‘AFFORESTATION ON 1100 HECTARES OF DEGRADED RESERVE FOREST LAND AT LONI KALBHOR, PUNE FOR CLIMATE CHANGE MITIGATION AND ADAPTATION’

FROM

TO

Pune Knowledge Cluster (PKC) – Shantanu Goel and Ashwini Keskar Sardeshmukh

With

Wildlife Research and Conservation Society (WRCS)

Jayant Kulkarni and Aparna Watve

CONTENTS

PROJECT OVERVIEW

<table>
<tr><td>Title</td><td colspan="3">Afforestation on 1100 hectares of degraded reserve forest land at LONI KALBHOR, Pune for climate change mitigation and adaptation.</td></tr>
<tr><td>Vision</td><td colspan="3">Towards climate resilient Pune metropolitan region</td></tr>
<tr><td rowspan="4">Approach and outcomes</td><td colspan="2">Objective: <u>To develop a self-sustaining Biodiversity Park on 1100 hectare of Degraded Reserve Forest land in Pune Metropolitan Region for Climate Change Mitigation and Adaptation.</u></td><td>Timeline</td></tr>
<tr><td colspan="2">1. An Integrated Conservation and Management Plan (ICMP) for the biodiversity park is developed through stakeholder participation.</td><td>1year</td></tr>
<tr><td colspan="2">2. The watershed interventions, irrigation facilities and micro-irrigation are implemented to ensure survival of plantations and sustainability of other activities.</td><td>3 years</td></tr>
<tr><td colspan="2">3. Increased biodiversity in the project site.

4. Reduced dependency of local people on reserve forest

5. Increased community participation and self-sustenance of the site is ensured.

6. The project site is proposed to be declared as a protected area.</td><td>5 years</td></tr>
<tr><td>Partners</td><td>Public partners
State forest departments
Gram panchayat through JFMC/BMC
Local communities
Pastorals, villagers, farmers</td><td colspan="2">Implementation Partners
WRCS: wildlife research and conservation society
Research institutions</td></tr>
<tr><td>Budget</td><td>The total budget cost is estimated to be about ₹50 crore

(€5.2 million @€1=₹70/-) for a period of five years.</td><td colspan="2"></td></tr>
</table>

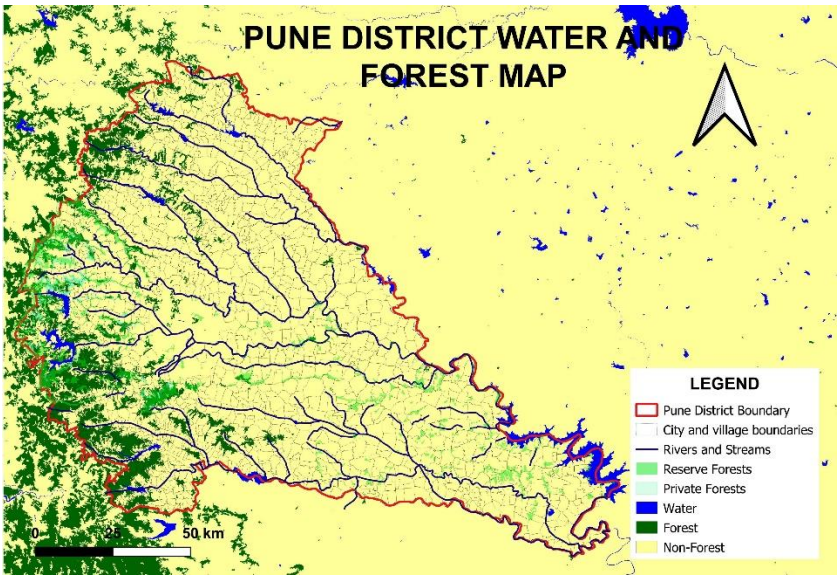
INTRODUCTION

Pune district, with a geographical area of 15,643 sq. kms. is spread from West to East, with a larger area in the West. The district receives more than 1000 mm rainfall in the West which reduces down to almost 500 mm in the East. The Western part of the district is also the origin of most rivers and streams in the district and is the source for most of the drinking water for Pune City. The district has a forest cover of 1,710.86 sq. kms which is about 10.94% of the geographical area and also has scrub forest of 508.03 sq. kms.

Climate Change Resilience (CC Resilient) of the district would, amongst others, mainly require food and water security, and mitigation of impacts of Climate Change, along with climate change adaptation (important for sectors such as employment, housing and mobility). To make the district CC Resilient it is essential to implement projects that aim at increasing forest and tree cover through watershed management, irrigation, plantation and strengthening of local bodies i.e. Gram Panchayats (JFMC/BMC).

Pune's burgeoning human population and the need for residential and commercial space are putting enormous pressure not only on water and environment, including biodiversity that the city harbours, but also on the neighbouring villages. Accordingly, a two-pronged approach is proposed to tackle the problem of water availability, and to increase forest and tree cover in the entire district, as follows:

1) To develop Integrated Conservation and Management Plans for afforestation of degraded Reserve Forests (RF) in the entire district and increasing tree cover on private lands near water bodies.
2) To showcase strengths of the State Government, Local Bodies and Pune Knowledge Cluster (PKC) in partnership with Wildlife Research and Conservation Society (WRCS) in afforesting a degraded RF at village Loni Kalbhor.

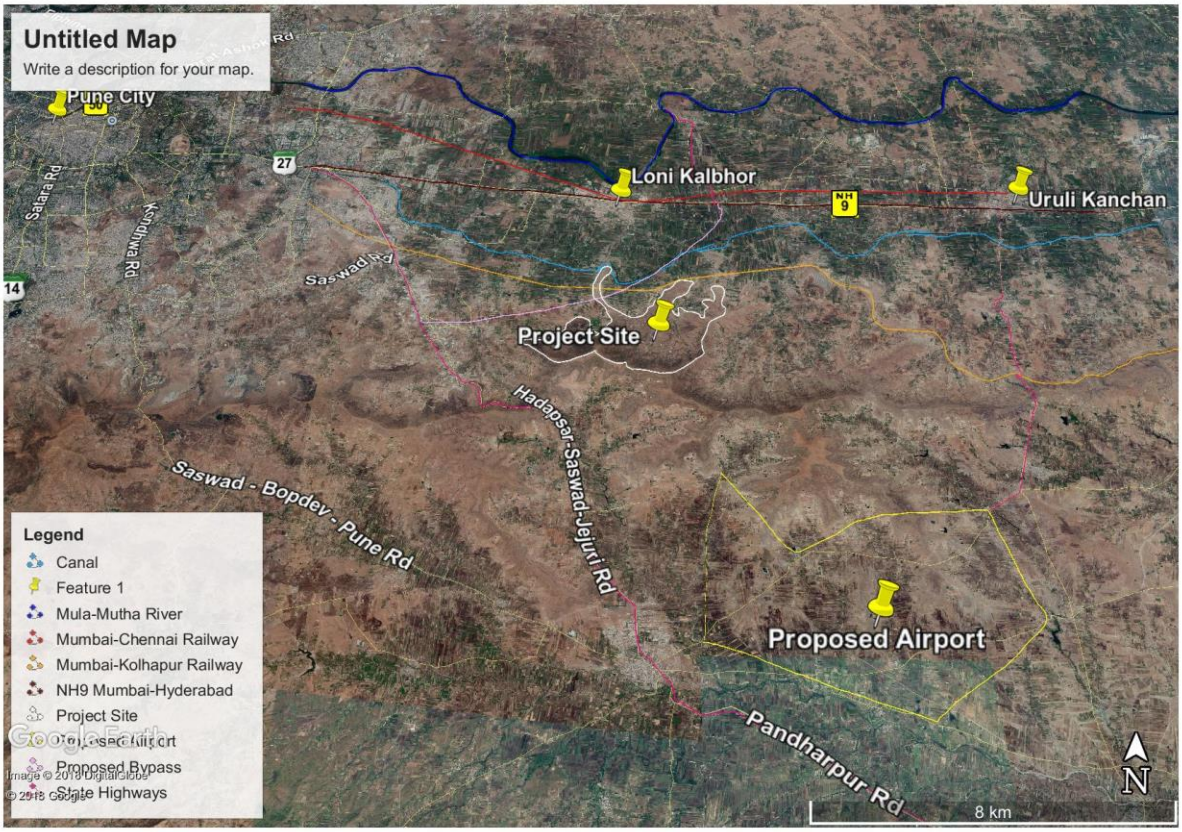


AFFORESTATION ON DEGRADED RESERVE FOREST LAND AT LONI KALBHOR

Loni Kalbhor is a large village that is situated on the outskirts of Pune city along the Pune-Solapur Highway, and is a fast-emerging suburb, edge city or bedroom community. The village has a total geographical area of about 4,316.12 hectares. The Mula-Mutha river forms the northern border of the village, and the Sinhagad -Bhuleshwar mountain range (Dive Ghat) forms the southern boundary. About one-fourth of the land in the village, i.e. about 1,172 hectares, is designated Reserved Forest, which is owned and managed by the Maharashtra State Forest Department. Due to its proximity to Pune city, and the presence of a large block of reserved forest, without major encumbrances, Loni Kalbhor is an excellent site for implementing a reforestation project.

The project will be implemented in the Reserved Forest with an area of more than **1170 hectares in Loni Kalbhor**, which is facing challenges such as low rainfall, overgrazing, tree cutting, soil erosion, loss of soil fertility, invasive species, unsettled rights and encroachment, poaching, and loss of ecosystem services. Accordingly, to address the challenges, the object of the project is to develop a self-sustainable biodiversity park on the degraded RF land for climate change mitigation and adaptation.

Figure 1: Location of project site in Google Earth image



PROPOSED METHODOLOGY

Under the project, the local pastoral community, namely the Dhangars, and some landless labourers (who are dependent on the forest), will be organised and strengthened into local self-governance institutions such as Joint Forest Management Committee (JFMC) or Biodiversity Management Committee (BMC). Through the project the JFMC/BMC, in collaboration with Forest Department, other line departments, NGOs and funding agencies, will be helped in undertaking afforestation, watershed development, and other forest management and conservation activities.

Objective: To develop a self-sustaining Biodiversity Park on 1100 hectare of Degraded Reserve Forest land in Pune Metropolitan Region for Climate Change Mitigation and Adaptation.

The outcomes and outputs are given below:

Outcome 1: An Integrated Conservation and Management Plan (ICMP) for a biodiversity park is developed through stakeholder participation.
Output 1: A base-line for biodiversity assessment established and publish inventories and report ecological changes in major biodiversity taxa such as birds, fishes, herpetofauna, insects and flora and use the same to prepare the participatory ICMP.
Output 2: A comprehensive watershed management and irrigation plan is developed.
Output 3: Socio-economic dependence and influence of stakeholders on the forests is assessed and documented.
Output 4: A strategy to safeguard the Biodiversity Park from encroachments, poaching and forest fire is developed.
Output 5: An ICMP with activities, funds and time-line required to meet the various outcomes and outputs of the project in the short, medium and long term is developed.

Outcome 2: The watershed interventions, irrigation facilities and micro-irrigation are implemented to ensure survival of plantations and sustainability of other activities.
Output 1: Rainwater harvesting and watershed management plans are implemented.
Output 2: The project site is irrigated by lifting water from wells/borewells near the canal.
Output 3: The plantation and regeneration of naturally occurring plants are irrigated through micro-irrigation to increase sapling survival and assist growth.

Outcome 3: Increased biodiversity in the project site
Output 1: Increase species richness and tree density in the project site through plantations and assisted regeneration.
Output 2: Increase in species richness and abundance of major fauna
Output 3: Protect the Reserve Forest from encroachments both human and invasive species.

Outcome 4: Reduced dependency of local people on reserve forest
Output 1: Quality and quantity of fuel and fodder resources are significantly improved.
Output 2: Encourage stall feeding of cattle and livestock
Output 3: Ensure that LPG is used as the primary domestic fuel and other fuel-saving devices are installed.

Outcome 5: Increased community participation and self-sustenance of the site is ensured.
Output 1: Encourage community participation through supplementary income generation.

Output 2: Develop eco-tourism facilities such as log-cabins, tents, restaurants/canteens, nature trails, medicinal and aromatic plants gardens and adventure sports (trekking and sport fishing).

Output 3: Plantation of commercially important timber and NTFP species.
Output 4: Build capacity of Forest Department staff and local communities for strengthening local self-governance and prudent natural resource management and use.

Outcome 6: The project site is proposed to be declared as a protected area.
Output: The project site is recognised as Conservation/Community Reserve under the Wildlife (Protection) Act, 1972 or Biological Heritage Site under the Biological Diversity Act, 2002.

TREATMENT MODELS

The proposed implementation models under the project are as follows:

1) Plantation

Plantation of ecologically compatible species of trees, shrubs and grasses to create Riparian, Dry Deciduous and Thorn Forest, and Meadows/Grasslands. Native tree species will be used for restoration in flat areas and slopes up to 30 degrees.

2) Assisted Natural Regeneration

All native major trees above 10 cm GBH and well-established shrubs will be preserved and documented. The growth of natural and native plants will be enhanced by improving soil fertility and humidity (through water shed/irrigation), ensuring protection and monitoring for diseases and pests.

TREATMENT PHASES

The total project area will use the existing compartments for ease and manageable implementation in phases. The project will begin with an intensive six-month field survey in all four compartments to document the existing bio-physical features of the area such as topography, hydrology including underground water level, biodiversity, soil health and anthropogenic pressures and dependence. After the field survey, the physical implementation activities will be carried out in the compartments in four phases.

Figure 2: Map of implementation phases of the proposed project

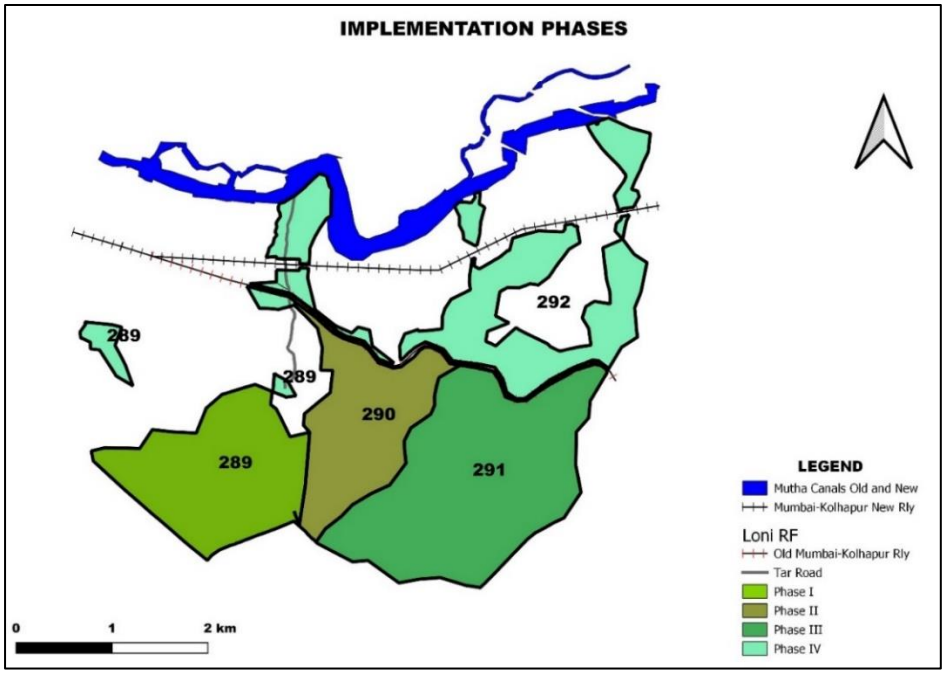
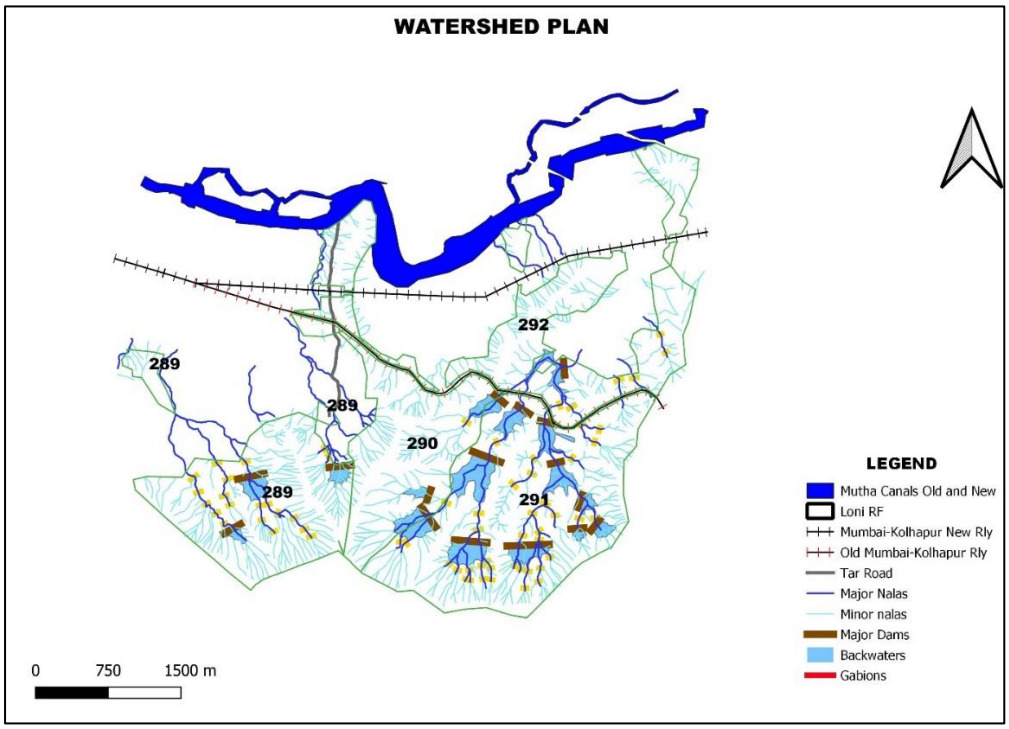


Figure 3: Watershed management map of the project area



TREATMENT ZONES

The main treatment zones in the project are:

Riparian zone	Plantation spacing at 6 x 6 m, 278 tall seedlings with 0.45x0.45x0.45 m pits
Dry deciduous zone	Plantation spacing at 4 x 4 m, 625 tall seedlings with 0.45x0.45x0.45 m pits and 1200 running meter continuous contour trench covered with grass.
Thorn Forest zone	Plantation spacing at 3 x 3 m, 1111 seedlings planted in 0.45x0.45x0.45 m pits along 1200 running meters (rmt) continuous contour trench covered with grass
Buffer zone	Plantation spacing at 2 x 2 m, 2500 seedlings planted in 1250 running meters (rmt) continuous contour trench with 0.60x0.45 m dimensions covered with thorny plants such as Ghaipat, Ber, Chilhaar and Sagargoti.
Meadow/ Grasslands	Meadow/Grassland development would comprise mainly grass restoration and reintroduction work. Grass seeds will be collected from similar ecosystem type and seedlings prepared in nurseries. The grass will then be planted at 1x1m spacing.

Figure 4: Map of treatment zones in the project area

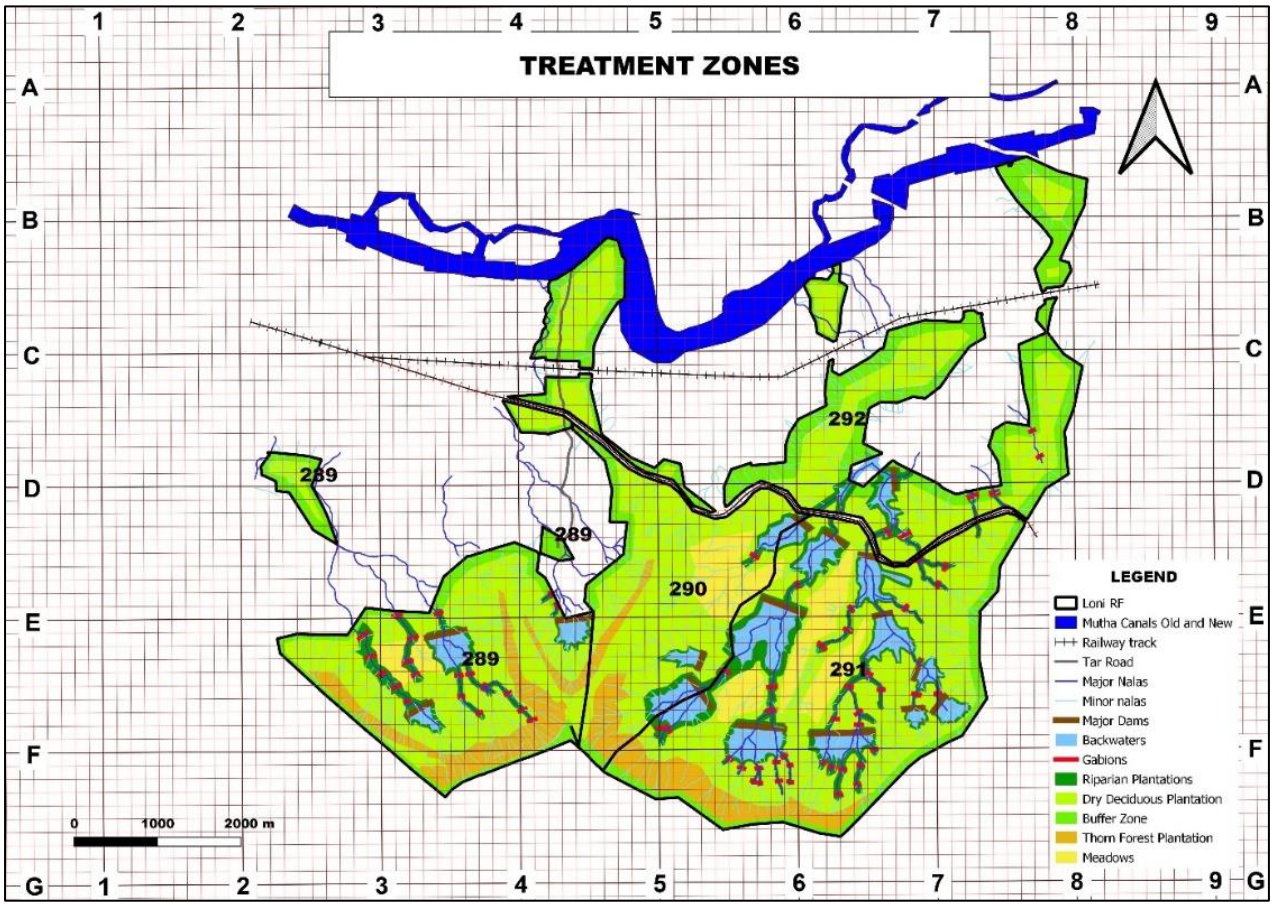
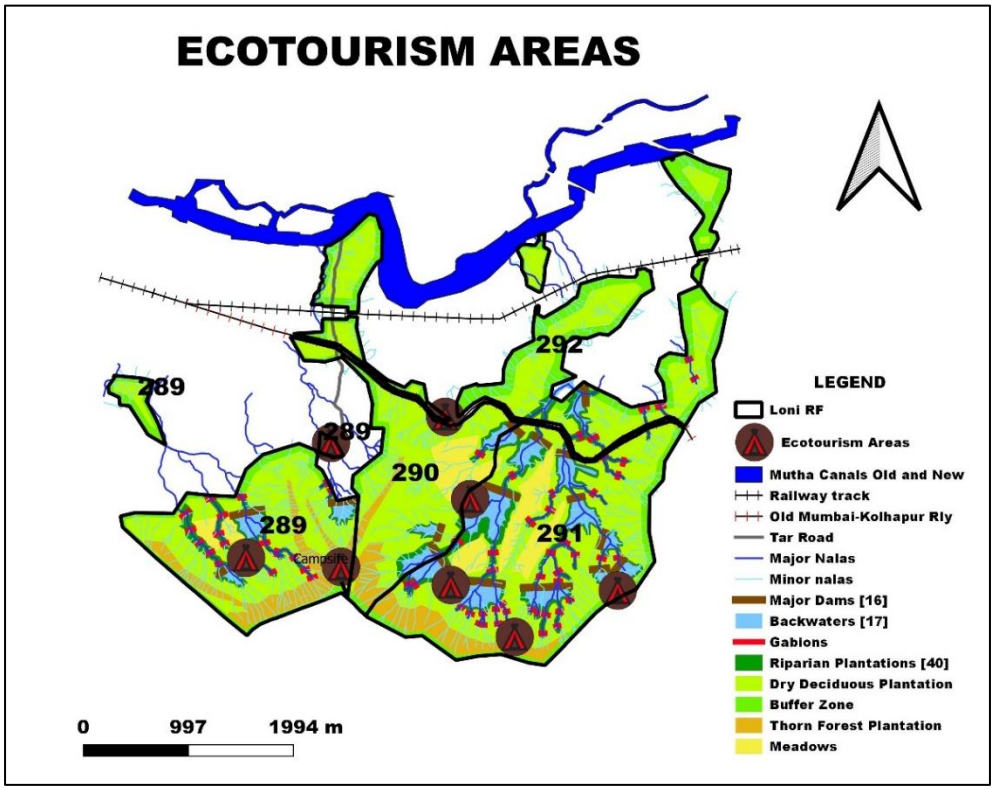


Figure 5: Map of proposed ecotourism sites in the project area



CLIMATE CHANGE MITIGATION

The carbon sequestration potential for the project has been calculated using the tool Ex-Ante Carbon-balance Tool (EX-ACT), Version 7 developed by Food and Agriculture Organisation (FAO) of the United Nations. EX-ACT is a land-based accounting system, estimating carbon stock changes (i.e. emissions or sinks of CO_2) as well as GHG emissions per unit of land, expressed in equivalent tonnes of CO_2 (tCO_2-e) per hectare and year. Ex-ante project evaluation compares the impacts of a planned intervention to the business-as-usual scenario. EX-ACT primarily uses the Guidelines for National Greenhouse Gas Inventories (NGGI-IPCC 2006, thereafter named IPCC 2006) in conjunction with other methodologies and reviews of default coefficients for mitigation option, where available, as a base.

GROSS FLUXES OVER 20 YEARS

Components of the project	Gross fluxes		
	Without	With	Balance
Land use changes			
Deforestation	0	0	**0**
Afforestation	-74,085	-3,59,875	**-2,85,790**
Grassland & Livestocks			
Grassland	0	-4,796	**-4,796**
Livestocks	0	0	**0**
Degradation & Management			
Forest degradation	0	-9,339	**-9,339**
Inputs & Investments	0	23,578	**23,578**
Total	-74,085	-3,50,432	**-2,76,347**
Per hectare	-70.3	-332.5	**-262.2**
Per hectare per year	-3.5	-16.6	**-13.1**

Notes:

1) *All GHG in tCO2eq*
2) *Positive = source / negative = sink*
3) *Balance = With project - Without project*

Table: Additional Sequestration by the Project in 20 years.

The total GHG sequestration due to the project is estimated to be about **2.8 lakh tCO_2eq (262 tCO_2eq per hectare)** of avoided emissions or increased carbon sequestration over the 20-year timescale of the analysis. These are rough estimates and can be refined using Tier II and Tier III methodologies using EXACT once better ground truth-based information is available on species composition and density.

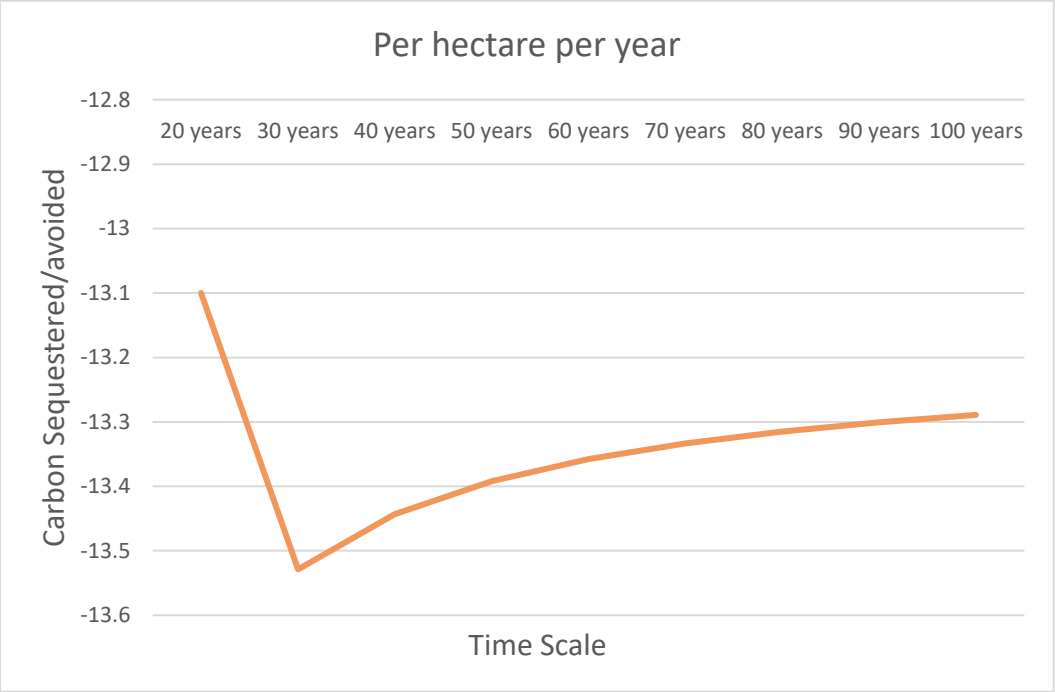
SEQUESTRATION IN COMPONENTS – BIOMASS AND SOIL

The total GHG sequestration over a period of twenty years in terms of Biomass and Soil Carbon due to the project intervention is estimated to be about 2.4 lakh tCO_2eq and 58 thousand tCO_2eq. The per hectare per year tonnes of CO_2 is estimated to be about 10.3 tCO_2eq biomass and 2.8 tCO_2eq of soil carbon.

PER HECTARE PER YEAR CARBON SEQUESTRATION

The per hectare per year GHG Sequestration was plotted on a graph for 100 years period. The per hectare per year graph shows a peak in carbon sequestration potential at 30 years which may be due to carbon sequestration by grasslands and reduced forest degradation. The Carbon Sequestration decreases from 30 years onwards up to 90/100 years after which it seems to stabilise. So, to ensure carbon sequestration will continue at the same rate beyond 40-50 years, the sustainable use of resources may be required to ensure continuous carbon sequestration.

Figure 6: Projected Carbon sequestration per hectare per year due to the project



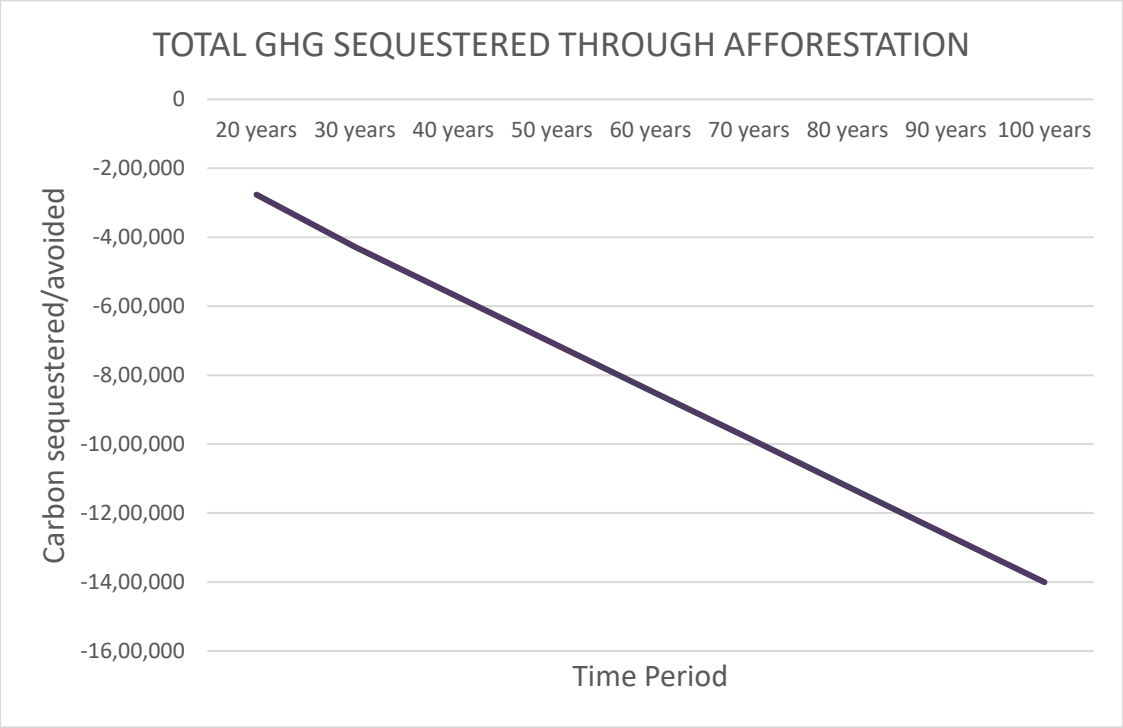
AFFORESTATION

Type of vegetation that will be planted	**Fire Use?** (y/n)	**Previous land use**	**Area (in hectares) that will be afforested/ reforested**				**Total Emissions (tCO2-eq)**		**Balance**
			Without	*	With	*	Without	With	
Plantation Zone 2	NO	Degraded Land	40	D	164	D	-17,118	-70,184	-53,066
Plantation Zone 3	NO	Degraded Land	129	D	656	D	-56,967	-2,89,691	-2,32,724

Under the project it is proposed to plant evergreen trees in the nallas and around water bodies so as to create a Riparian Forest. The area under Riparian Forest without project and with project are estimated to be about 40 and 164 hectares respectively. Further, on slopes up to 30^0 it is proposed to plant dry deciduous species and the area without project and with project are estimated to be about 129 and 656 hectares respectively. Accordingly, the total carbon sequestered/avoided using Plantation of Evergreen trees (Plantation Zone 2 – Tropical Moist Forest) and Plantation of Dry Deciduous trees (Plantation Zone 3 – Tropical Dry Forest) calculated using EXACT comes to about -2.82 lakh tCO_2eq.

The graph below shows the total GHG Sequestration through afforestation over 100 years period. EXACT tool predicts GHG sequestration to increase at almost a constant rate of about 77% over the period.

Figure 7: Total projected GHG sequestered through afforestation



In 2014, a study published in Nature found that a typical tree's growth continues to accelerate throughout its lifetime. A study published in the Proceedings of the National Academy of Sciences in 2019, found young forests sequester more carbon per year than old-growth forests. While young forests tend to absorb more carbon overall because of dense tree plantation, a tree's carbon absorption rate accelerates as it ages. Old growth trees store a lot of carbon but the eventually die and if they aren't harvested and converted into wood products, they will fall down in a windstorm, burn up in a wildfire or meet their fate some other way and eventually they will release all their stored carbon content back to the atmosphere. So, while a single tree might continue to pile on more and more biomass, there will be less of such trees in a stand, simply because of their size and as tree stands age, gaps tend to appear due to tree mortality thereby reducing the carbon sequestration potential. So, it may be safe to conclude that individual tree mass growth rate increases with tree size, but old forests usually absorb carbon more slowly than young forests and therefore young forests are responsible for more of the terrestrial carbon sink than old growth forests.

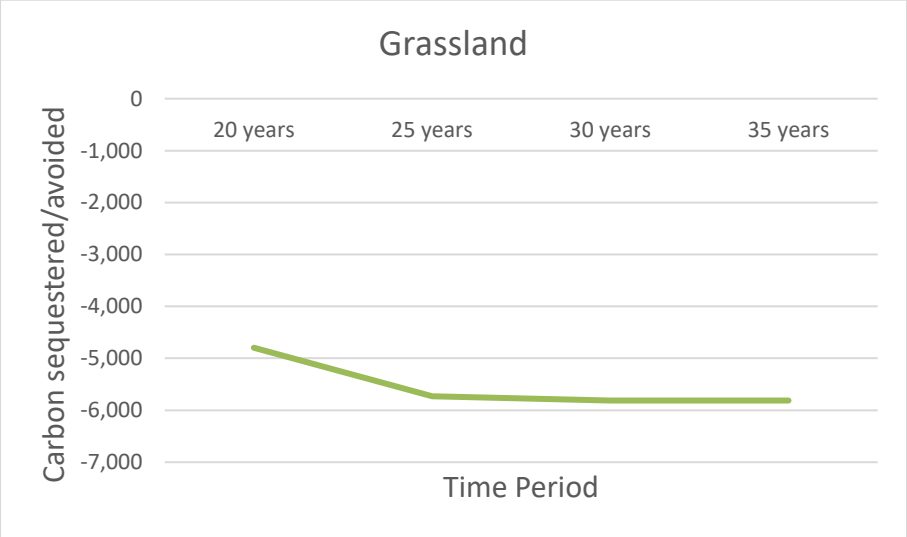
GRASSLANDS

There is a belief that carbon sequestration rates in grasslands may be slower and much less compared to forests. However, this may not be true as studies have shown that reversal of management practices that deplete soil carbon stocks can rebuild grassland ecosystem carbon stocks thereby sequestering atmospheric CO_2 at the same rate as forests and agriculture. Grassland carbon sequestration faces the same challenges as those relating to forestry and

agricultural sequestration, but in some ways they are greater. There are certain limitations that hinder in adopting the practices for enhancing carbon sequestration in grasslands. The limitations include continuous degradation of grasslands, sequestration rates can be slower, changing climate, paucity of information on carbon stock of grasslands, disagreement on systems for documenting carbon stock changes over a period of time and the ability to measure change could be more difficult. Therefore, to improve carbon stocks in grasslands it is pertinent to manage grasslands with improved inputs and management practices. Carbon sequestration can be enhanced in grasslands through grazing management, sowing favourable forage species, fertilizer application and irrigation, restoration of degraded grasslands etc.

The graph below shows the carbon sequestered by grasslands between 20–30-year period. The carbon sequestration plateau's off after 30 years may be because long-term data on carbon sequestration by grasslands is patchy or unavailable.

Figure 7: Carbon sequestered by grasslands



IMPLEMENTATION PLAN AND TIME PERIOD

Quite a few of the envisaged outcomes, outputs and activities are process-driven and require the willingness, cooperation and collective time of several stakeholders, thus making the project quite complex. Given the complexities, it is envisaged that the project may have delays due to numerous uncontrollable and unforeseen reasons. Accordingly, though funding is being sought for five years, some activities such as research, protection under an extant act and capacity building of stakeholders may require more time, hence the project would be for a period of seven years.

IMPLEMENTATION MODEL

The project will be implemented by PKC and WRCS in collaboration with Forest Department, line departments, JFMC/BMC, NGOs and funding agencies under the provisions of the tripartite agreement model of the Government of Maharashtra. The three parties to the tripartite

agreement are the land owner (Forest Department), the funding agency and the implementing agency (PKC and WRCS).

BUDGET

As stated earlier, funding is being sought for five years but to factor delays the project would be initially for a period of seven years. The total budget cost is estimated to be just below ₹50 crore (€5.2 million @€1=₹70/-) for a period of five years. However, if due to unforeseen and unfortunate circumstances, the project has to be extended beyond five years i.e. up to seven years, then the project may be given a no-cost extension. Additional Operating Costs during the extended period, if required, would be drawn from the funds generated by the project. During the five-year period, the Total Capital Expenditure is estimated to be about ₹31.18 crore and Total Operating Cost is estimated to be about ₹12.29 crore. Therefore, the Capital Expenditure to Operating Cost is in the ratio 62:38. At least 40% of the Total Capital Expenditure i.e. ₹12.47 crore would provide employment to landless labour and small and marginal farmers. The Human Resources and Administrative cost is about 28% of the total cost of the project. The budget is based on estimates of current costs of executing the project. PKC and WRCS will seek approval of funding agency and Project Steering Committee for reallocation of budget under the various sub-heads (except to the sub-heads Human Resources and Administrative Costs) if necessitated by material increases in costs including taxes and duties.

BUDGET ALLOCATIONS:

ACTIVITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL FUNDS
Developing Management Plan	1,00,00,000					1,00,00,000
Watershed Management	15,00,000	60,00,000	75,00,000			1,50,00,000
Irrigation	2,07,60,000	1,35,00,000	2,50,000	2,50,000	2,50,000	3,50,10,000
Plantation	2,63,77,298	2,45,65,949	3,97,86,816	3,07,93,314	1,14,98,408	13,30,21,785
Demarcation and Boundary		2,52,00,000	2,52,00,000	2,52,00,000	2,52,00,000	10,08,00,000
Supplementary Income Generation	25,00,000	30,00,000	45,00,000	40,00,000	40,00,000	1,80,00,000
TOTAL CAPITAL EXPENDITURE	**6,11,37,298**	**7,22,65,949**	**7,72,36,816**	**6,02,43,314**	**4,09,48,408**	**31,18,31,785**
Capacity building, training, awareness generation	25,00,000	25,00,000	25,00,000	25,00,000	25,00,000	1,25,00,000
Research and Extension	5,00,000	5,00,000	5,00,000	5,00,000	5,00,000	25,00,000
Human Resources	1,27,20,000	1,37,18,400	1,47,97,488	1,59,63,992	1,72,25,220	7,44,25,100
Equipment	75,00,000	5,00,000	2,50,000	2,50,000	1,00,000	86,00,000
Consumables	10,00,000	10,00,000	10,00,000	10,00,000	10,00,000	50,00,000
Travel	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000	1,00,00,000
Monitoring and Evaluation	12,00,000	12,84,000	28,73,880	14,70,052	30,72,955	99,00,887
TOTAL OPERATING COST	2,74,20,000	2,15,02,400	2,39,21,368	2,36,84,044	2,63,98,175	12,29,25,987
Administrative cost	1,32,83,595	1,40,65,252	1,51,73,728	1,25,89,104	1,01,01,987	6,52,13,666
TOTAL COST	10,18,40,893	10,78,33,601	11,63,31,912	9,65,16,461	7,74,48,570	49,99,71,437

HUMAN RESOURCES

Roles	no	Per month per year
Advisor	3	₹3,00,000
Program Manager	1	₹2,00,000
ecologist	1	₹1,50,000
Forester	1	₹1,20,000
Social worker	1	₹60,000
supervisor	3	₹90,000
Field assistants	7	₹1,40,000
Total		₹10,60,000

ANNEXURE 1 : STAKEHOLDERS, BENEFICIARIES AND END-USES

Stakeholder	**Stake**		**Impact**	**Influence**	**What is important to the stakeholder?**	**How could the stakeholder contribute to the project?**	**How could the stakeholder block the project?**	**Strategy for engaging the stakeholder**	**Benefits**		**End-uses**
	What is at stake for the stakeholder?	*Direct/ Indirect stake*	*Project impact them? **	*influence over the project? **					**What are the benefits of the project for the stakeholder?** *Direct*	*Indirect*	*What are the end products?*
Maharashtra State Forest Department	Land owners and custodians of forests	Direct	HIGH	HIGH	a) Ensuring nothing contrary to the laws and policies on forests and environment is carried out in the Reserve Forest.	a) Enter into a tripartite agreement with funding agency and PKC/WRCS to carry out afforestation activities.	By refusing to enter into a tripartite agreement to carry out activities on the land.	a) Get the proposal vetted to ensure it fits the mandate of the department and is in sync with the laws and policies.	a) increases forest cover including timber and NTFPs	a) helps achieve the departments mandate, obligations and commitments	The degraded land gets forest cover.
						b) supervise the project.		b) constitute Steering Committee's under the chairmanship of the Forest Department to keep them apprised of the project activities, progress and results.	b) potential to contribute to the budget of the FD as there are many sources for supplementary income through activities such as sale of timber and NTFPs and tourism.		The timber, NTFPs and tourism can provide a supplementary source of income
					b) the land should be afforested.	c) attend to encroachments, settlement of rights and cases of poaching, if any.					
						d) Enter into a agreement with local governing body (JFMC/BMC) to carry out afforestation activities.		c) keep the FD informed of any cases of encroachments, trespassing and poaching.	c) infrastructure such as demarcation (boundary wall?), roads, office space and rest houses, and irrigation facilities.		The project will construct infrastructure such as demarcation (boundary wall?), roads, office space and rest houses, and irrigation facilities.
Local Government namely Gram Panchayat and JFMC/ BMC thereunder	opportunity for additional revenue	Direct	High	HIGH	Increase in revenue of the Gram Panchayat	Support and participate in the project activities.	Not following the management guidelines? Non participation in the activities?	Involve in project by nominating a representative on the steering and monitoring committee.	strengthened capacity to manage the RF	Contributions of Forest produce towards revenue of the Gram Panchayat	Contributions of Forest produce towards revenue of the Gram Panchayat
									contribution to the local economy	improve the lives of the villagers	stake in the RF is duly acknowledged.
									increased green cover		increased green cover

					Improved quality of life of the people of the village	constitute and enable the JFMC/BMC to operate	Individuals not following the directions of the representatives	strengthen capacity of JFMC/BMC to manage the RF	Increased underground water table		Increased underground water table
									stake in the RF is duly acknowledged.		contribution to the local economy
pastorals/herders	Loss of access to fodder	Direct	High	High	Fodder	Limit grazing in the RF and follow fodder management practices	Do not cooperate and stop grazing livestock in the RF	Ensure representation in the JFMC/BMC	Increased fodder from the RF	Savings in labour, time and resources.	Increased fodder from the RF
									Increased production of meat, milk, dung (manure) and offspring due to stall feeding		Increased production of meat, milk, dung (manure) and offspring due to stall feeding
						Take up stall feeding			Increased fodder availability from outside the RF.		Increased fodder availability from outside the RF.
land-less labour	Loss of access to natural resources.	direct	High	High	opportunity for employment during and after project period	participate in the project activities	do not cooperate and stop labour from outside the village from working at the site.	Engage in project activities on daily wages.	during project period earn an income from implementation of project activities	strengthened capacity to manage tourism, collect and process NTFPs.	during project period earn an income from implementation of project activities
								capacity building and training for managing tourism, NTFP collection and processing.	after project period earn an income from tourism and collection of NTFPs		after project period earn an income from tourism and collection of NTFPs
								representation on the steering/monitoring committees.	Get access to natural resources.		Get access to natural resources.
Farmers neighbouring the RF.	possibility of human-wildlife conflicts	direct	High	High	The RF provides wood, fodder, thorns, soil and stones for agriculture.	collect and use natural resources sustainably	not allow project activities to be implemented	involve in project activities	supplementary income from project activities	natural pest control and increased pollination	supplementary income from project activities
	reduced availability of wood, fodder, thorns, soil and stones.					participate in the project activities	damage project assets	capacity building and training	increase in soil fertility due to nutrients from the forest	increase in land prices	increase in soil fertility due to nutrients from the forest
								literature and information materials	increased water-table		increased water-table
Villagers		indirect	Medium	High	Increase in income	cooperate in implementation	Not applicable	Communication	place for recreation	improve the lives of the villagers	place for recreation

	improvement in the socio-economic status				Increase in property prices				increase in property prices		increase in property prices
					improved lives of the villagers				increase in income		increase in income
					place for recreation						
Pune Municipal Corporation	opportunity to dispose wet wastes and sewage.	indirect	Low	Low	Reduced dependence of farmers and villagers on water from dams.	Could provide part funding, segregated wet waste (manure), chemical free sewage water.	Not applicable	Communication	Wet waste disposal	reduced pressure on Pune City	Wet waste disposal
					Clean air for Pune				Sewage disposal		Sewage disposal
Citizens of Pune	improved air quality and loss of potential recreational space	indirect	Medium	Low	Recreational place and clean air.	Increase tourism and spend on tourism related activities.	Not Applicable	Communication	Improved air quality	Option for investing or even moving base.	Improved air quality
					Option for residential and commercial spaces outside Pune City				Recreational place		Recreational place
State Government	The Reserve Forest Land	Direct	High	High	The State Government of Maharashtra aims to increase the forest cover in the state from the current 20% of the State's land area to the nationally mandated 33%.	Provide the requisite permissions and forward the proposal to central government for seeking funding.	By not giving the requisite permissions	The project proposal has been submitted to the State Government for scrutiny and approval.	Contributes towards the tree plantation target of the State Government.	furthers the agenda of inclusive and sustainable development	increased forest cover including timber and NTFPs.
					Increasing agricultural income and providing supplementary income to landless people through Sustainable use of resources.			SFD will chair and be represented in the monitoring and scientific/advisory committee of the project.	Leverage funding from central government/external bi, multi-lateral agencies/corporates to fulfil commitments made to the people of the State.		Increased water table in the area.
					Improving the lives of the citizens				boost in the local economy can provide to the exchequer		boost in the local economy can provide to the exchequer

National Government	contribution to commitments and obligations at both national and international levels.	Indirect	Medium	High	The project should contribute towards national goals and their targets, contribute towards to the international commitments.	The National Government can help raise the funds through international multilateral and bilateral agencies or consider funding the project itself.	The National Government may not block the project but at the same time may not evince any interest also.	The national government, especially MoEFCC will be approached for comments on the proposal and also for nominating an officer on the Steering Committee.	The project contributes towards 13 Goals and 52 targets of the Sustainable Development Goals, and 09 targets set under the Aichi biodiversity targets under CBD. At the national level the project would contribute towards 89 National Indicators for achievement of SDGs, 09 targets of National Biodiversity Targets for achievement of Aichi targets, 06 targets voluntarily envisaged under the Intended Nationally Determined Contribution towards fulfilment of our commitments to the Paris Agreement.	The project contributes towards a number of Missions/Programmes aimed at socio-economic upliftment of urban citizens while conserving the environment. These are National Development Agenda, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities Mission, Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (NRLM), Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) and National Forest Policy 1988.	A report that highlights the contributions of the project to various missions/schemes of the Government and also towards the commitments made at various international fora.
Funding Agency	The funds committed for the project	Direct	High.	High	The project achieves all its envisaged targets as per the proposed methodology in a timely and cost-effective manner.	The funding agency besides providing the funds could supervise project activities and also get physically involved by providing staff time and strengths.	The funding can be stopped.	It is proposed to have a representative on the Steering Committee and/or advisory committee. Further, the agency can participate in project activities and monitor the project as deemed appropriate.	The project can help the funding agency showcase their philanthropic initiatives.		A report that highlights the contributions of the project towards the mandate of the funding agency.
									The staff of the agency can volunteer in project activities and get respite from routine and mundane works.		
									Could help achieve the mandate of the funding agency		The funding agency can advertise its works at the project site which is close the proposed international

											airport and railway lines.
PKC and WRCS	goodwill and future sustainability	Direct	High	High	The project achieves all its envisaged targets in a timely and cost-effective manner.	PKC can bring in scientific knowledge and technical capacities and also help in raising funding. Further, PKC can monitor the project.	PKC or WRCS backing out of the project can delay the project.	PKC and WRCS are the implementers and shall be bound by an agreement which will oblige them to complete the project.	a) Showcase the organisations strength in implementing such projects	a) Help in getting more projects.	a) Staff cost and assets.
									b) contribute towards staff and office expenditure.	b) Fulfil the mandate of PKC and WRCS.	b) Seed money/capital
						WRCS will be responsible for on ground implementation and will bring in their experience in doing the same.			c) Certain amount can be used for capital (seed money) and other assets	c) Provide data for future research and analysis	c) Data for future research and analysis

Notes: * Low, Medium High

ANNEXURE 2: LOG FRAME OF THE PROJECT

	INDICATORS	TARGETS	TIME LINE	MEANS OF VERIFICATION	RISKS AND ASSUMPTIONS
OBJECTIVE : TO DEVELOP A SELF-SUSTAINING BIODIVERSITY PARK ON 1100 HECTARE OF DEGRADED RESERVE FOREST LAND IN PUNE METROPOLITAN REGION FOR CLIMATE CHANGE MITIGATION AND ADAPTATION.	**Lead to increase in natural capital use efficiency by all stakeholders and ensure implementation of integrated conservation and management plan by all sectors and stakeholders so as to protect and restore the forests.**	**The participatory approach in the planning, management and conservation of forest will help satiate all stakeholders and secure the Biodiversity Park.**			**All stakeholders are identified, participate in the planning process and eventually endorse the ICMP.**
	The Reserve Forest transforms into a self-sustaining Biodiversity Park.	**The restoration of the Reserve Forest leads to self-sustainability.**			**All activities proposed in the ICMP are executed in a manner that leads to self-sustainability of the Biodiversity Park.**
	The Biodiversity Park is protected under an extant law.	**The Biodiversity Park is notified as a protected area under an extant law.**			**All stakeholder agree to declare the biodiversity park as protected area under an extant law.**
Outcome 1: An Integrated Conservation and Management Plan (ICMP) for the biodiversity park is developed through stakeholder participation.	**The participatory approach in the planning, management and conservation of the Biodiversity Park will help satiate all stakeholders and lead to water, livelihood and environmental security of the area, its people and biodiversity.**	**The ICMP prescribes activties for the short (5 years), medium (10 years) and long (20)-terms.**	**By end of year five.**	**The ICMP**	**All stakeholders exhibit their willingness, cooperate and devote their time for drafting and reviewing the ICMP.**
	Forest Department approves the ICMP.	**The ICMP gets incorporated into the Working Plan of the Forest Department.**	**By end of year seven.**	**The working plan**	**The Working Plan comes up for re-drafting during the project period.**
Output 1: Establish a base-line for biodiversity assessment and publish inventories and report ecological changes in major biodiversity taxa such as birds, fishes, herpetofauna, insects and flora and use the same to prepare the participatory ICMP.	Baseline data of flora and flagship fauna such as mammals, birds, amphibians, reptiles and butterflies.	Base-line data is documented	Year 1	Database	The researchers are well trained and qualified to carry out the survey. The sampling methods and the sample size are robust.
	Assess the changes in flora (trees, shrubs and herbs/grasses) and fauna (mammals, reptiles, birds, amphibians, butterflies, moths and other invertebrates).	Changes in flora and fauna are submited to the Forest Department and funding agency.	Every year from year 2 onwards	Reports and database. Scientific publications.	
	Assess the soil carbon and changes in soil carbon through sampling in fixed quadrats.	Changes in soil carbon is documented and base-line established.	Every year.		
Carry out annual survey of major biodiversity taxa through ecological tools and permanent monitoring methodologies such as transects, quadrats, capture-recapture and other scientific methods.	Annual Reports on biodiversity is submitted to Forest Department and funding agency.	Yearly report on major biodiversity taxa such as birds, fishes, herpetofauna, insects and flora submitted to Forest Department and funding agency.	Every year	Reports and database. Scientific publications.	The researchers are well trained and qualified to carry out the survey. The sampling methods and the sample size are robust.
Carry out soil sampling as per methodologies suggested by IPCC.	Annual Reports on soil carbon is submitted to Forest Department and funding agency.	Yearly report on soil carbon changes submitted to Forest			

		Department and funding agency.			
Output 2: Develop a comprehensive watershed management and irrigation plan and include the same in the ICMP.	Watershed management and irrigation plan included in the ICMP			Watershed and irrigation plan	The agency developing the plan gets all required information in a timely manner
Develop a comprehensive watershed development plan through expert organisation.	Watershed management plan developed.	Watershed plan developed in year 1.	Year 1	Watershed and irrigation plan	The agency developing the plan gets all required information in a timely manner
Develop an irrigation plan for the entire area through a hydrologist/ organisation/ company.	Irrigation Plan developed.	Irrigation plan developed in year 1.			
Output 3: Socio-economic dependence and influence of stakeholders on the forests is assessed and documented in the ICMP.	Assessment of socio-economic status and dependence of local people and other important stakeholders on the forests.	50% of the people dependent on the forest are interviewed.	Year 1	Report and ICMP	The stakeholder mapping is robust and stakeholders readily share information
Conduct stakeholder analysis and mapping for identifying the needs, attitude, impacts and influence of various stakeholders.	Stakeholders mapped and their direct/indirect influence and impacts on the Forests is documented.	All stakeholders are mapped and analysed.	Year 1	Report and ICMP	* Local communities are willing to attend meetings and share information. * State government and village level govt. Agencies are cooperative and share data and reports as well as participate in meetings/interviews.
Document the local people's and other important stakeholders socio-economic status, dependence and influence on the forests.	Assessment of socio-economic status and dependence of local people and other important stakeholders on the forests.	50% of the people dependent on the forest are interviewed.			
Document stakeholder's needs and expectations especially the Forest Department and local community through socio-economic assessment.					
Engage the stakeholders especially the Forest Department and local community in developing the ICMP for the Biodiversity Park.	Stakeholders participate in drafting the ICMP.	ICMP is approved by stakeholders			
Output 4: Develop a strategy to safeguard the Biodiversity Park from encroachments, poaching and forest fire.	A strategy to safeguard the Biodiversity Park from encroachments, poaching and forest fire is incorporated in the ICMP.	ICMP has a chapter on safeguards from forest fire, encroachments and poaching.	Year 1	Report and ICMP	The funding required to execute the safeguards is available.
Delineate and map the Reserve Forest Boundary through the Department of Land Records using GPS and other satellite-based technologies.	The Forest Boundary is delineated by the Department of Land Records.	The full Biodiversity Park boundary is delineated.	Year 1	Reports and ICMP	The Forest Boundaries are clear of encroachments and forest rights issues settled.
Develop a strategy to demarcate and safeguard the Reserve Forest from encroachments, forest fires and poaching.	The Strategy to safguard the Bidoversity Park from encroachments, poaching and forest fires is included in the ICMP.	The full Biodiversity Park boundary is delineated			
Output 5: Develop an ICMP with activities, funds and time-line required to meet the various outcomes and outputs of the project in the short, medium and long term.	Forest Department and stakeholders approve the ICMP.	The participatory approach in the planning, management and conservation of forest will help satiate all stakeholders and secure the Biodiversity Park.	Year 1	ICMP	The ICMP is practical and thorough.

Draft the ICMP to inter-alia include the following: a. Literature review to understand the history of the area b. Assessment of biodiversity of the area and establishing a baseline. C. Detailed watershed assessment d. Socio-economic assessment with a focus on documenting local people dependency, potential for fodder development, supplementary livelihood options through activities such as dairy development, eco-tourism, aquaculture/ pisciculture, bee-keeping, sericulture, horticulture, NTFP (medicinal and aromatic plants) and forestry. E. Strategy to safeguard the Reserve Forest from encroachments, poaching and forest fire. F. Activities to be carried out in the short, medium and long-term with indicative budgets, time-lines, roles and responsibilities, targets and indicators.	Forest Department and stakeholders approve the ICMP.	The participatory approach in the planning, management and conservation of forest will help satiate all stakeholders and secure the Biodiversity Park.	Year 1	ICMP	The ICMP is practical and thorough.
Outcome 2: The watershed interventions, irrigation facilities and micro-irrigation is implemented to ensure survival of plants and sustainability of other activities.	**The watershed management and irrigation plan is implemented.**	**100 ha. In Year 1. 400 ha. In Year 2. 500 ha. In Year 3.**	**Year 3**	**Reports.**	**The borewells/wells have enough water.**
Output 1: Implement rain water harvesting and watershed management plans	The water table in the project site and adjoining area increases.	**100 ha. In Year 1. 400 ha. In Year 2. 500 ha. In Year 3.**	Year 3.	No. Of rain water harvesting structure built and operationalised. Increase in watertable.	The rainfall in the area is sufficient to fill the various rainwater harvesting structures at least once a year.
Construct earthen/concrete dams, farm ponds, loose boulder, gabion, contour trenches and other structures as mentioned in the management plan.	Structure as envisaged in the ICMP are constructed and operational and the water-table increases.	As per the Watershed Management Plan and increase in water table by 10% during the project period.	Year 3	Rain water harvesting structure built.	The rainfall in the area is sufficient to fill the various rainwater harvesting structures at least once a year.
Output 2: Irrigate the project site by lifting water from wells/borewells near the canals	Pipelines and water storage tanks built and operational.	As per the irrigation plans	Year 1	Area covered by pipelines	The water in wells near canals is accessible and water is sufficient throughout the year.
Construct underground/overhead tanks for storage and irrigation in the reserve forest.	Water storage tanks are built and operational	As per the irrigation plans	8 tanks of 2 lakh liters each built in Years 1 and 2.	Water tanks built and operational.	The area proposed for water tanks is accessible.
Drill bore-wells and/or dig wells within the Reserve Forest for irrigating the area and sustaining other activities.	Bore-wells, wells and storage tanks built and operational		Year 1 and 2	No. Of borewells/wells dug.	There is sufficient underground water.
Lay main and sub-main lines from the canal/wells/bore-wells.	Pipelines laid for irrigating the Park.			Area covered by pipelines	Laying of pipelines in unhindered by local community due to forest rights or encroachments

Construct renewable energy such as solar or wind powered irrigation systems.	Renewable energy systems installed and operational.			No. Of renewable energy systems installed.	Area is suitable for renewable energy systems and are secure.
Output 3: Irrigate the project sites through micro-irrigation.	Area covered under micro-irrigation	200 ha.	Throughout project period	Area covered by micro-irrigation	There is sufficient water
Use micro-irrigation systems such as rain-guns, sprinklers and drip irrigation for afforestation and fodder development.	Area covered under micro-irrigation	200 ha.	Throughout project period	Area covered by micro-irrigation	There is sufficient water
Outcome 3: Increase in biodiversity in the project site	Significant increase in sprecies richness and populations of flora and major fauna.	200% increase in biodiversity.	Year 5	Reports and publications	
Output 1: Increase in the species richness and tree density in the project site	Increase in tree density and diversity.	500 trees per hectare	Year 5	Reports and satellite imageries	The trees planted survive
Arrest soil erosion and increase soil fertility a) Digging contour trenches/pits for plantations. B) Increase soil fertility through application of compost and organic manures	Soil fertility is increased significantly and soil erosion is in check	200% increase in Soil organic carbon.	Year 5	Reports and publications	There is sufficient quantities of manures and compost readily available
Procure mature saplings and/or make nursery for saplings.	Increase in floral diversity and density.	200% increase in diversity and 500 trees per hectare.			The locals support plantation of species by controlling grazing by livestock.
Increase vegetal cover and overall productivity of the land through plantation of ecologically compatible species of trees, shrubs and grasses.					
Control invasive alien species through physical removal using excavators.	Invasive alien species population is significantly reduced.	<10% of original area covered.			The invasive alien species are controlled from areas outside the Biodiversity Park also.
Control forest fires through fire-lines, fire-watching and fire-fighting.	Negligible incidence of forest fires and preparedness for controlling the same.	<10% incidences of forest fires.			The locals do not light fires in different and more than one zone.
To ensure the survival of plantations from overgrazing, the areas may be temporarily / permanently fenced using live fencing or other means.	Population density of floral diversity in the Biodiversity Park.	>90% survival rate of plantations by Year 5.			The temporary fencing is not stolen or destroyed by people.
Output 2: Increase in species richness and abundance of major fauna	Significant increase by in species richness and abundance of major fauna such as birds, mammals, reptiles and butterflies	100% increase in species richness and abundance	Project end	Reports	The enriched flora can attract new species to the area and also help increase abundance. Poaching can be controlled.
Afforestation activities to include plantation of wild fruiting and flowering trees, shrubs and herbs for attracting mammals, birds and invertebrates.	Significant increase by in species richness and abundance of major fauna such as birds, mammals, reptiles and butterflies	100% increase in species richness and abundance	Project end	Reports and Publications	The watershed management activities and plantations actually attract biodiversity and fauna is successful in reaching the Biodiversity Park.
Promote aquaculture/pisciculture using ecologically compatible fish, crustacean species in farm ponds and dams created for watershed management. If need be, the dams and ponds could be filled with water lifted from the canal.					
Report poaching cases to Forest Department.					

Output 3: Protect the Reserve Forest from encroachments.	The boundary of the biodiversity park is delineated and safeguarded by a physical fence.	Demarcation and contruction of physical boundary.	Year 7.	Satellite imageries and Govt. Records.	There is no encroachments on the forest land and if there is any the same is removed by the Government in a timely manner. Forest Rights issues are settled in a timely manner.
Delineate the Reserve Forest boundary through physical fencing (such as metal fence, brick wall, modular-wall, barbed-wire and or chain link) digging TCM or live fence.	The boundary of the biodiversity park is delineated and safeguarded by a physical fence.	Demarcation and contruction of physical boundary.	Year 7.	Satellite imageries and Govt. Records	There is no encroachments on the forest land and if there is any the same is removed by the Government in a timely manner. Forest Rights issues are settled in a timely manner.
Outcome 4: Reduce dependency of local people on reserve forest	The dependce of local people on the forests for fuelwood, fodder and other destructive harvesting practices is drastically reduced.	> 90% reduction in the impacts of local people on the forests.	Project end.	Reports	The local people participate in the project and endorse and support the same.
Output 1: Improve quality and quantity of fuel and fodder resources.	Availability of good quality fodder and fuelwood in village common lands.	>90% reduction in grazing in biodiversity park.	Project end	Reports	The villagers cooperate by allowing the fodder and fuel wood species to establish.
Improve quality and quantity of fuel and fodder resources, bamboo and small timber in village common lands such as land belonging to Dhangar Community (Gat No. 1148 of 3.88 hectares).	Plantation and habitat management leads to increased disposable income of the local people.	>90% reduction in grazing in biodiversity park.	Project end	Reports	The local people participate in the project and endorse and support the same.
Develop fodder management practices within the reserve forest and plant improved fodder and fuel-wood species to meet requirements of local people.	Activities under the project reduces the dependence and impacts of the local people on the Biodiversity Park.				
Output 2: Encourage stall feeding of cattle and livestock	Increase in goat and sheep farms using stall feeding	50% of the livestock is stall fed.	Project end	Reports	The villagers are willing to cut fodder for the livestock and stall feed the same.
Encourage local communities to stall feed their cattle and livestock by sourcing cut grass and other fodder from the reserve forest.	Increase in livestock being stall feed.	50% of the livestock is stall fed.	Project end	Reports	The local people are open to the idea of stall feeding.
Outcome 5: Increase community participation and self-sustenance of the site is ensured	**Capacity of stakeholders is built leading to sustainable use of natural resources and local people earn significant additional income from the Biodiversity park.**	**Capacity of stakeholders especially Forest Department and local people is built to ensure sustainable use of natural resources.**	**Proejct end**	**Reports**	**The stakeholders participate in the project activities.**
		Local people earn additional income of about ₹200 per day from the forests.			
Output 1: Encourage community participation through supplementary income generation	Increase in income of local people through sustainable use of biological resources such as apiculture, sericulture, horticulture, aquaculture/ pisciculture, and sale of NTFP (medicinal and aromatic plants).	Local people earn additional income of about ₹200 per day from the forests.	Project end	Reports	The villagers participate in the project activities and are willing to undertake additional responsibilities.

Ensure supplementary income generation for local people by promoting and sustainable use of biological resources such as aquaculture/ pisciculture, bee-keeping, sericulture, horticulture, NTFP (medicinal and aromatic plants) and forestry.	Significant increase in the income of local people dependent on the forests.	Local people earn additional income of about ₹200 per day from the forests.	Project end	Socio-economic data and reports	The local people participate in the project.
Output 2: Develop eco-tourism facilities such as log-cabins, tents, restaurants/canteens, nature trails, medicinal and aromatic plants gardens and adventure sports (trekking and sport fishing).	Increase in number of tourists visiting the site and also duration of stay at the site	500-1000% increase.	Project end	Reports	Tourist attractions can be created and maintained
Encourage community participation also by developing eco-tourism facilities such as log-cabins, tents, restaurants/canteens, nature trails, medicinal and aromatic plants gardens and adventure sports (trekking, water-sport and sport fishing)	Number of tourists and the time spent by the tourists in the area increases significantly.	500-1000% increase in number of tourists and the time spent in the area.	Project end	Invoices of eco-tourism facilities.	The Forest Department and local people support the idea of eco-tourism in the area.
Output 3: Plantation of commercially important timber and NTFP species.	Increase in revenue from project site		Project end	Reports	The commercially important plants survive and are sustainably harvested.
Afforestation of the reserve forest with commercially important and ecologically compatible species of timber and ntfps such as teak, bamboo and shisham.	The Biodiversity Park is made self-sustainable through plantation of commercially important and ecologically compatible timber and NTFP species.	At-least 30% of the area is under commercially important and ecologically compatible timber and NTFP species.	Project end	Satellite imageries and data and reports.	The Forest Department and local people support the idea of planting commercially important and ecologically compatible timber and NTFP species.
Output 4: Build capacity of Forest Department staff and local communities for strengthening local self-governance and prudent natural resource use.	Organise and conduct national and international exposure visits, workshops, meetings and training programmes to build capacity.	Conduct a workshop/training programme/exposure visit once every quarter.	Project end	Reports	The Forest department staff and local community members actively participate in events.
Organise and strengthen local governance institutions such as JFMC/BMC.	The JFMC is recognised under an extant law.	Get JFMC recognised under an extant law.	Project end	Minutes of meetings and tour reports	The various stakeholders are willing to participate in the training programmes.
Conduct training programmes for Forest Department staff and local communities through national and international exposure visits, workshops, training programmes etc.	Key managers, leaders and other stakeholders are aware of their roles, responsibilities and activities to address the issues or problems afflicting the Biodiversity Park and capable of effecting the same.	Conduct a workshop/training programme/exposure visit once every quarter.			
Outcome 6: The project site is declared as protected area.	The Biodiversity Park is protected under an extant law.	The Biodiversity Park gets notified as protected area.	Year 7	Gazette notification	The Gram Panchayat/local governance institution and forest department are ready and willing to get the Biodiversity Park protected under an extant law.
Output: The project site is recognised as Conservation/Community Reserve under the Wildlife (Protection) Act, 1972 or Biological Heritage Site under the Biological Diversity Act, 2002	Declaration of the site as protected area	The Biodiversity Park gets notified as protected area	Year 7	Gazette notification	The biodiversity is enhanced to levels where the area can be declared as protected area and the villagers are willing to let the area get declared under some Act.
Encourage and motivate the Gram Panchayat and Forest Department to declare the reserve forest area as a protected area such as Conservation Reserve under the Wildlife (Protection) Act, 1972 or Biological Heritage Site under the Biological Diversity Act, 2002.	The Biodiversity Park is protected under an extant law.	The Biodiversity Park gets notified as protected area	Year 7	Gazette notification	The Gram Panchayat/local governance institution and forest department are ready and willing to get the Biodiversity Park protected under an extant law.

Ensure long-term research and training by creating state-of-the art research centre which will maintain data on parameters such as climate, soil, changes in population structures and biodiversity, ecology and natural history of flora and fauna.	State-of-the-art Research centre established	Research centre established, sustainable and operational.	Year 5	Research centre	The Forest Department maintains the research centre and the staff stay committed to the centre.

ANNEXURE 3: DETAILED BUDGET

ACTIVITY	SUB-ACTIVITY	UNIT COST	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL FUNDS
			Target	Amount	Target	Amount	Target	Amount	Target	Amount	Target	Amount	
Developing Management Plan	Biodiversity assessment Watershed management plan Socio-economic assessment Drafting the management plan Printing management plan	Lumpsum		1,00,00,000									**1,00,00,000**
Watershed Management	as per Govt. norms	₹15,000/- per ha	100 ha.	15,00,000	400 ha.	60,00,000	500 ha.	75,00,000					**1,50,00,000**
Irrigation	Mainline 8"	₹1000 per meter	3850 meters	38,50,000									**38,50,000**
	Water storage tanks	₹10 per litre	4 tanks of 2 lakh litres each	80,00,000	4 tanks of 2 lakh litres each	80,00,000							**1,60,00,000**
	Mainline 4"	₹320 per meter	5500 mtrs	17,60,000									**17,60,000**
	Sub-main 2"	₹110 per meter	15000 mtrs	16,50,000									**16,50,000**
	Microirrigation	₹50,000 per ha	100 ha.	50,00,000	100 ha.	50,00,000							**1,00,00,000**
	Repairs and maintenance	Lumpsum		5,00,000		5,00,000		2,50,000		2,50,000		2,50,000	**17,50,000**
Riparian Zone Afforestation	Plantation	278 plants per ha @₹28917/- per ha	36 ha.	10,41,012	39 ha.	11,27,763	72 ha.	20,82,024	17 ha.	4,91,589	0	0	**47,42,388**
	Maintenance and gap filling	₹33870/- per ha	Nil	0	36 ha	3,38,364	75 ha.	7,08,381	147 ha.	13,16,601	164 ha	14,05,023	**37,68,369**
Dry Deciduous Zone Afforestation	Plantation	675 plants per ha with 1200 rmt of cct @₹88038/- per ha	82 ha	72,19,116	92 ha	80,99,496	110 ha	96,84,180	65 ha	57,22,470	0	0	**3,07,25,262**
	Maintenance and gap filling	₹36431/- per ha			82 ha	9,80,720	174 ha	18,78,910	284 ha	28,03,156	349 ha	31,24,762	**87,87,548**
Thorn Forest Zone Afforestation	Plantation	1111 plants per ha with 1200 rmt of cct @₹105485/- per ha	45 ha.	47,46,825	51 ha.	53,79,735	67 ha.	70,67,495	NIL		NIL		**1,71,94,055**
	Maintenance and gap filling	₹41529/- per ha	NIL		45 ha.	6,97,905	96 ha.	12,87,939	163 ha.	19,39,307	163 ha.	14,58,796	**53,83,947**

ACTIVITY	SUB-ACTIVITY	UNIT COST	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL FUNDS
			Target	Amount	Target	Amount	Target	Amount	Target	Amount	Target	Amount	
Meadows/Grassland Development	Plantation	12000 seedlings per ha @₹75701/- per ha	15 ha.	11,35,515	26 ha.	19,68,226	30 ha.	22,71,030	NIL		NIL		**53,74,771**
	Maintenance and gap filling	₹118011/- per ha	NIL		15 ha.	2,44,350	41 ha.	5,89,200	71 ha.	8,88,164	71 ha.	6,38,328	**23,60,042**
Buffer Zone development and Afforestation	Plantation	2500 plants per ha with 1250 rmt of cct @₹137470/- per ha	89 ha	1,22,34,830	25 ha	34,36,750	89 ha	1,22,34,830	104 ha	1,42,96,880	NIL	0	**4,22,03,290**
	Maintenance and gap filling	₹55779/- per ha	NIL	0	89 ha.	22,92,640	114 ha.	19,82,827	203 ha.	33,35,147	307 ha.	48,71,499	**1,24,82,113**
Demarcation and Boundary	TCM, metal fence, brick wall, modular-wall, barbed-wire and or chain link and live fencing	Approx length 84000 running feet @₹1200 per running feet.			21000 running feet	2,52,00,000	21000 running feet	2,52,00,000	21000 running feet	2,52,00,000	21000 running feet	2,52,00,000	**10,08,00,000**
Supplementary Income Generation	Fodder development	₹10000 per ha			50 ha	5,00,000	50 ha	5,00,000					**10,00,000**
	Apiculture/Sericulture	Lumpsum						5,00,000		5,00,000		5,00,000	**15,00,000**
	Aromatic plants							5,00,000		5,00,000		5,00,000	**15,00,000**
	Aquaculture/pisciculture							5,00,000		5,00,000		5,00,000	**15,00,000**
	Eco-tourism			25,00,000		25,00,000		25,00,000		25,00,000		25,00,000	**1,25,00,000**
TOTAL CAPITAL EXPENDITURE				6,11,37,298		7,22,65,949		7,72,36,816		6,02,43,314		4,09,48,408	**31,18,31,785**
Capacity building, training, awareness generation		Lumpsum		25,00,000		25,00,000		25,00,000		25,00,000		25,00,000	**1,25,00,000**
Research and Extension		Lumpsum		5,00,000		5,00,000		5,00,000		5,00,000		5,00,000	**25,00,000**
Human Resources	Advisers	₹3,00,000 per month		36,00,000		39,60,000		43,56,000		47,91,600		52,70,760	2,19,78,360
	Project Manager	₹2,00,000 per month		24,00,000		25,68,000		27,47,760		29,40,103		31,45,910	**1,38,01,774**
	Ecologist	₹1,50,000 per month		18,00,000		19,26,000		20,60,820		22,05,077		23,59,433	**1,03,51,330**
	Forester	₹1,20,000 per month		14,40,000		15,40,800		16,48,656		17,64,062		18,87,546	**82,81,064**
	Social Worker	₹60,000 per month		7,20,000		7,70,400		8,24,328		8,82,031		9,43,773	**41,40,532**
	Supervisors (three)	₹30,000 per month per person		10,80,000		11,55,600		12,36,492		13,23,046		14,15,660	**62,10,798**
	Field Assistants (seven)	₹20,000 per month per person		16,80,000		17,97,600		19,23,432		20,58,072		22,02,137	**96,61,242**

ACTIVITY	SUB-ACTIVITY	UNIT COST	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5		TOTAL FUNDS
			Target	Amount	Target	Amount	Target	Amount	Target	Amount	Target	Amount	
Equipment	IT equipment, GPS, office furniture, car, weather station etc.	Lumpsum		75,00,000		5,00,000		2,50,000		2,50,000		1,00,000	**86,00,000**
Consumables		Lumpsum		10,00,000		10,00,000		10,00,000		10,00,000		10,00,000	**50,00,000**
Travel		Lumpsum		20,00,000		20,00,000		20,00,000		20,00,000		20,00,000	**1,00,00,000**
Monitoring and Evaluation	Monitoring Officer	₹1,00,000 per month		12,00,000		12,84,000		13,73,880		14,70,052		15,72,955	**69,00,887**
	Third party Evaluation	Lumpsum						15,00,000				15,00,000	**30,00,000**
TOTAL OPERATIONAL COST				***2,74,20,000***		***2,15,02,400***		***2,39,21,368***		***2,36,84,044***		***2,63,98,175***	***12,29,25,987***
Administrative cost	15%			1,32,83,595		1,40,65,252		1,51,73,728		1,25,89,104		1,01,01,987	**6,52,13,666**
TOTAL COST				**10,18,40,893**		**10,78,33,601**		**11,63,31,912**		**9,65,16,461**		**7,74,48,570**	**49,99,71,437**

NOTE: -

1. Applicable Taxes, if any, may need to be added to the proposed budget

2. The budget is based on estimates of current costs of executing the project. WRCS will seek approval for enhancement of the fees if necessitated by material increases in costs including taxes and duties. The cost will be restated at the end of three-year period.