



RASHTRIYA KRISHI VIKAS YOJANA



2017-18

DPR Submitted By:-

**State Forest Development Agency, Directorate of Forests,
Govt. of West Bengal**



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Executive Summary

Despite years of study and substantial investment in remediation and prevention, soil erosion continues to be a major environmental problem with regard to land use in India and West Bengal. Furthermore, changing climate and/or weather patterns are exacerbating the problem. Our objective is to undertake relevant soil moisture conservation works in the forest land to conserve natural resources and achieve consequent improvement in agriculture crop productivity in fringe areas. In order to achieve the goal relevant work programmes have been identified in different sites of West Bengal, which will help in rain water harvesting, reduced erosion, and increase canopy cover, and minimized impacts of floods, increase humidity, increase regeneration and change in micro-climate.

To spur growth in the agriculture and allied sectors, National Development Council (NDC) in its meeting held on 29th May 2007 observed that a special Additional Central Assistance (ACA) Scheme to be introduced to incentivize states to draw up comprehensive agriculture development plans taking into account agro-climatic conditions, natural resources and technology for ensuring more inclusive and integrated development of agriculture and allied sectors.

In pursuance to aforesaid observation and in consultation with the planning commission, Department of Agriculture & Co-operation (DAC), Ministry of Agriculture, Govt. of India launched Rasthriya Krishi Vikas Yojana (RKVY) from 2007-08, which has been operational since then. The Natural Resource Management component of the scheme is being implemented all over the State through the different Forest Divisions. The schemes mainly aim to incentivize the state to attain 4% annual growth rate in agriculture & allied sectors during the 11th plan period.

RKVY was introduced as a new Additional Central Assistance Scheme to State Plan with 100% assistance. But from 2015-16, 60% grant is provided by the Govt. of India and the balance 40% fund comes from State Share. The project is taken up for holistic development of agriculture and allied sectors in which Forest Department is a stakeholder along with some other departments.

The major objectives of the RKVY 2017-18 is as follows;

1. To improve the productivity of the areas under treatment.
2. To improve the ground water regime.
3. To control soil erosion and arrest the sedimentation to the extent possible.
4. To create small irrigation system for the agricultural lands in the proximity of forest areas.
5. To develop/create modern infrastructures/centers for improved quality planting materials for enhancing productivity and biodiversity.



Despite having so much of potentialities forest areas in the region has remained under developed. It is primarily because there are also a number of constraints and problems which are responsible for the present state of natural resource management and production. These constraints can be grouped under five broad heads at local / regional / national level these are; climatic, infrastructural, bio-physical, management and socio-economic constraints.

The major objectives are to improve the productivity of the areas, ground water regime, control soil erosion and runoff and arrest the sedimentation to the extent possible, create small irrigation system for the fringe agricultural lands and to develop/create modern infrastructures/centers for improved quality planting materials for enhancing productivity and biodiversity.

The major reasons for selecting the proposed strategy is basically on the basis on the change in land use pattern, climate variability, and infrastructure development due to change in socio-economic condition of the adjacent population in the project area. The new approach envisages a broader vision of natural resource management to achieve goal of soil moisture conservation. The project is being implemented within the forest land and aims to benefit the fringe area population in their agricultural endeavor.

To achieve the goal of soil moisture conservation and development of minor/major irrigation projects the proposed activities and the total estimated budget for 2017-18 is as follows;

- ✓ The 2408 km of contour trenches at a budget of Rs. 96,51,264.00/-
- ✓ The 25.5 units of earthen dams and the total budget of Rs. 2,07,84,744.00/-
- ✓ The 8799 units of gully plugging and the total budget of Rs. 1,98,15,348.00/-
- ✓ The 6200 units of river training and the total budget of Rs. 2,80,55,000.00/-
- ✓ The 16 units of Production centre for 1.0 lakh capacity seedlings each and the total budget of Rs. 4,00,00,000.00/-
- ✓ The 14 units of Production centre for 2.0 lakh capacity seedlings each and the total budget of Rs. 6,30,00,000.00/-
- ✓ The 265 ring wells and the total estimated budget of Rs. 1,66,95,000.00/-
- ✓ The 1% administrative cost is Rs. 20,00,000.00/-
- ✓ The total infrastructure development proposed cost is Rs. 19,83,79,365/-
- ✓ Thus the total estimated budget for the proposed development is Rs. 20,00,00,000.00/-

There are many intangible and tangible benefits of all the proposed developmental activities to improve the agricultural activities. The respective Internal Rate of Return (IRR) calculated in Cost benefit Analysis (CBA) is as follows;

- ✓ Contour Trench; NPV – Rs. 21014294 and IRR is 62%
- ✓ Earthen Dam; NPV – Rs. 80649302 and IRR is 56%



- ✓ Gully Plugging; NPV – Rs. 19018863 and IRR is 35%
- ✓ River Training; NPV – Rs. 9617786 and IRR is 19%
- ✓ Production Center of 1 lakh QPM seeds; NPV – Rs. 47987086 and IRR is 27%
- ✓ Production Center of 2 lakh QPM seeds; NPV – Rs. 3489533 and IRR is 11%
- ✓ Ring Well; NPV – Rs. 88124413 and IRR is 70%

The major outcome of the infrastructure development in the forest land is an increase in agricultural crop, timber, fuel wood, biomass, fodder, minor forest produce, hydrological services, soil conservation, biodiversity conservation, carbon sequestration and reduction in soil erosion.

Construction of contour trench, earthen dam, gully plugging, river training, production center for QPM 1 lakh & 2 lakh capacities and ring well as minor irrigation structures would be one of the most effective strategies for bringing climatic, hydrological and socio-economic change to different parts of forest and non- forest land of West Bengal. These infrastructures would be revolutionized for forest and agriculture by aligning various sectors through technological soil and water conservation interventions and land-use diversification. Significant results associated with various infrastructure developments for soil and water conservation programs and interventions that would be effective for reducing land degradation and improving productivity in different parts of the West Bengal.



i. Background:

The Additional Central Assistance Scheme-‘Rashtriya Krishi Vikash Yojana’ (RKVY) has been launched by the Govt. mainly to incentivize the state to attain 4% annual growth rate in agriculture & allied sectors during the 11th plan period. RKVY was introduced as a new Additional Central Assistance Scheme to State Plan with 100% assistance. But from 2015-16, 60% grant is provided by the Govt. of India and the balance 40% fund comes from State Share. The project is taken up for holistic development of agriculture and allied sectors in which Forest Department is a stakeholder along with some other departments.

Some studies indicate that the surface water availability per capita per year for population living in basin area of River Damodar would be reduced in future leading to severe water shortage in the future. Studies have shown that the reduction of water availability would be more in case of the Rupnarayan than that of the Damodar watershed. Similarly the river Dwarakeswar including the river Gandheswari would face severe shortage of water followed by other basins such as Kailaghai and Ajoy river. The surface water available per capita per year for population living in catchment of River Kangsabati would face seasonal or regular water stress in the projected scenario where surface water availability per capita per year would be reduced.

As increase in population results in increased demand in agricultural production, conservation and replenishment of water resources and reducing runoff will be of utmost importance. To meet the increasing demand for water, rain water harvesting and recharging of ground water through appropriate soil conservation works for arresting soil erosion and runoff, need to be undertaken in areas with scanty tree cover and exposed to the elements of weathering. Forest sector is included as one of the allied sectors as it supplements to agricultural growth and the agricultural lands are mostly surrounded by forest. Forest Department takes up different forestry activities and soil & moisture conservation works with the objective of reducing runoff and erosion of fertile top soil thereby improving soil quality, productivity and rain water harvesting.

The **contour trench** construction is an extension of the practice of ploughing fields at a right angle to the slope. Contour trenches are ditches dug along a hillside in such a way that they follow a contour and run perpendicular to the flow of water. The soil excavated from the ditch is used to form a berm (a narrow shelf) on the downhill edge of the ditch. The berm can be planted with permanent vegetation (native grasses, legumes) to stabilize the soil and for the roots and foliage in order to trap any sediment that would overflow from the trench in heavy rainfall events. Contour trenches are used to slow down and attract runoff water, which then infiltrates into the soil. Small scale contour trenches can also be used within field level. The water that infiltrates can be used as soil moisture for crops cultivated after a rainfall event, directly for pumped irrigation, or extracted



from shallow wells in the area. Suitable conditions are locate trenches in natural run-off areas, but not on slope over 10 % and soil in vicinity needs to have sufficient infiltration capacity and potential sub-surface storage capacity.

An **earthen dam** will be unique to an individual site; although special emphasis will have been given to local conditions, certain guidelines and generalities can be applied to all dams. When followed, such guidelines will allow for the safe and economic construction of embankments. It must be stressed that, although most of the procedures are simple, and more a matter of common sense than advanced engineering knowledge. The main advantages involved in the construction of small earth dams are: Local natural materials are used. Design procedures are straightforward. Comparatively small plant and equipment are required. Foundation requirements are less stringent than for other types of dam. The broad base of an earth dam spreads the load on the foundation. Earthen dams resist settlement and movement better than more rigid structures and can be more suitable for areas where earth movements are common.

A **gully plug** is a small, temporary or permanent dam constructed across a drainage ditch, gully, swale, or channel to lower the speed of concentrated flows (like an overflow weir) for a certain design range of storm events. They may be more categorized as a type of floodwater rather than a runoff harvesting technique. A gully plug can be built from logs of wood, stone, pea gravel-filled sandbags or bricks and cement. They have been used widely in India. Gully plugs have been built in riverbeds with no coarse sand transport may end up being used in this way. These structures are relatively cheap and can last about 2-5 years.

The **ring well** structures are important means for providing minor irrigation for small agricultural / horticultural fields and also for regular water usage of small communities. These are low cost and works well in areas with adequate soil depth and moderately high water table.



ii. Problems to be addressed:

In spite of having access to abundant natural resources the fringe areas remain socio-economically under developed. It is primarily because there are a number of constraints which are responsible for the present state of low accessibility to natural resources.

The impact of climate change through increased evaporation (due to global warming) combined with regional changes in precipitation characteristics (such as total amount, variability, frequency of extremes) has the potential to affect runoff, frequency and intensity of floods and droughts, soil moisture relation, water availability for irrigation and hydroelectric power generation. In these watersheds with forested catchments, the hydrologic cycle involving precipitation, subsurface flow, groundwater flow and stream flow are closely linked to water quality as the water movement through the forest ecosystem also transports sediments, dissolved nutrients as well as fertilizers and pesticides. Understanding relationship between forested ecosystems and quality of surface and subsurface water, river ecological flow associated with these systems is a key component of river basin management.

Constraints of Climate include heavy rainfall with high intensity and periodic distribution and humidity, low temperature during winter, low light intensity and radiation, recurrent floods as well as drought conditions. Infrastructural Constraints include geographic isolation, lack of water harvesting structures to prevent flooding and erosion. The acidic soil, in accessible areas, the varied undulating topography, soil erosion and degradation, ecological imbalance, recurring floods, abundance of weeds, insects, pests, and diseases and low level technology are some of the important bio-physical constraints limiting agricultural and forest production. There are also a large number of problems connected with management and some important ones are the gap in extension, poor motivation and awareness, inadequacy of training, lack of incentive for the farmers including non-assurance of support price; non availability of improved inputs in time etc.

West Bengal has annual rainfall of 1000 – 2500 mm. North Bengal and Gangetic Delta Plains, has major problems of Gully and stream bank erosion. Many part of West Bengal where the rain fall is 1000 – 1500 mm do face problem of improper land management. (Bhattacharya & etal. 2016)

The major problems to be addressed through the different soil conservation works as:

1. Increased runoff of precipitation in land with reduced the cover;
2. Imbalances in water table;
3. Loss of agricultural production due to water shortage;
4. Loss of top soil due to water and wind erosion;
5. Decrease in soil moisture content and soil nutrition;
6. Decrease in regeneration, vegetation, timber, fuel wood, biomass, fodder;



7. Increase in sedimentation;
8. Soil loss due to soil erosion and sedimentation;
9. Decrease in carbon sequestration;
10. Lackness of modern infrastructures/centers for improved quality planting materials for enhancing productivity and biodiversity

Major crops in West Bengal are rice, potato and jute. The state possesses about 14 percent of the nation's rice cultivation area. West Bengal agricultural production includes high value commercial crops like jute and tea. The state also produces significant amount of fruits and vegetables. The absence of tree cover is resulting, the precipitation directly hitting the ground and increased runoff carrying along with the top soil, instead of reaching the underground water table and recharging it.

Forest cover reduces the magnitude of peak discharge during rainy months and ultimately controls excess runoff in the downstream. Forests induce infiltration which leads to more uniform flow round the year. The water quality results indicate that the organic loading as well as coliform and fecal coliform will be reduced substantially by dense forest lands compared to disturbed forest. In general, conversions to forestland have the potential to reduce erosion and subsequent sedimentation, as well as reduce levels of dissolved nutrients and pesticides in surface runoff and groundwater. These improvements in water quality are a function of lower amounts of runoff and leaching as well as lower concentration of potential pollutants that are expected to result from the conversion of forestland. Part of the banks of river Ganga which is mostly covered by forested catchment, the streams are functioning at present as perennial water safe source and also to maintain the base flow or ecological flow to some extent that may be due to high amount water retained and ultimately recharged through vegetation.

River runoff is a function of precipitation, land use, soil type, porosity, slope etc. Again water availability largely depends on river runoff. Larger runoff will imply lesser availability of water in the catchment. In Eastern India the problem of soil erosion largely causes the increase in runoff. Forest or vegetation can detain the runoff, absence of which may allow water to drain out of the basin with significantly small recharging. In some basins of West Bengal, namely Kangsabati, Rupnarayan, Gandeswari, Dwarkeswar, Damodar, Kalighai, Ajoy etc, high slope causes runoff to increase but dense forest cover helps the catchment to hold the surface runoff to a greater extent. Some studies indicate that the surface water availability per capita per year for population living in basin area of River Damodar would be reduced in future leading to severe water shortage in the future. Studies have shown that the reduction of water availability would be more in case of the Rupnarayan than that of the Damodar watershed. Similarly the river Dwarakeswar including the river Gandheswari would face severe shortage of water followed by other basins such as Kailaghai and Ajoy river. The surface water available per capita per year for population living in catchment of



River Kangsabati would face seasonal or regular water stress in the projected scenario where surface water availability per capita per year would be reduced.

With populations rising explosively in some parts of the world and per capita demand of water increasing in others, optimization of water resources (both stream flow and groundwater reserves) is becoming increasingly important. Also, rising demands for timber products require the establishment of large areas of fast-growing plantation forests, often on land that is currently not forested. Coupled with the continued indiscriminate clearing of the world's natural forests, which in many areas serve as the traditional suppliers of high-quality water, the associated degradation of soil and water quality due to erosion, and the possibility of less dependable precipitation inputs due to climate change, a sound understanding of the hydrological functioning of forests is arguably more important than ever before.

Table: Land Use Pattern

District	Geo Area (Reorting Area)	Forest Area	Land under Non Agri. Use	Barren Land	Pasture & other grazing land	Land under Misc. trees	Cultivable Land	Total Rainfed Areas		Other fallow	Current fallow	Not shown areas	Net Irrigated Area	Gross cropped Area
								Cultivated	Cultural waste land					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Burdwan	698762	21165	208526	1367	222	1418	479365	117606	5605	1371	4978	452395	361759	861894
Birbhum	451118	15853	98348	477	231	854	342717	150115	3601	3170	6357	320078	192601	568120
Bankura	687998	148930	147002	2313	806	2823	389258	193116	2035	1620	32317	346866	196082	514447
Purba Medinipur	396594	899	101834	521	47	1964	303400	201983	205	281	1789	287967	101417	519922
Paschim Medinipur	928581	171935	159371	2451	827	10037	593531	356544	4061	2816	12690	560359	236987	982084
Howrah	138676		52031	2	83	1370	91576	50991	90	181	4699	79655	40585	15826A
Hooghly	313379	530	94327	226	89	1552	226369	68231	1569	460	377	214640	158138	554606
North 24 Parganas	386524		123226	64		4475	272055	172769			39125	257405	99286	510901
South 24 Parganas	948710	426300	141297	475		2685	397297	301757	1473	34	18911	373660	95540	539916
Nadia	390655	1216	88938	245	49	3912	308811	136649	788	367	4399	289169	172161	697229
Murshidabad	532499	771	129403	1958	12	1193	409039	202100	1023	155	512	399561	206939	937768
Uttar Dinajpur	312466	580	32671	63	26	2087	279686	203799	88	47	1394	276990	75887	508263
Dakshin Dinajpur	221909	932	32382	88	43	1028	162573	110983	72	193	1465	185592	51590	326675
Malda	370862	1679	88623			3430	285603	178764	92	332	60709	212455	106839	450766



Detailed Project Report - RKVY 2017 - 18



District	Geo Area (Reorting Area)	Forest Area	Land under Non Agri. Use	Barren Land	Pasture & other grazing land	Land under Misc. trees	Cultivable Land	Total Rainfed Areas		Other fallow	Current fallow	Not shown areas	Net Irrigated Area	Gross cropped Area
								Cultivated	Cultural waste land					
Jalpaiguri	622700	179000	87939	3090		5276	363041	286215	101	79	11441	335694	76826	550759
Darjeeling	325469	124575	40165	2135	1126	2333	164590	133996	1555	3646	17666	132507	30602	194119
CoochBehar	331565	4256	68081	851	35	5633	264968	224965	116	40	1196	251955	40003	551876
Purulia	625646	75048	104477	5307	2559	3190	443984	377560	8232	4722	102703	317092	66424	373907
West Bengal	8684113	1173669	1798641	21633	6155	55260	5807871*	3468143	30706	19514	322728	5294040	2309666	9801516

Excluding Kolkata, (Source: Evaluation wing, Directorate of Agriculture & Economic Review, Govt. of West Bengal, 2010-2011 & Census Hand book 2001)

* This includes Net Area sown + Current Falow + Falow other than current fallow + Culturable waste land + Land under Misc. Tree



iii. Aim and objective:

Recently a revised operational guideline, 2014, has been formulated by Government of India for RKVY. The present project proposal for 2017-18 has been prepared as per the revised guidelines of Government of India.

Objectives:

1. To improve the productivity of the areas under treatment.
2. To improve the ground water regime.
3. To control soil erosion and arrest the sedimentation to the extent possible.
4. To create small irrigation system for the agricultural lands in the proximity of forest areas.
5. To develop/create modern infrastructures/centers for improved quality planting materials for enhancing productivity and biodiversity.

Activities:

Based on the identified objectives, the following activities have been shortlisted in this project:

1. Construction of soil conservation and rain water harvesting structures for water conservation, ground water recharging and irrigation.
2. River training works and slope stabilization in North Bengal.
3. Creation of modern infrastructures for producing quality planting materials to improve and enhance tree quality in plantation forestry for increased productivity and improved forest health and biodiversity.
4. Construction of Digging Ring Wells for water facilities for the Forest Protection Committee village

The infrastructure items will improve the working of the front line staff of the Division and in effect develop the forest area under its jurisdiction by increasing the short agriculture crop timber, quick growing (shed tree/ fire wood), game and fodder for wild life, Non Timber Forest Product (NTFP), herbal, fruits, ornamental plants and agriculture areas. The fringe area villages will be benefited from the project. We would be achieving soil moisture conservation, ground water recharge definitely with minimum rain fall. Reduced erosion, reduced run-off, increase canopy cover, increase litter and organic matter of the soil, increased agricultural crops and also increase in vegetable due to increase in water table of the area, the barren land and degraded forests would be regenerated.

The fringe community resilience would be increased due to change in microclimate by the interventions proposed. The erosion and flooding would be reduced and agricultural crop productivity will be increased. The infrastructure items will provide the forest division to effectively and efficiently implement its plans and schemes to improve the forest and better manage of its resources on a long term basis.



iv. Strategy :

Among the identified sites of West Bengal, many are drought prone and many are flood prone districts. The only risk to this project is natural disaster like flood and drought etc. The major problems are soil erosion, run-off, decrease in ground water table, decrease in green cover and adverse impacts of crop productivity in changing climatic conditions. The proposed infrastructure developments will help in mitigating the adverse climate impacts. The construction of contour trench, gully plugging, earthen dam, river training will help in mitigating the impacts of drought & flood. All the proposed interventions will mitigate the soil moisture content in draught and flood prone areas of West Bengal. All the concerned DFOs have the list of existed and ongoing activities, and the proposed structures are an updated only so there will be no duplication of activities (Land use map of West Bengal is mentioned in page 13). The major problems and the respective proposed strategy for RKVY 2017-18 for the West Bengal are:

- 1. Increased runoff of precipitation in land with reduced the cover** – The proposed contour trench, gully plugging and river training works will help in reducing run-off during precipitation and also minimized the soil erosion. These infrastructures will help in increasing soil – moisture conservation and increased regeneration. This would increase the green cover and work in soil binding.
- 2. Imbalances in water table** – The proposed construction of contour trench will help in recharging aquifers, earthen dams to do rain water harvesting, gully plugging will also help in rain water harvesting. These rain water harvesting structures for water conservation, ground water recharging and irrigation.
- 3. Loss of agricultural production due to water shortage** – The proposed infrastructures e.g. contour trench, earthen dams, gully plugging and ring well will help to overcome the problem of water scarcity for agricultural produce.
- 4. Loss of top soil due to water and wind erosion** – The top soil erosion is very high due to decrease in canopy cover in West Bengal. The 1 lakh QPM and 2 lakh QPM seed planting material has been proposed to help in increase the ground cover. The QPM seed planting material has reduced mortality because of increase in root – shoot ratio.
- 5. Decrease in soil moisture content and soil nutrition** – All the proposed interventions e.g. contour trench, earthen dam, gully plugging, river training, production centre of quality planting material and ring wells will help in increase in soil moisture content and soil nutrition due to increase in biomass of the proposed areas.
- 6. Decrease in regeneration, vegetation, timber, fuel wood, biomass, fodder** – The ground water decrease, soil moisture & nutrient decrease is actually depleting the production of forest and agriculture. All the proposed interventions will change the quality of natural resources and



their management and also result in increase in regeneration, vegetation, timber production, fuel wood, biomass and fodder of the area.

- 7. Increase in sedimentation** – Due to continuous decrease in green cover resulting increased soil erosion. This is depleting all the water bodies and agriculture productivity. All the proposed interventions will help in reducing sedimentation and conserve water bodies and agricultural lands.
- 8. Soil loss due to soil erosion and sedimentation** – Contour trench, gully plugging, River training works will help in slope stabilization in North Bengal which will reduce soil loss due to soil erosion and sedimentation.
- 9. Decrease in carbon sequestration** – The proposed strategy to water harvesting structures i.e. contour trench, gully plugging, earthen dam, and construction of quality planting material will help in increase in carbon sequestration of the area.
- 10. Lackness of modern infrastructures/centers for improved quality planting materials for enhancing productivity and biodiversity** – Creation of modern infrastructures for producing quality planting materials to improve and enhance tree quality in plantation forestry for increased productivity and improved forest health and biodiversity of the area.

v. Target Beneficiaries:

According to the provisional results of the 2011 national census, West Bengal is the fourth most populous state in India with a population of 91,347,736 (7.55% of India's population). There are 18 administrative districts (excluding Kolkata), 66 Sub- divisions, 341 blocks, 333 Panchayat Samities, 3356 Gram Panchayat and 38975 numbers of villages. Hindu population is 6,43,85,546 in West Bengal while Muslim population is 2,46,54,825 as per 2011 census. The state's 2001–2011 decennial growth rates was 13.93%, lower than 1991–2001 growth rate of 17.8%, and also lower than the national rate of 17.64%. The gender ratio is 947 females per 1000 males. As of 2011, West Bengal has a population density of 1,029 inhabitants per square kilometer, making it the second-most densely populated state in India, after Bihar. West Bengal's total fertility rate is 1.6, way below Bihar's 3.4, which is the highest in the entire country. The literacy rate is 77.08%, higher than the national rate of 74.04%. The Scheduled Castes (SC) and Tribes (ST) form 28.6% and 5.8% of the population respectively in rural areas, and 19.9% and 1.5% respectively in urban areas. Kolkata (with a population of 132.05 lakh) and Asansol (population 10.67 lakh) are the largest cities in West Bengal.

Table: Demographic details of West Bengal

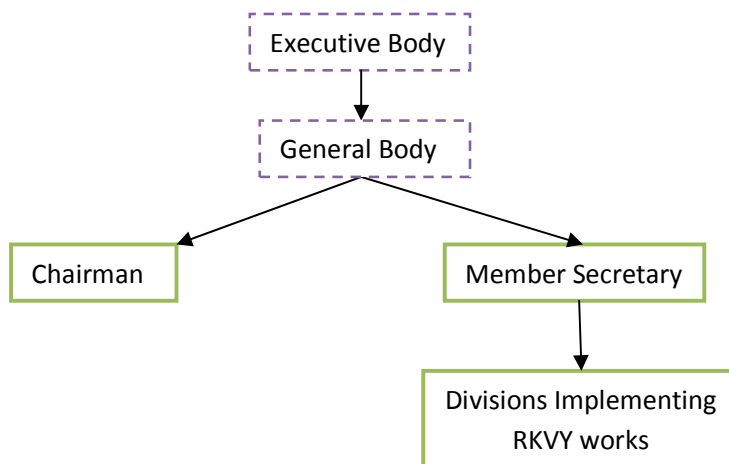
S. No	Indicators	Year	Unit	West Bengal	India
1	Geographical Area	2011	Lakh Sq. Km	0.88	32.87
2	Population	2011	Crore	9.13	121.02
3	Decadal Growth Rate	2011	Percentage	13.93	17.64
4	Density of Population	2011	Population/Sq. Km.	1029	382
5	Urban to total population	2011	Percentage	31.89	31.16
6	Sex Ratio	2011	Females/1000 Males	947	940
7	Literacy Rate (LR)	2011	Percentage	77.08	74.04

The major implementing divisions where the infrastructure has been proposed are Purulia, Kangshabati (N), Kangshabati (S), Kurseong S.C., Kalimpong S.C., Jalpaiguri S.C., Raiganj, Malda, Howrah, Baikunthapur, Coochbehar, Jalpaiguri, Jaldapara Wild life, Gorumara Wildlife, Darjeeling Wildlife, Bankura (N), Bankura (S), Panchet, Nadia-Murshidabad, Birbhum, Durgapur, Burdwan, Rupnaraya, , Jhargram, Kharagpur, Purba- Medinipur, Medinipur, Kurseong, and Darjeeling.

The beneficiaries of the proposed project RKVY 2017-18 are the poorest people living in the fringe areas of the forest. The proposed project would be implemented at the Joint Forest Management Committee (JFMCs) areas of the forest. This project would help in improving agriculture of the area and also help in augmenting the socio-economic status of the fringe area population constituting the JFMCs .

vi. Management:

The State Forest Development Agency (SFDA), Department of Forest (DoF), Govt. of West Bengal (GoWB) will be implementation agency of the Forestry Interventions of RKVY scheme, 2017-18. The concerned Divisional Forest Officials (DFO) and their subordinates Range Officers will be implement the RKVY scheme in the field. The monitoring will be taken care of by SFDA. The organization structure of SFDA is as follows;



Implementation of the RKVY 2017 – 18 in the states needs a well-organized and dynamic institution. As per the advice of the NAEB, Government of India, ‘State Forest Development Agencies’ (SFDA) have been created in 2010. PCCF, HoFF will designate one DFO of the district as the Convener. DAP has been managed by all the districts of West Bengal. Baseline share of agriculture and allied sector in its total plan has been maintained. The funds will be channeled through WBSFDA to the Divisions which are the implementing units in the field.



vii. Finance:

The cost estimates, budget for the RKVY – 2017 project is attached in Annexures. The means of financing and phasing of expenditure is RKVY funds for one year (2017-18). The options for cost sharing and cost recovery (user charges) rule has oriented and there is no scope for explore. The major issues of project sustainability is the state's forests are under tremendous pressure due to the indiscriminate removal of timber, fuel wood, fodder & other forest produce and also decrease in soil moisture, water table, erosion in throughout the West Bengal. Though there are various afforestation and plantation programs being implemented by the State Forest Department, the results will be positive when supported by good and useful infrastructure.

The steady depletion of forest resources and increasing deforestation has brought into focus- the realization that the constructions of contour trench, earthen dam, gully plugging, river training, production centers for QPM 1 lakh and 2 lakh capacity and ring wells. Operation and maintenance of assets after project completion would depend on type of land on which project would be implemented. On forest lands the maintenance would be take care by Forest Department and on private lands by private individuals.

a. Infrastructure and Assets:

i. Natural Resource management

Under this component Soil and Moisture Conservation activities shall be taken and are described below in detail.

1. Contour Trenches in Forest Areas:

Objectives:

- a. Recharge ground water.
- b. To conserve soil moisture in the plantation areas in the dry seasons.

Activities:-

Under this sub component the digging of contour trenches in the plantation areas along the contour is taken up so that the soil water runoff may be prevented. This activity also helps in conserving the soil moisture which is of great help for young plantations in the dry seasons. The activity is labour intensive and generates wages in rural areas.



2. Earthen Dam:

Objectives:

- a. To prevent soil erosion.
- b. To harvest Rain water.
- c. To recharge ground water.
- d. To irrigate agricultural field in the command area downstream.
- e. To use the water body for pisciculture and other house hold purpose.

Activities:

Earthen dams are constructed for the purpose of holding excess run-off water by creating bund of suitable size with a small inner core wall. This structure slows down the run-off and water during rainy season is harvested. These have been proved very useful for South West Bengal. This work is labour intensive and generates employment for the local people.

3. Gully Plugging work/ Rock check dams:

Objectives:

- a. To prevent accelerated erosion.
- b. To harvest Rain water.
- c. To improve soil moisture regime.
- d. To recharge ground water.

Activities:

Small Rock check dams are constructed for the purpose of holding excess run-off water by creating obstructions of suitable size. Generally series of such check dams are constructed. These structures slow down the run-off and water during rainy season is harvested. These have been proved very useful for checking gully and reel erosion in South West Bengal. The work is labour intensive and generates employment for the local people.

4. River Training Works:

Objectives:

- a. To prevent stream bank erosion.
- b. To check landslides and stabilization hill slopes.
- c. To reduce the chance of flooding of agricultural fields by hilly torrents.

Activities:

Boulder sausage works: Upper reaches are treated with this work where bigger boulders are used to construct sausage works to stabilize the slopes.



5(a) Production centers for QPM 1 lakh capacity:

Objectives:

- a. To produce improved QPM 1 lakh capacity.
- b. To increase production of plantation forestry and enhance forest health and biodiversity.

Activities:

After implementation of Forest Conservation Act (1980) felling in high forest areas have been banned and the entire timber and subsidiary produces come exclusively from plantations created.

For producing better quality high grade planting materials - to ultimately create a high quality plantation with enhanced productivity – modern production centres are required for having modern facilities for making growth media, grading and screening of seeds, controlled irrigation and proper drainage facilities, modern growth containers and proper seedling hardening facilities.

5(b) Production centers for QPM 2 lakh capacity:

Objectives:

- a. To produce improved QPM 2 lakh capacity.
- b. To increase production of plantation forestry and enhance forest health and biodiversity.

Activities:

After implementation of Forest Conservation Act (1980) felling in high forest areas have been banned and the entire timber and subsidiary produces come exclusively from plantations created.

For producing better quality high grade planting materials - to ultimately create a high quality plantation with enhanced productivity – modern production centres are required for having modern facilities for making growth media, grading and screening of seeds, controlled irrigation and proper drainage facilities, modern growth containers and proper seedling hardening facilities.



Detailed work program for this stream is shown below:-

	Natural Resource Management	Rate (Rs)	Unit	Nos.	Amount (Rs)
1	Contour trench in Forest Areas	4008.00	km	2408	96,51,264.00
2	Earthen Dam	8,15,088.00	Unit	25.5	2,07,84,744.00
3	Gully Plugging/Rock check Dam	2,252.00	Cum	8799	1,98,15,348.00
4	River training works to prevent damage to Agricultural Fields	4,525.00	Cum	6200	2,80,55,000.00
5 (a)	Production centers of QPM 1 lakh capacity	25,00,000.00	No.	16	4,00,00,000.00
5 (b)	Production centers of QPM 2 lakh capacity	45,00,000.00	No.	14	6,30,00,000.00
	Sub Total				18,13,06,356.00
	Administrative Cost (1% of sub-total for monitoring & evaluation)				1813063.56
	Total				18,31,19,419.56

(Rupees Eighteen Crores Thirty One Lakhs Nineteen Thousand Four Hundred and Nineteen Only)

Implementing divisions: Purulia, Kangshabati (N), Kangshabati (S), Kurseong S.C., Kalimpong S.C., Jalpaiguri S.C., Raigunj, Malda, Howrah, Baikunthapur, Coochbehar, Jalpaiguri, jaldapara Wild life, Gorumara Wildlife, Darjeeling Wildlife, Bankura (N), Bankura (S), Panchet, Nadia-Murshidabad, Birbhum, Durgapur, Burdwan, Rupnarayan, Jhargram, Kharagpur, Purba- Medinipur, Medinipur, Kurseong, Darjeeling.

Estimates: ANNEXURE I,II,III,IV,V,VI.



ii. **Micro/Minor Irrigation Systems:**

1. **Digging Ring Wells for water facilities for the Forest Protection Committee villages**

Objectives:

- a. To maintain availability of water to the forest protection committee villages,

Activities:

The ring wells are the major source of water availability to the villages on the fringes of the forests. Availability of water for drinking and household purposes is one of the major inputs that can be given to them.

Detailed work program for this stream is shown below:-

No.	Minor/Micro irrigation	Rate	Unit	Nos.	Amount
1	Ring wells (20 mtr depth 4 ft diameter)	63,000.00	No.	265	1,66,95,000.00
	Sub Total				1,66,95,000.00
	Administrative Cost (1% of sub-total for monitoring & evaluation)				1,66,950.00
	Total				1,68,61,950.00

(Rupees One Crore Sixty Eighty Lakhs Sixty One Thousand Ninety Hundred and Fifty only).

Implementing divisions: Purulia, Kangshabati (N), Kangshabati (S), Kurseong S.C., Kalimpong S.C., Jalpaiguri S.C., Raiganj, Malda, Howrah, Baikunthapur, Coochbehar, Jalpaiguri, Jaldapara Wild life, Gorumara Wildlife, Darjeeling Wildlife, Bankura (N), Bankura (S), Panchet, Nadia-Murshidabad, Birbhum, Durgapur, Burdwan, Rupnarayan, Jhargram, Kharagpur, Purba- Medinipur, Medinipur, Kurseong, Darjeeling.

Estimates: ANNEXURE VII.

**Annexure - RKVY 2017-18 Tentative estimates of project activities**

RKVY: Work Programme for 2017-18					
I. Infrastructure & Assets					
(i) Natural Resource Management (Soil and Moisture Conservation Work)					
S. No.	Particulars of Work	Unit	Physical	Rate (Rs.)	Financial (Rs.)
1	Contour trench *	Km	2408	4,008.00	97,47,778.00
2	E.D *	Unit	25.5	8,15,088.00	2,09,92,591.00
3	Gully Plugging/Rock check Dam *	cum	8799	2,252.00	2,00,13,501.00
4	River training works to prevent damage to Agricultural Fields *	cum	6200	4,525.00	2,83,35,550.00
5 (a)	Production centres of QPM for 1.0 lakh capacity *	No.	16	25,00,000.00	4,04,00,000.00
5 (b)	Production centres of QPM for 2.0 lakh capacity *	No.	14	45,00,000.00	6,36,30,000.00
(ii) Minor /Micro irrigation					
1	Ring-well (20 mtr depth 4 ft diameter) *	No.	265	63,000.00	1,68,61,950.00
PROJECT TOTAL OUT LAY *					19,99,81,370.00
Or Say					20.00 Crores
(Rupees Twenty Crores Only)					
*Includes 1% Administrative Cost for Monitoring & Evaluation.					



Annexure.1 - Estimate for Making/Digging Contour Trench

Component of the Scheme :

B. Soil & Moisture Conservation

Unit = 1 km.

SL. No.	Particulars Of Works	Unit	Qty.	Rate	Amount
1	Cost of Surveying, mazdoor engaged	No.	1	224	224.00
2	Supply of bamboo peg, rope, lime etc for necessary alignment	LS			49.90
3	Cost of excavation of earth for making/digging contour trench around 1 KM area where necessary over 5.00mtx0.45mtx0.30mt=0.675m ³ x60nos=40.5m ³	m ³	40.5	92.2	3734.10
TOTAL(Rs)					4008.00

Physical	Rate		Amount(
2408.00	4008.00	/km	9651264.00

Rupees Ninety Six Lakhs Fifty One Thousand Two Hundred Sixty Four Only

**Annexure.2 - Estimate for Construction of Earthen Dam****Component of the Scheme :****Soil & Moisture Conservation**

S. No	Particular of Works	Man-days (md) / Quantity	Rate	Material Cost	Total Cost
	Cost of doing the following works in connection with construction of an E.D. in forest area as follows :				
1	Survey, demarcation & cleaning of the site	5 md	224.00 /md		1120.00
2	Digging key trench in mixed medium hard soil with morrum over : - Length - 50mt.; Top width - 2.5mt.; Bottom width - 2mt.; Depth - 90cm. = $(2.5+2.0)/2 \times 0.9\text{mt.} \times 50\text{mt.} = 101.25 \text{ m}^3 = 3543.75\text{cft.}$ Or say 3544cft. by engaging daily labour	70 md	224.00 /md		15680.00
3	Making core wall including rain water depression of mud and placing layer after layer (layer not excluding 30cm. Height) by ordinary mixed soil to be excavated over : 1) $(2.5+2.0)/2 \times 0.9\text{mt.} \times 50\text{mt.} = 101.25\text{m}^3$ 2) $(2.0+0.6)/2 \times 1.5 \text{ mt.} \times 50\text{mt.} = 97.50\text{m}^3 = 198.75 \text{ m}^3$	75 md	224.00 /md		16800.00
4	Digging earth and depositing the same layer after layer not excluding 15cm. Including breaking of clodes and rough dressing in mixed medium hard soil with morrum over : 950 m ³ + (add) 10% for settlement i.e. 95 m ³ = 1045 m ³ - (less volume of earth excavation for spill way and core wall) 112.25 m ³ = 932.75 m ³ (a) Spill way - 30mt. x 0.90cm. x $(2.0+1.5)/2$ and (b) Core wall 47.25 m ³ + 65.00 m ³ = 32646 cft.				
	Lead upto 80 ft. and lift upto 3 ft., 55% of earth = 17955 cft. by engaging daily labour	245 md	224.00 /md		54880.00
	Lead upto 80 ft. and lift from 3 ft. to 6 ft. 45% of earth = 14691 cft. by engaging daily labour	190 md	224.00 /md		42560.00
5	Digging spill way to drain out excess water over 47.25 m ³ = 1654 cft. by engaging daily labour	21 md	224.00 /md		4704.00
	Total :	606 md	224.00 /md	0.00	135744.00
	Overhead Expenditure		L.S.	104.00	104.00
	Estimate for 50 mt. length				135848.00
7	Estimate for 300 mt length of E.D				8,15,088.00

Cost of 25.5 units of 300 mt E.D @ Rs. 8,15,088=Rs.2,07,84,744/-

[Rupees Two Crores Seven Lakhs Eighty Four Thousand Seven Hundred Forty Four Only]



Annexure.3 - Estimate for Construction of Gully Plugging

Component of the Scheme :

B. Soil & Moisture Conservation

UNIT = 1 M3

S. No	Item of work	Man days in Nos.	Material in unit.	Rate (in Rs.)	Amount (in Rs.)
	Cost of doing the following works in connection with treatment of gully for protection of gully & soil and moisture conservation works over 1 m ³ . (Size 1mt. X 1m. X 1mt.)				
1	Making structural works for protection of gully by using of morrum blocks, fitting fixing including foundation trench & supplying of all materials over 1 mt.	6.5		224	1456
2	Cost of morrum blocks (1mt. X 1mt. X 1mt. = 1m ³) Bamboo Posts, Bushes etc. including carriage		L.S.	796	796
	Total				2252

Cost of Gully plugging of 8799 @ Rs.2252/-= Rs. 1,98,15,348/-

(Rupees One Crore Ninety Eight Lakhs Fifteen Thousands Three Hundred Forty Eight only)

Annexure.5 - Unit cost for establishment of Production center for QPM 1 lakh capacity in 0.5 ha.

S. No	Description of item	Unit	Qty	Rate (Rs.)	Work Amt (Rs.)
1	Barbed wire-fencing with RCC pillars around the administrative area and Central Nursery: (100 nos. 0.15 m x 0.15 m x 2.4 m long x 100 nos. RCC poles with 5 rows of 300 m Heavy Duty (8 gauge) double knotted barbed wire).	m	200	797	159400
2	Sinking of 80 mm dia. bore well.	nos.	1	285000	285000
3	Development of Closed Compost Chamber (CCC) size: 3 m width x 5 m long x 1.8 m height masonry closed chamber x 1 no.	m ²	15	667	10005
	3 (a). Supplying, fitting & fixing the Manual Chopping Machine within the compost area. Chopping Machine Platform (CMP)- 4 m width x 6 m length x 2.4 m height open area having CC (1:3:6) platform over SBFS with CGI roof top.	nos.	1	30000	30000
4	Construction of Shed for storage purpose (Storage for- (a). Compost Heap Yard (CHY)-5 m x 4 m, (b). Potting Media Platform (PMP)- 5 m x 5 m , (c). Scrap Yard (SY)- 3.5 m x 4 m and (d). Root Trainers Store [Hycopot] (RTS)-3.5 m x 4.	m ²	73	607	44311
5	Construction of Washing & Disinfecting Sink (W & DS), size: 2 m width x 3 m length x 0.75 m height above GL for Root trainer.	m ³	4.5	3333	14999
6	Construction of Labor Shed (L.S) size: 4 m width x 5 m length 2.4 m height.	m ²	20	2067	41340
7	Supply & installation of Raised 2,000 ltr. PVC water tank with 5 hp Diesel Pump set. PVC tank will be raised by 7 m with concrete pillars. Platform for Pump House & Raised Water Tank (PH & RWT) 2 m x 3 m.	nos.	1	100000	100000
8	Construction of Drying & Seed Treatment Platform (D & STP), size: 5 m x 5 m.	m ²	25	714	17850
A	Laying out 3 m wide Inspection Path (IP) incl. construction of "V" shaped drain on either side of the path, filling up depressions and other works of land development:-				
1	Laying out 4 m wide Inspection Path (IP) and filling up depressions and other works of land development.	LS	1	46000	46000
2	Construction of "V" shaped Drainage, length 220 m.	m	220	486	106920
B	Laying out beds incl. supply of Root trainers (Hycopots) and iron sheds:-				
1	Supplying Root trainers: 300 cc (Class- I) 40,000 @ Rs.5/ pc = Rs. 2,00,000 and 150 cc (Class-I) 60,000 @ Rs.3/pc. = Rs. 1,80,000. Cost includes loading, unloading, carriage & stacking.	nos.	1,00,000	3.8	380000
2	A) Iron Stands for raised bed: For 300 cc stands 1m x 1m x 1m 100 nos. per stand 400 nos. @ Rs. 1,600/ pc = Rs. 6,40,000/- and For 150 cc stands 1m x 1m x 1m 160 nos. per stand 375 nos. @ Rs. 1,600/ pc = Rs. 6,00,000/-	sets	775	1400	1085000
	B) Agro net Shed 2 nos. size 20m x 15m x 2.5m including supply of agro net iron bars and fitting fixing	sets	2	45000	90000
C	Laying water pipeline network, total 300 m. with micro sprinklers and assorted dia. of 38 mm to 13 mm with necessary fittings.	m	300	200	60000



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D	Construction of Hydro-pits (HP) - 2 (two) nos. for seed germination. Each of size 1 m width x 2 m length x 1 m depth filled with graded pebbles over impermeable plastic sheet and sand layer at the top of bed. This will have lid of IRC net covered with UV film.	nos.	2	7500	15000
E	RCC Sign board of size 450 mm x 80 mm & 50 mm thick made by re-enforced mesh (12 SWG wire) of 25 mm x 25 mm size, cutting to requisite length in proper position & cement concrete mix 1:2:4 with 20 mm down well graded stone chips (Pakur/ Chandil variety), fixing on 2 (two) nos. RCC posts having size 100 mm x 100 mm & length 1,800 mm cement concrete mix 1:2:4 with 20 mm down well graded stone chips (Pakur/ Chandil variety), including Nut, Bolt & Washers etc, (Bolt size: 10 mm to 16 mm dia. & length above 150 mm and Nut size: 25 mm shank) and painting (2 coats) over a primer (1 coat) with best quality synthetic enamel primer & paint of approved name & brand, writing & painting black letters of digit of size 20 mm to 25 mm in black japan or any approved paint on the sign board & post including shuttering & curing of cement concrete & supply & carriage of all materials (cost of all materials and the required machineries to be borne by the contractor/ agency) etc. to worksite fixing & fitting in proper position & place & complete it in all respect as per direction of DFO.	Unit	1	2120	2120
Total					2487945
Add : Contingency					12056
Grand Total					2500000
Say, Rs.lakh:					25.00

Project Cost for 16 Central Nurseries Rs.lakh:	400.00
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(Rupees Four Crores Only)



Annexure.6 - Unit cost for establishment of Production center for QPM 2 lakh capacity in 1 ha.

S. No	Description of item	Unit	Qty	Rate (Rs.)	Work Amt (Rs.)
Part- 1:					
1	Barbed wire-fencing with RCC pillars around the administrative area and Central Nursery. (160 nos. 0.15 m x 0.15 m x 2.4 m long x 160 nos. RCC poles with 5 rows of 300 m Heavy Duty (8 gauge) double knotted barbed wire).	m	300	797	239100
2	Sinking of 80 mm dia. Bore well.	nos.	1	285000	285000
3	Development of Closed Compost Chamber (CCC) size: 3 m width x 5 m long x 1.8 m height masonry closed chamber x 1 no.	m ²	15	667	10005
3 (a)	Supplying, fitting & fixing the Manual Chopping Machine within the compost area. Chopping Machine Platform (CMP)- 4 m width x 6 m length x 2.4 m height open area having CC (1:3:6) platform over SBFS with CGI roof top.	nos.	1	30000	30000
4	Construction of Shed for storage purpose (Storage for- (a). Compost Heap Yard (CHY)-7 m x 7 m, (b). Potting Media Platform (PMP)- 7 m x 8 m , (c). Scrap Yard (SY)- 3.5 m x 5 m and (d). Root Trainers Store [Hycopot] (RTS)-3.5 m x 5.	m ²	140	607	84980
5	Construction of Washing & Disinfecting Sink (W & DS), size: 2 m width x 3 m length x 0.75 m height above GL for Root trainer.	m ³	4.5	3333	14999
6	Construction of Labor Shed (L.S) size: 4 m width x 6 m length 2.4 m height.	m ²	30	2067	62010
7	Supply & installation of Raised 4,000 ltr. PVC water tank with 5 hp Diesel Pumpset. PVC tank will be raised by 7 m with concrete pillars. Platform for Pump House & Raised Water Tank (PH & RWT) 2 m x 3 m.	nos.	1	170000	170000
8	Construction of Drying & Seed Treatment Platform (D & STP), size: 6 m x 7 m.	m ²	42	714	29988
Sub-total of Part- 1:					926082

Part - 2

S. No	Description of item	Unit	Qty	Rate (Rs)	Work Amt (Rs.)
A	Laying out 4 m wide Inspection Path (IP) incl. construction of "V" shaped drain on either side of the path, filling up depressions and other works of land development:-				
1	Laying out 4 m wide Inspection Path (IP) and filling up depressions and other works of land development.	LS	1	46000	46000
2	Construction of "V" shaped Drainage, length 288 m.	m	288	486	139968
B	Laying out beds incl. supply of Root trainers (Hycopots) and iron sheds:-				
1	Supplying Root trainers: 300 cc (Class- I) 80,000 @ Rs.5/ pc = Rs. 4,00,000 and 150 cc (Class-I) 1,20,000 @ Rs.3/pc. = Rs. 3,60,000. Cost includes loading, unloading, carriage & stacking.	nos.	2,00,000	3.8	760000



2	A) Iron Stands for raised bed: For 300 cc stands 1m x 1m x 1m 100 nos. per stand 800 nos. @ Rs. 1,600/ pc = Rs. 12,80,000/- and For 150 cc stands 1m x 1m x 1m 160 nos. per stand 750 nos. @ Rs. 1,600/ pc = Rs. 12,00,000/-	sets	1550	1400	2170000
	B) Agronet Shed 3 nos. size 30m x 20m x 2.5m including supply of agronet iron bars and fitting fixing	sets	3	70000	210000
C	Laying water pipeline network, total 500 m. with micro sprinklers and assorted dia. of 38 mm to 13 mm with necessary fittings.	m	500	200	100000
D	Construction of Hygropits (HP)- 2 (two) nos. for seed germination. Each of size 1 m width x 2 m length x 1 m depth filled with graded pabbles over impermeable plastic sheet and sand layer at the top of bed . This will have lid of IRC net covered with UV film.	nos.	2	7500	15000
E	RCC Sign board of size 450 mm x 80 mm & 50 mm thick made by re-inforced mesh (12 SWG wire) of 25 mm x 25 mm size, cutting to requisite length in proper position & cement concrete mix 1:2:4 with 20 mm down well graded stone chips (Pakur/ Chandil variety), fixing on 2 (two) nos. RCC posts having size 100 mm x 100 mm & length 1,800 mm cement concrete mix 1:2:4 with 20 mm down well graded stone chips (Pakur/ Chandil variety), including Nut, Bolt & Washers etc, (Bolt size: 10 mm to 16 mm dia. & length above 150 mm and Nut size: 25 mm shank) and painting (2 coats) over a primer (1 coat) with best quality synthetic enamel primer & paint of approved name & brand, writing & painting black letters of digit of size 20 mm to 25 mm in black japan or any approved paint on the sign board & post including suttering & curing of cement concrete & supply & carriage of all materials (cost of all materials and the required machineries to be borne by the contractor/ agency) etc. to worksite fixing & fitting in proper position & place & complete it in all respect as per direction of DFO.	Unit	1	2120	2120
Sub- total of Part- 2:					3443088

Project Cost for 14 Central Nurseries :-

Sub-Total of Part- 1 & Part- 2:				4369170
Contingency @ 3% of Rs. 42,52,567/- :				131075
Project Cost for 1 Central Nursery:				4500245
Say, Rs.lakh:				45.00

Project Cost for 14 (Fourteen) Central Nurseries:				630.00
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**Annexure.7 Model estimate of Ring well**

S. No.	Description of item of works	Total Cost		
		Vol./Unit	Rate	amount
Cost of earth digging including mixed, morrum soil and any other stone including spreading spoils within a lead of 75 meter including bailing out of water up to 1mtr depth if required and back filling with medium sand including cost of sand as follows:				
1	a)Up to 3 meter below G.L =3Mtr.@Rs.331.00/m	3	331	993
2	b)3 Meter to 6 Meter =3 Mtr. @Rs.331.00/m	3	331	993
3	c)6Meter to 9 Meter =3 Mtr @Rs.404.00/m	3	404	1212
4	d)9 Meter to 12 Meter =3 Mtr.@ Rs.468.00/m	3	468	1404
5	e) 12 Meter to 15 Meter =3 Mtr.@Rs.607.00/m	3	607	1821
6	f)15 Meter to 18 Meter =3 Mtr.@Rs.787.00/m	3	787	2361
7	g)18 Meter to 20 Meter= 3 Mter@Rs.865.00/m	2	865	1730
8	Cost of supply of prccast R.C.C Well ring, 4 ft diameter, made with cement concrete (4:2:1) with stone chips and 0.8% reinforcement fitted fixed in position true to plumb in the well including jointing with cement Mortar 2:1 complete as per direction:	20	1500	30000
9	Cost of supply of Iron Angle and making hole at the centre including fitting fixing in position properly complete. 10 Kg @ Rs.45.50.Kg.	10	45.5	455
10	Supplying and fitting in position 15 cm dia Pullcy Ino @ Rs.235.00	1	235	235
11	Construction of Platform:-			
	Consolidation work over 14.766m ²			
	a) Sand packing over 14.766m ² ×0.15 Mtr =2.215 m ³ @ 214.71/m ³	2.215	214.71	475.58
	b) Boulder soling over 14.766m ² ×0.30 mtr =4.430 m ³ @750.00/m ³	4.43	750	3322.5
	c)Single brick flat soling over 14.766m ² @114.00/m ²	14.766	114	1683.32
	d)C.C Work (4:2:1) with Chandil chips over 14.766m ² ×0.10=1.4766 m ³ @2707.00/m ³	1.4766	3654.45	5396.16
	e)Brick work of parapet wall in the platform 2.331 m ³ @ 2070.00/m ³	2.331	2898	6755.24
	f) Pillar 0.25×0.25× 1Metre × 2 Nos = 0.125m ³ @2070.00/m ³	0.125	2898	362.25
	Cost of cement plastering 20 mm thick (6:1) with cement mortar Platform = 14.766m ² ,Pillar=2.000m ² Parapet=8.925m ² , Total=25.691 m ² @62.00/m ²	25.691	83.7	2150.34
	Neat cement punning over (15 mm thick) 25.691 m ² @ 16.00/m ²	25.691	17.6	452.16
	Colour washing with "ELLA" with a coat of white wash priming including cleaning and smoothening surface thoroughly (two coats) over 25.691 m ² @ 4.80/m ²	25.691	4.8	123.32
Cleaning washing and removing rubbish and silt from the site	5	88.27	441.35	
			62366.22	
Contingency			633.78	
Total			63000	

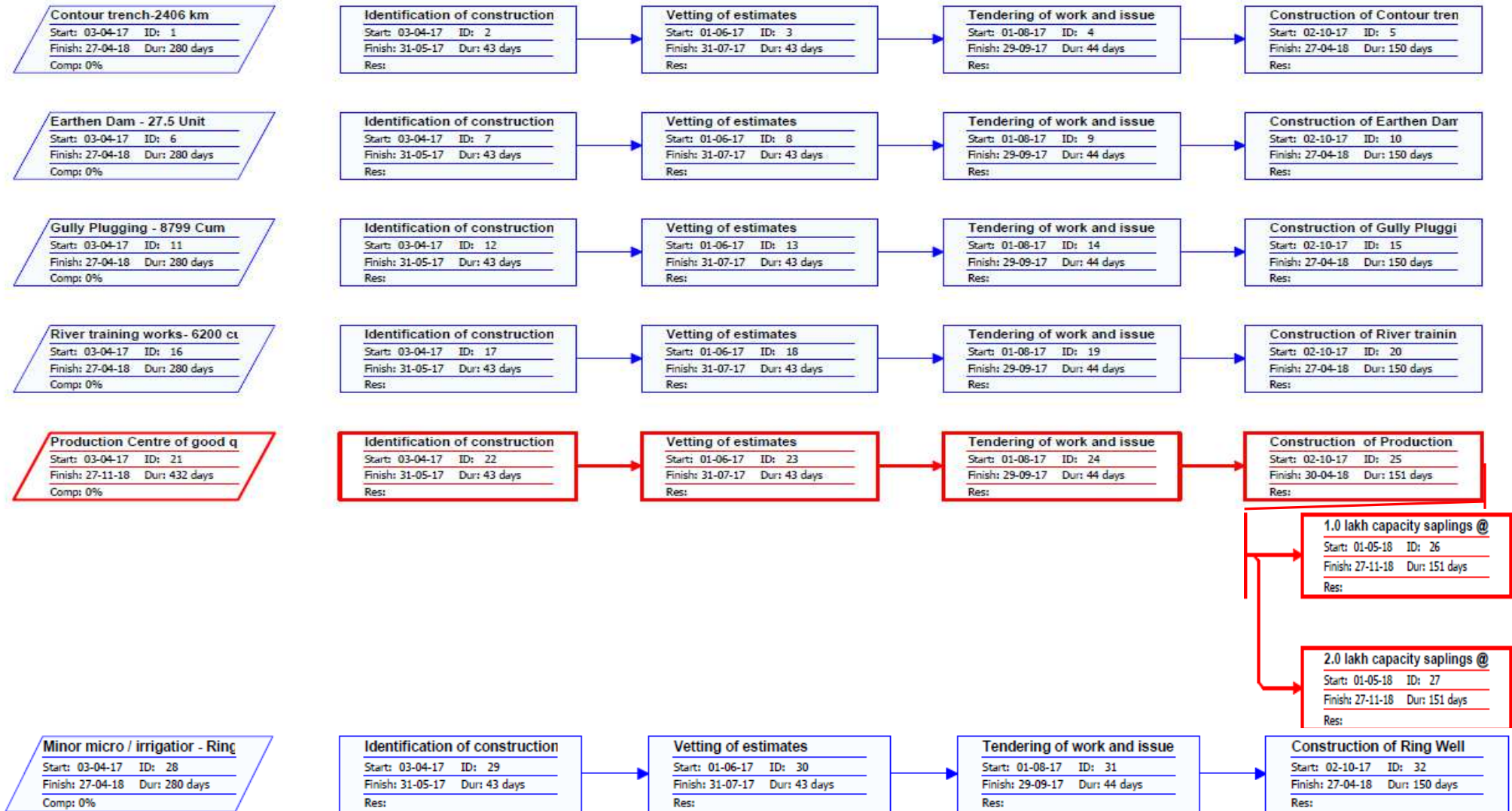
Cost of 265 Ring wells @ 63,000/- = Rs. 1,66,95,000/-

viii. Time Frame :

S. No	Activities (Time Line)	2017 - 18											
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
		1	2	3	4	5	6	7	8	9	10	11	12
i.	Natural Resource Management												
1	Contour trench-2406 km												
A.1.	Identification of construction area & approval												
A.2	Vetting of estimates												
A.3	Tendering of work and issue of work order												
A.4	Construction of Contour trench												
2	Earthen Dam - 27.5 Unit												
A.1.	Identification of construction area & approval												
A.2	Vetting of estimates												
A.3	Tendering of work and issue of work order												
A.4	Construction of Earthen Dam												
3	Gully Plugging - 8799 Cum												
A.1.	Identification of construction area & approval												
A.2	Vetting of estimates												
A.3	Tendering of work and issue of work order												
A.4	Construction of Gully Plugging												
4	River training works- 6200 cum												
A.1.	Identification of construction area & approval												
A.2	Vetting of estimates												
A.3	Tendering of work and issue of work order												
A.4	Construction of River training work												
5	Production Centre of good quality planting material												
A.1.	Identification of construction area & approval												
A.2	Vetting of estimates												
A.3	Tendering of work and issue of work order												
A.4	Construction of Production Centre 1.0 lakh QPM capacity saplings @ 25,00,000/- Nos. 16 2.0 lakh QPM capacity saplings @ 45,00,000/- Nos. 14												
ii.	Minor / micro irrigation - Ring Well - Nos. 271												
A.1.	Identification of construction area & approval												
A.2	Vetting of estimates												
A.3	Tendering of work and issue of work order												
A.4	Construction of Ring Well												



PERT Chart – Soil Moisture Conservation Project (RKVY – 2017) and cost Rs. 20,00,00,000.00





ix. Cost Benefit Analysis :

1. Cost Benefit analysis of Contour Trenches

Cost Benefit Analysis (CBA) - Contour Trench		
Input parameters	Unit	Value
Total Capital Cost Contour Trench	Rs/ km	96,51,264
Number of Contour Trenches	per km	2,408
Unit Capital Cost Contour Trench	Rs/ km	4,008
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	5
No of days of operation	Days	365
Average daily hours of operation	hours	24
Depreciation (on straight line basis)	Percentage	20%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from Contour Trench

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			
7	Increased Humidity	Direct	Intangible			
8	Improvement in Micro-climate	Direct	Intangible			



S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Improvement in Plant mortality rate by 4%	Direct	Tangible			
10a	4% more stock of timber quality plants that can be felled after (http://www.fao.org/docrep/ARTICLE/WFC/XII/0634-C2.HTM)	Direct	Tangible	7920	4	10%
11	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
11a	Labor Charges (person - day)	Direct	272	81600	2	10%
11b	Net Farm Productivity (rice) http://sap.ipni.net/article/west-bengal	Direct		5444	2	10%
12	Pisciculture Productivity	Direct	Tangible			
13	Labor Charges (person - day)	Direct	272	8160	2	10%
14	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
15	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	83.86	106624		
16	Benefits	Direct		8941489		

Cost Benefit Analysis - Contour Trench

Cash Flow	0	1	2	3	4	5
Capital Cost	96,51,264	0	0	0	0	0
Operational Cost	0	9651.264	9651.264	9651.264	9651.264	9651.264
Depreciation (on straight line basis)	19,30,253	19,30,253	19,30,253	19,30,253	19,30,253	19,30,253
Escalation cost	1,44,769	1,44,769	1,44,769	1,44,769	1,44,769	1,44,769
Benefits	0	8941489	9835638	10819201	11901121	13091234
Total Benefit	-117,26,286	68,56,816	77,50,964	87,34,528	98,16,448	110,06,560
	-117,26,286	68,56,816	77,50,964	87,34,528	98,16,448	110,06,560
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323
Present Value	-11726286	6233469	6405756	6562380	6704766	6834208
Net Present Value (NPV)	21014294					
Internal rate of return (IRR)	62%					



2. Cost Benefit analysis of Earthen Dam

Cost Benefit Analysis (CBA) - Earthen Dam		
Input parameters	Unit	Value
Total Capital Cost Earthen Dam	Rs/ km	20784744
Number of Earthen Dam	Number of Unit	25.5
Unit Capital Cost Earthen Dam	Rs/ km	815088
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	10
No of days of operation	Days	365
Average daily hours of operation (Dry Season)	Hours	4
Depreciation (on straight line basis)	Percentage	10%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from Earthen Dam

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			
7	Increased Humidity	Direct	Intangible			



S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
8	Improvement in Micro-climate	Direct	Intangible			
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Water availability for irrigation	Direct	Intangible			
11	Improvement in Plant mortality rate by 4%	Direct	Tangible			
11a	4% more stock of timber quality plants that can be felled after (http://www.fao.org/docrep/ARTICLE/WFC/XII/0634-C2.HTM)	Direct	Tangible	7920	4	10%
12	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
12a	Labor Charges (person - day)	Direct	272	81600	2	10%
12b	Net Farm Productivity(rice) http://sap.ipni.net/article/west-bengal	Direct		54440	2	10%
13	Pisciculture Productivity	Direct	Tangible			
14	Labor Charges (person - day)	Direct	272	8160	2	10%
15	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
16	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	83.86	155620		
17	Benefits	Direct		13050293		



Cost Benefit Analysis - Earthen Dam

Cash Flow	0	1	2	3	4	5	6	7	8	9	10
Capital Cost	207,84,744	0	0	0	0	0	0	0	0	0	0
Operational Cost	0	20784.744	20784.744	20784.744	20784.744	20784.744	20784.744	20784.744	20784.744	20784.744	20784.744
Depreciation (on straight line basis)	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474	20,78,474
Escalation cost	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771	3,11,771
Benefits	0	13050293	14355323	15790855	17369940	19106934	21017628	23119390	25431330	27974462	30771909
Total Benefit	-231,74,990	106,39,263	119,44,292	133,79,824	149,58,910	166,95,904	186,06,597	207,08,360	230,20,299	255,63,432	283,60,878
	-231,74,990	106,39,263	119,44,292	133,79,824	149,58,910	166,95,904	186,06,597	207,08,360	230,20,299	255,63,432	283,60,878
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323	0.56447393	0.513158118	0.46650738	0.424097618	0.385543289
Present Value	-23174990	9672057	9871316	10052460	10217137	10366843	10502939	10626663	10739139	10841391	10934346
Net Present Value (NPV)	80649302										
Internal rate of return (IRR)	56%										



3. Cost Benefit analysis of Gully Plugging

Cost Benefit Analysis (CBA) - Gully Plugging		
Input parameters	Unit	Value
Total Capital Cost Gully Plugging	Rs/ km	19815348
Number of Gully Plugging	Cum	8799
Unit Capital Cost Gully Plugging	Rs/ km	2252
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	5
No of days of operation	Days	365
Average daily hours of operation	hours	24
Depreciation (on straight line basis)	Percentage	20%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from Gully Plugging

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			



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S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
7	Increased Humidity	Direct	Intangible			
8	Improvement in Micro-climate	Direct	Intangible			
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Improvement in Plant mortality rate by 4%	Direct	Tangible			
10a	4% more stock of timber quality plants that can be felled after (http://www.fao.org/docrep/ARTICLE/WFC/XII/0634-C2.HTM)	Direct	Tangible	7920	4	10%
11	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
11a	Labor Charges (person - day)	Direct	272	81600	2	10%
11b	Net Farm Productivity (rice) http://sap.ipni.net/article/west-bengal	Direct		5444	2	10%
12	Pisciculture Productivity	Direct	Tangible			
13	Labor Charges (person - day)	Direct	272	8160	2	10%
14	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
15	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	83.86	155620		
16	Benefits	Direct		13050293		



Cost Benefit Analysis – Gully Plugging

Cash Flow	0	1	2	3	4	5
Capital Cost	198,15,348	0	0	0	0	0
Operational Cost	0	19815	19815	19815	19815	19815
Depreciation (on straight line basis)	39,63,070	39,63,070	39,63,070	39,63,070	39,63,070	39,63,070
Escalation cost	2,97,230	2,97,230	2,97,230	2,97,230	2,97,230	2,97,230
Benefits	0	13050293	14355323	15790855	17369940	19106934
Total Benefit	-240,75,648	87,70,178	100,75,207	115,10,740	130,89,825	148,26,819
	-240,75,648	87,70,178	100,75,207	115,10,740	130,89,825	148,26,819
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323
Present Value	-24075648	7972889	8326618	8648189	8940527	9206288
Net Present Value (NPV)	19018863					
Internal rate of return (IRR)	35%					



4. Cost Benefit analysis of River Training

Cost Benefit Analysis (CBA) - River Training		
Input parameters	Unit	Value
Total Capital Cost River Training	Rs/ km	28055000
Number of River Training	Cum	6200
Unit Capital Cost River Training	Rs/ km	4525
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	5
No of days of operation	Days	365
Average daily hours of operation	hours	24
Depreciation (on straight line basis)	Percentage	20%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from River Training

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			



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S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			
7	Increased Humidity	Direct	Intangible			
8	Improvement in Micro-climate	Direct	Intangible			
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
10a	Labor Charges (person - day)	Direct	272	81600	2	10%
10b	Net Farm Productivity (rice) http://sap.ipni.net/article/west-bengal	Direct		81660	2	10%
11	Pisciculture Productivity	Direct	Tangible			
12	Labor Charges (person - day)	Direct	272	8160	2	10%
13	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
14	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	84	174920		
15	Benefits	Direct		14668791		



Cost Benefit Analysis – River Training

Cash Flow	0	1	2	3	4	5
Capital Cost	280,55,000	0	0	0	0	0
Operational Cost	0	28055	28055	28055	28055	28055
Depreciation (on straight line basis)	56,11,000	56,11,000	56,11,000	56,11,000	56,11,000	56,11,000
Escalation cost	4,20,825	4,20,825	4,20,825	4,20,825	4,20,825	4,20,825
Benefits	0	14668791	16135670	17749237	19524161	21476577
Total Benefit	-340,86,825	86,08,911	100,75,790	116,89,357	134,64,281	154,16,697
	-340,86,825	86,08,911	100,75,790	116,89,357	134,64,281	154,16,697
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323
Present Value	-34086825	7826283	8327099	8782387	9196285	9572556
Net Present Value (NPV)	9617786					
Internal rate of return (IRR)	19%					

**5. Cost Benefit analysis of Production Center of 1 Lakh QPM seeds**

Cost Benefit Analysis (CBA) - Production Center of 1 Lakh QPM seeds		
Input parameters	Unit	Value
Total Capital Cost Production Center of 1 Lakh QPM seeds	Rs/ km	40000000
Number of Production Center of 1 Lakh QPM seeds	Number of Unit	16
Unit Capital Cost Production Center of 1 Lakh QPM seeds	Rs/ km	2500000
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	10
No of days of operation	Days	365
Average daily hours of operation (Dry Season)	hours	8
Depreciation (on straight line basis)	Percentage	10%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from Production Center of 1 Lakh QPM seeds

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			



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S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
7	Increased Humidity	Direct	Intangible			
8	Improvement in Micro-climate	Direct	Intangible			
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Water availability for irrigation	Direct	Intangible			
11	Improvement in Plant mortality rate by 4%	Direct	Tangible			
11a	4% more stock of timber quality plants that can be felled after (http://www.fao.org/docrep/ARTICLE/WFC/XII/0634-C2.HTM)	Direct	Tangible	7920	4	10%
12	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
12a	Labor Charges (person - day)	Direct	272	81600	2	10%
12b	Net Farm Productivity(rice) http://sap.ipni.net/article/west-bengal	Direct		54440	2	10%
13	Pisciculture Productivity	Direct	Tangible			
14	Labor Charges (person - day)	Direct	272	8160	2	10%
15	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
16	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	83.86	155620		
17	Benefits	Direct		13050293		



Cost Benefit Analysis Production Center of 1 Lakh QPM seeds

Cash Flow	0	1	2	3	4	5	6	7	8	9	10
Capital Cost	400,00,000	0	0	0	0	0	0	0	0	0	0
Operational Cost	0	40000	40000	40000	40000	40000	40000	40000	40000	40000	40000
Depreciation (on straight line basis)	40,00,000	40,00,000	40,00,000	40,00,000	40,00,000	40,000	40,00,000	40,00,000	40,00,000	40,00,000	40,00,000
Escalation cost	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000	6,00,000
Benefits	0	13050293	14355323	15790855	17369940	19106934	21017628	23119390	25431330	27974462	30771909
Total Benefit	-446,00,000	84,10,293	97,15,323	111,50,855	127,29,940	184,26,934	163,77,628	184,79,390	207,91,330	233,34,462	261,31,909
	-446,00,000	84,10,293	97,15,323	111,50,855	127,29,940	184,26,934	163,77,628	184,79,390	207,91,330	233,34,462	261,31,909
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323	0.5644739	0.5131581	0.4665074	0.4240976	0.3855433
Present Value	-44600000	7645721	8029192	8377802	8694720	11441676	9244744	9482849	9699309	9896090	10074982
Net Present Value (NPV)	47987086										
Internal rate of return (IRR)	27%										



6. Cost Benefit analysis of Production Center of 2 Lakh QPM seeds

Cost Benefit Analysis (CBA) - Production Center of 2 Lakh QPM seed		
Input parameters	Unit	Value
Total Capital Cost Production Center of 2 Lakh QPM seeds	Rs/ km	63000000
Number of Production Center of 2 Lakh QPM seeds	Number of Unit	14
Unit Capital Cost Production Center of 2 Lakh QPM seeds	Rs/ km	4500000
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	10
No of days of operation	Days	365
Average daily hours of operation (Dry Season)	hours	8
Depreciation (on straight line basis)	Percentage	10%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from Production Center of 2 Lakh QPM seeds

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			



S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
7	Increased Humidity	Direct	Intangible			
8	Improvement in Micro-climate	Direct	Intangible			
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Water availability for irrigation	Direct	Intangible			
11	Improvement in Plant mortality rate by 4%	Direct	Tangible			
11a	4% more stock of timber quality plants that can be felled after (http://www.fao.org/docrep/ARTICLE/WFC/XII/0634-C2.HTM)	Direct	Tangible	7920	4	10%
12	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
12a	Labor Charges (person - day)	Direct	272	81600	2	10%
12b	Net Farm Productivity(rice) http://sap.ipni.net/article/west-bengal	Direct		54440	2	10%
13	Pisciculture Productivity	Direct	Tangible			
14	Labor Charges (person - day)	Direct	272	8160	2	10%
15	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
16	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	83.86	155620		
17	Benefits	Direct		13050293		



Cost Benefit Analysis Production Center of 2 Lakh QPM seeds

Cash Flow	0	1	2	3	4	5	6	7	8	9	10
Capital Cost	630,00,000	0	0	0	0	0	0	0	0	0	0
Operational Cost	0	63000	63000	63000	63000	63000	63000	63000	63000	63000	63000
Depreciation (on straight line basis)	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000	63,00,000
Escalation cost	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000	9,45,000
Benefits	0	13050293	14355323	15790855	17369940	19106934	21017628	23119390	25431330	27974462	30771909
Total Benefit	-702,45,000	57,42,293	70,47,323	84,82,855	100,61,940	117,98,934	137,09,628	158,11,390	181,23,330	206,66,462	234,63,909
	-702,45,000	57,42,293	70,47,323	84,82,855	100,61,940	117,98,934	137,09,628	158,11,390	181,23,330	206,66,462	234,63,909
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323	0.5644739	0.5131581	0.4665074	0.4240976	0.3855433
Present Value	-70245000	5220267	5824233	6373294	6872441	7326210	7738727	8113743	8454667	8764598	9046353
Net Present Value (NPV)	3489533										
Internal rate of return (IRR)	11%										



7. Cost Benefit analysis of Ring Well

Cost Benefit Analysis (CBA) - Ring Well		
Input parameters	Unit	Value
Total Capital Cost Ring Well construction	Rs/ km	16695000
Number of Ring Well	Number of Unit	265
Unit Capital Cost Ring Well	Rs/ km	63000
Operational Cost (Annual) (O&M)	Percentage of Capital cost	1%
Life	Years	10
No of days of operation	Days	365
Average daily hours of operation (Dry Season)	hours	12
Depreciation (on straight line basis)	Percentage	10%
Escalation cost	Percentage	1.5%
Discount Factor	Percentage	10%

Expected Benefits from Ring Well

S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
1	Recharge of Ground water	Direct	Intangible			
2	Increase in Soil Moisture Content during dry season	Direct	Intangible			
3	Reduced Run-Off / Erosion	Direct	Intangible			
4	Reduced Evaporation	Direct	Intangible			
5	Increase in Canopy Cover	Direct	Intangible			
6	Increase in Biomass	Direct	Intangible			



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S. No	List of Benefits	Direct / Indirect	Cost associated with Benefit /day	Cost per year	Expected year of Benefit	Yearly increment expected in Benefit
7	Increased Humidity	Direct	Intangible			
8	Improvement in Micro-climate	Direct	Intangible			
9	Drinking water availability for wild animals & birds	Direct	Intangible			
10	Water availability for irrigation	Direct	Intangible			
11	Improvement in Plant mortality rate by 4%	Direct	Tangible			
11a	4% more stock of timber quality plants that can be felled after (http://www.fao.org/docrep/ARTICLE/WFC/XII/0634-C2.HTM)	Direct	Tangible	7920	4	10%
12	Increased Agriculture Productivity (conventional method) ftp://ftp.fao.org/agl/agll/docs/sb79.pdf	Direct	Tangible			
12a	Labor Charges (person - day)	Direct	272	81600	2	10%
12b	Net Farm Productivity(rice) http://sap.ipni.net/article/west-bengal	Direct		54440	2	10%
13	Pisciculture Productivity	Direct	Tangible			
14	Labor Charges (person - day)	Direct	272	8160	2	10%
15	Net fish catch http://rkvy.nic.in/static/SAP/WB/WB.PDF	Direct	Kg/ Ha / year	3500	2	10%
16	2% EDC & FPCs benefited in West Bengal http://www.westbengalforest.gov.in/publication_pdf/state_forest_report_06_07.pdf	Direct	83.86	155620		
17	Benefits	Direct		13050293		



Cost Benefit Analysis Ring Well

Cash Flow	0	1	2	3	4	5	6	7	8	9	10
Capital Cost	166,95,000	0	0	0	0	0	0	0	0	0	0
Operational Cost	0	16695	16695	16695	16695	16695	16695	16695	16695	16695	16695
Depreciation (on straight line basis)	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500	16,69,500
Escalation cost	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425	2,50,425
Benefits	0	13050293	14355323	15790855	17369940	19106934	21017628	23119390	25431330	27974462	30771909
Total Benefit	-186,14,925	111,13,673	124,18,703	138,54,235	154,33,320	171,70,314	190,81,008	211,82,770	234,94,710	260,37,842	288,35,289
	-186,14,925	111,13,673	124,18,703	138,54,235	154,33,320	171,70,314	190,81,008	211,82,770	234,94,710	260,37,842	288,35,289
Discount Factor (10%)	1	0.909090909	0.826446281	0.751314801	0.683013455	0.620921323	0.56447393	0.513158118	0.46650738	0.424097618	0.385543289
Present Value	-18614925	10103339	10263391	10408892	10541165	10661414	10770731	10870111	10960455	11042587	11117252
Net Present Value (NPV)	88124413										
Internal rate of return (IRR)	70%										

x. Risk Analysis :

In the process of drafting the FIG for West Bengal, the Forest Directorate has held consultations with several departments, institutions, stakeholders. The consultative groups are given in the chart enclosed. The program is designed with plans and resources to ensure transparent decision making and implementation, including mechanisms for redressing potential grievances. Given the framework approach adopted for infrastructure investments, the proposed project has some high inherent risks.

Table: Major Risks, Mitigation Measures, and Rating of Residual Risks

<i>Risk factors</i>	<i>Description of risk</i>	<i>Rating^a of Risk</i>	<i>Mitigation measures</i>	<i>Rating of Residual risk</i>
I. Sector-specific Risks				
Sector Governance	Governance and financial accountability framework rest with multiple agencies. Issues include: (a) weak coordination, resulting in poor planning and implementation delays; (b) weak capacity at intermediate and lower levels which are responsible for service delivery; and inadequate performance management and accountability systems; (c) M&E systems are not very strong; and (d) despite a strong framework of sanctions, there remains patronage and direct theft of public money.	Substantial	(a) Institutionalization of co-ordination with dedicated institutions for implementing FIG, WB with emphasis on training of staff. (b) Sector governance and financial accountability assessments have to be conducted at the executing agency level. (c) Various technical assistance activities have to be initiated including capacity building of all associated agencies, (d) The design of the project includes better internal control systems, third party quality assurance, better systems for M&E and expenditure tracking; prudent systems for financial and procurement management; and process reforms supporting transparency and accountability.	Moderate
Sector Institutions and Policies	Basin-level management across three key sectors – water resources, environment, and urban development - will be challenging ,with weak service delivery institutions, insufficient cross-sectoral coordination, and no proven models for river basin clean-up/management in the country	Substantial	(a) Cross-sectoral coordination to be built with institutional design, (b) The program will be supported by ongoing reforms in these sectors/states, (c) improving financial sustainability of service delivery through rational charges and tariffs and improved financial management.	Moderate
II. Operation-specific Risks				
Operational	ULBs do not currently have adequate technical and	High	(a) No investments will be considered without explicit consent of	Substantial



capacity and ownership at the ULB level	financial capacity.		ULB. (b) ULBs are being sensitized through workshops and communications program.	
Operational Capacity of institutions	Successful implementation requires competent and dedicated executive bodies at state levels.	Substantial	(a) The SPMGs at the state level are to be set up as registered societies, with agreed structure and staffing plans, to enhance administrative and financial autonomy and promote single-point accountability. (b) Up-front support for capacity building being provided, including project management and technical support consultancies.	Moderate
Investments Preparation and Execution	Technical quality of investment preparation(including city-level planning) is inadequate, and long-term sustainability is not addressed satisfactorily	Substantial	(a) Investments framework with criteria for selecting, appraising and implementing investments have to be developed to ensure technical quality, effectiveness and sustainability of investments. (b) A rigorous review process has to be designed, requiring feasibility and planning analyses and independent reviews	Moderate
	Householders do not connect to sewer networks	Substantial	ULB to be empowered for suitable mechanism for the same	Moderate
Transparency, Accountability redressal	Lack of citizen voice in investment planning and implementation; in adequate disclosure measures; weak grievance redressal	Moderate	(a) Consultations, communication and disclosure are mandated by framework(b) All RTI Act provisions will apply, (c)Project to include social audits and publicly disclose all M&E reports(d) Dedicated grievance redressal system to be incorporated.	Low
Social and environmental safeguards	Inadequate attention to social and environmental impacts of project/program interventions.	Moderate	(a) SPMG to be staffed with competent social and environment specialists to ensure ESMF compliance (b) Project provides for systematic and long term effort to track social and environmental issues in the basin,	Low
Reputational risks	Unrealistic public expectations that the river will become clean by the time the project is completed.	High	(a) Design includes strong communications and outreach program, (b) Communications will focus on managing expectations, including the fact that the Ganga clean-up will require longer time and more resources than possible in one project.	Substantial
III. Overall Risk				
Overall Risk	The project is complex in scope and of high visibility in India. Even though the PDO, components, and institutional arrangements have been designed to integrate the mitigation measures described above, the overall risk remains high.			High
^a Rating of risks on a four-point scale – High, Substantial, Moderate, Low – according to the likelihood of occurrence and magnitude of potential adverse impact.				

xi. Outcome :

Outcome of the interventions –

Land use type	Activities	Forest	Outcome of the infrastructure development (Service and Benefit)									
			Timber	Fuel Wood	Biomass	Fodder	Reduced Erosion	Minor produce	Hydrological benefit	Soil Conservation	Biodiversity	Carbon Sequestration
Land use type	Contour Trench	Degraded Natural Forest	+	++	++	++	+++	++	+++	+++	++	++
	Earthen Dam		++	++	++++	++	+++	++	+++	+++	++	+++
	Gully Plugging		+	++	++	+++	+++	+	++	+++	+	++
	River Training		++	+	++	+++	+++	0	+	+++	+	+
	Production Center 1 lakh QPM		+++	+++	+++	+++	+++	++	+++	+++	++	+++
	Production Center 2 lakh QPM		+++	+++	+++	+++	+++	++	+++	+++	++	+++
	Ring Well		+	++	++	++	0	+	++	+	++	++

Extent of Benefit – +++ High, ++ Medium, + Low, 0 None, - Negative

Type of beneficiary – Local Regional National / Global



xii. Evaluation:

The primary monitoring of the RKVY works is done by the Divisional Forest Offices at the Divisional level and by the Chief Conservator of Forests in the Circle comprising different Divisions.

However as per the recent guidelines an independent 3rd party monitoring of the RKVY projects, implemented in the field, has been put in auction following the observation of CAG that deficiency in monitoring in monitoring was the biggest weakness of the programme.