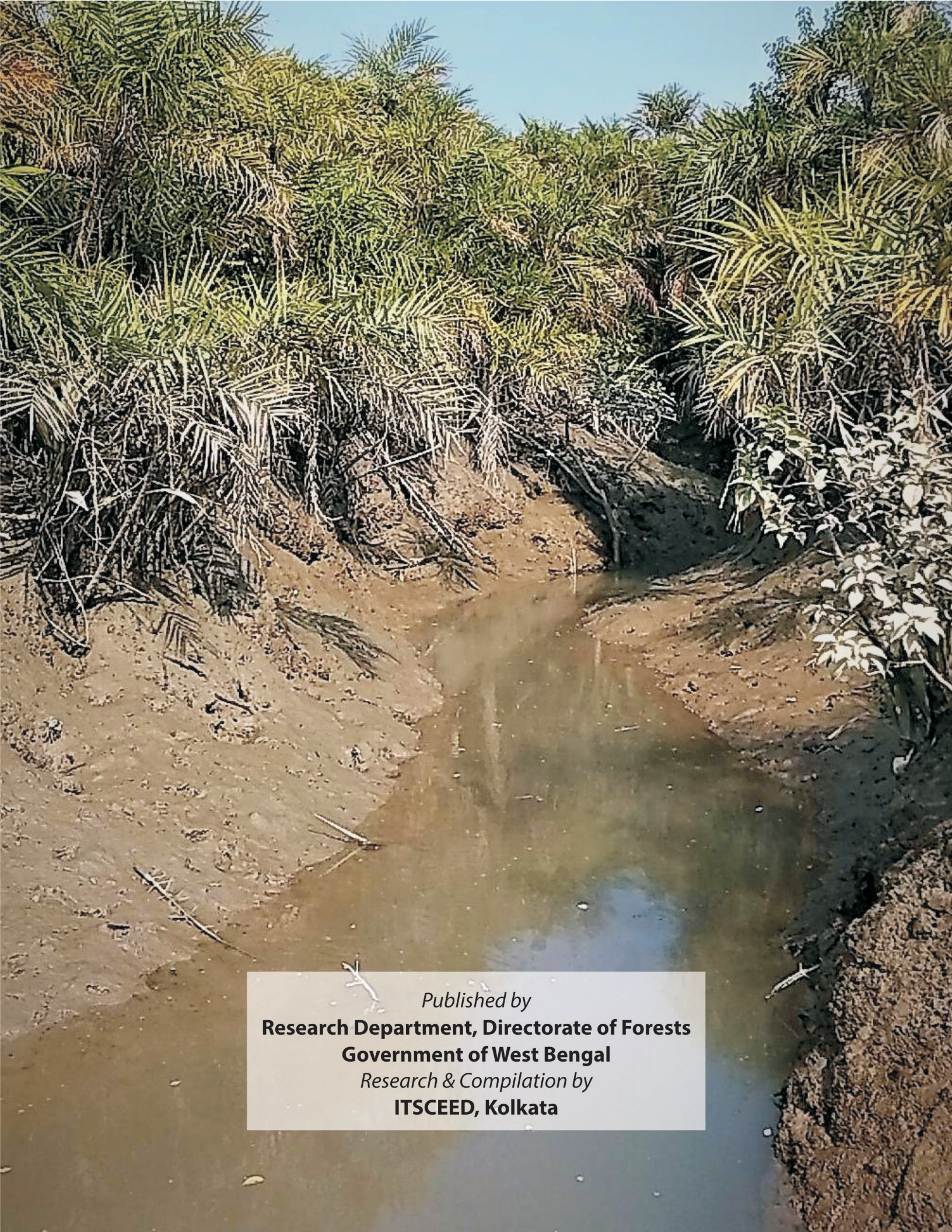
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Report on Revisiting of seven old MPCAs in West Bengal published in 2022 by West Bengal Forest Department and TDU University, Bangalore.

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