

Concept Note

Enhancing Adaptive Capacity of vulnerable Communities in coastal areas of India through Integrated Mangroves Management and Promotion of Sustainable Livelihood Systems

India | NATIONAL BANK FOR AGRICULTURE AND RURAL DEVELOPMENT (NABARD)

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**GREEN
CLIMATE
FUND**

Project/Programme Title: "Enhancing Adaptive Capacity of vulnerable
Communities in coastal areas of India through
Integrated Mangroves Management and Promotion



GREEN
CLIMATE
FUND

of Sustainable Livelihood Systems”

Country/Region: INDIA

Accredited Entity: NATIONAL BANK FOR AGRICULTURE AND RURAL
DEVELOPMENT (NABARD)

National Designated Authority: MINISTRY OF ENVIRONMENT, FOREST & CLIMATE
CHANGE (MoEF&CC), GOVERNMENT OF INDIA.

Concept Note

The Green Climate Fund (GCF) is seeking high-quality projects or programmes.

Accredited entities may choose to submit a concept note, in consultation with the relevant national designated authority, to present the proposed project or programme idea in order to receive early feedback and recommendation.

Please submit the completed form to fundingproposal@gcfund.org¹

A. Project / Programme Information	
A.1. Project / programme title	Enhancing Adaptive Capacity of vulnerable Communities in coastal areas of India through Integrated Mangroves Management and Promotion of Sustainable Livelihood Systems
A.2. Project or programme	Programme
A.3. Country (ies) / region	INDIA (Coastal Regions of India)
A.4. National designated authority(ies)	MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE (MoEF&CC), GOVERNMENT OF INDIA
A.5. Accredited entity	NATIONAL BANK FOR AGRICULTURE AND RURAL DEVELOPMENT (NABARD)
A.6. Executing entity / beneficiary	Executing Entity: State Government Departments on the Concerned States and MoEF&CC Beneficiary: Vulnerable coastal communities of India
A.7. Access modality	Direct <input checked="" type="checkbox"/> International <input type="checkbox"/>
A.8. Project size category (total investment, million USD)	Micro (≤ 10) <input type="checkbox"/> Small ($10 < x \leq 50$) <input checked="" type="checkbox"/> Medium ($50 < x \leq 250$) <input type="checkbox"/> Large (> 250) <input type="checkbox"/>
A.9. Mitigation / adaptation focus	Mitigation <input type="checkbox"/> Adaptation <input checked="" type="checkbox"/> Cross-cutting <input type="checkbox"/>
A.10. Public or private	public
A.11. Results areas (mark all that apply)	<i>Which of the following targeted results areas does the proposed project/programme address?</i>
	<p>Reduced emissions from:</p> <p><input type="checkbox"/> Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)</p> <p><input type="checkbox"/> Low emission transport (E.g. high-speed rail, rapid bus system, etc.)</p> <p><input type="checkbox"/> Buildings, cities, industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)</p> <p><input type="checkbox"/> Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)</p>

¹ Please use the following naming convention for the file name: “[CN]-[Agency short name]-[Date]-[Serial number]” (e.g. CN-ABC-20150101-1).

	<p>Increased resilience of:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.) <input checked="" type="checkbox"/> Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation systems, etc.) <input type="checkbox"/> Infrastructure and built environment (E.g. sea walls, resilient road networks, etc.) <input type="checkbox"/> Ecosystems and ecosystem services (E.g. ecosystem conservation and management, ecotourism, etc.)
<p>A.12. Project / programme life span</p>	<p>...5..... years</p>
<p>A.13. Estimated implementation start and end date</p>	<p>Start: November 2016. End: November 2021.</p>

B. Project/Programme Details

The Fund requires the following preliminary information in order to promptly assess the eligibility of project/programme investment. These requirements may vary depending on the nature of the project/programme.

<p>B.1. Project / programme description (including objectives)</p>	<p>Introduction: In India nearly 100 million people living along the coastline are reliant on climate-dependent activities such as agriculture, marine fisheries and aquaculture. The livelihood security of these coastal communities and ecological security of the coastal zones of India are already under stress due to high population density, urbanization, industrial development, high rate of coastal environmental degradation and frequent occurrence of cyclones and storms. Sea level changes and occurrence of extreme events such as cyclones and storm surges are going to aggravate this problem (INCCA, 2010)². According to Aggarwal and Lal (2000)³, predicated sea level rise would lead to inundation of about 5,700 km² of land along the coastal states of India and nearly 7 million coastal families could be directly affected if the sea level increases by 1 m by 2100. Farming families, fishermen, aqua farmers and others will bear the full impacts due to sensitive livelihoods and rising risks to their health, safety and homes. Many fisheries-dependent</p>
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² Indian Network for Climate Change Assessment (INCCA) 2010 Climate change and India: a 4x4 assessment - A sectoral and regional analysis for 2030s Published by Ministry of Environment & Forests, Government of India pp – 160.

³ Aggarwal, D. and M. Lal. 2000. Vulnerability of Indian Coastline to Sea Level Rise. Proceedings of the APN/SURVAS/LOICZ Joint Conference on Coastal Impacts of Climate Change and Adaptation in the Asia-Pacific Region, APN and Ibaraki University, Ibaraki

communities already live a precarious and vulnerable existence because of poverty, lack of access to social services and essential infrastructure. The Coastal Zone Management Subgroup of the IPCC (Dronkers et al 1990)⁴ identified mangroves as one of the important ecosystems that would enhance adaptive capacity to climate change. According to this group, adaptive responses required to protect human life and property in coastal areas from climate induced problems fall broadly into three categories namely, retreat, accommodation and protection. This subgroup suggested that conservation of natural protection-value coastal resources such as mangroves and coral reefs is an important option to increase adaptation in the accommodation type of response to sea level rise. It also suggested that in the protection category of adaptive response mangroves can be raised as a soft structure to protect coastal land from increasing sea level instead of hard structures such as seawalls. It was also indicated that apart from the physical protection given by the mangroves the fishery resources associated with mangroves provide livelihood security to communities.

Considering the above, the project on conservation and management of mangrove wetlands including restoring mangroves in degraded areas and integrated sustainable livelihood systems around the mangrove areas is proposed to enhance the adaptive capacity of vulnerable communities to climate induced problems in India.

Mangroves Scenario in India

Mangrove are one among the most productive ecosystems on the earth. They serve as custodians of their juvenile stock and form most valuable biomass (Odum, 1971). The term mangroves refer to an ecological group of halophytic plant species which is known as the salt tolerant forest ecosystem and provides a wide range of ecological and economic products and services, and also supports a variety of other coastal and marine ecosystems. India with a long coastline of about 7516.6 km, including the island territories (Anonymous, 1984), has a mangrove cover of about 6,749 km², the fourth largest mangrove area in the world (Naskar & Mandal, 1999).

These mangrove habitats (69°E-89.5°E longitude and 7°N-23°N latitude) comprise three distinct zones: East coast habitats having a coast line of about 2700 km, facing Bay of Bengal, West coast habitats with a coast line of about 3000 km, facing Arabian sea, and Island Territories with about 1816.6 km coastline. In India, the states like West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Andaman and Nicobar Islands, Kerala, Goa, Maharashtra, and Gujarat occupy vast area of Mangroves. The area under mangroves in Gujarat is the second largest along the Indian coast, after Sunderbans. Gujarat has about 23 percent of India's estimated mangrove cover of 4.88 lakh ha. Of the total

⁴ Dronkers, J. T. E. Gilbert, L.W. Butler, J.J. Carey, J. Campbell, E. James, C. McKenzie, R. Misdorp, N. Quin, K.L. Ries, P.C. Schroder, J.R. Spradley, J.G. Titus, L. Vallianos, and J. von Dadelszen. 1990. Strategies for Adaption to Sea Level Rise. Intergovernmental Panel On Climate Change. Response Strategies Working Group. 147 pp

mangrove cover in the state, the coastal district of Kachchh covers almost 90%.

Mangroves in India account for about 3% of the global mangroves and 8% of Asian mangroves (SFR, 2009; FAO, 2007). About 60% of the mangroves occur on the east coast along the Bay of Bengal, 27% on the west coast bordering the Arabian Sea, and 13% on Andaman & Nicobar Islands. Mangroves are spread over an area of 4,628 square km along the coastal areas of the country. Mangrove cover has been categorised into very dense (canopy density of more than 70%), moderately dense (canopy density between 40-70%) and open mangrove cover (canopy density between 10-40%). The Very Dense mangrove comprises 1,472 sq. km (31.05 percent) of the mangrove cover, Moderately Dense mangrove is 1,391 sq. km (29.35 percent) while Open mangroves constitute an area of 1,877 sq. km (39.60 percent). The state wise coverage of the mangroves is given in the table below:

Table 1: State-wise Mangrove Coverage in India⁵

No	State/UT	Area (Sq. km)
1	Andhra Pradesh	352
2	Goa	22
3	Gujarat	1103
4	Karnataka	3
5	Kerala	6
6	Maharashtra	186
7	Orissa	213
8	Tamil Nadu	39
9	West Bengal	2097
10	Andaman & Nicobar	604
11	Daman & Diu	1.63
12	Pondicherry	1
Total		4628

It may be noted that there are two major types of ownership for mangrove wetlands in India. The first type includes mangrove wetlands owned and managed by the Forest Department and these mangroves are legally protected as Reserve Forests, Sanctuaries and National Parks. These mangroves are considered as protected mangroves. The second category includes mangroves present in the lands owned by the Revenue Department of the state government. The second category of mangroves comprise small patches of about 10 to 30 ha up to 200 to 300 ha each. These mangroves are considered as unprotected mangroves since they are not managed under any legal instruments.

The mangroves play an important role in peoples' livelihood in these areas. For examples, in West Bengal the Sundarbans mangrove forest

⁵ India State of Forest Report, 2015

protects nearly 4.44 million people living in 54 islands⁶. In Andhra Pradesh 79,400 people living in 39 villages are protected by the Godavari mangroves and 31,065 people living in 28 villages are protected by the Krishna mangroves (Ravishankar et al)⁷. In Tamil Nadu about 17,781 people living in 17 villages near Pichavaram and 37,255 people living in 26 villages near Muthupet are protected by the respective mangroves (Selvam et al 2002)⁸.

Indian mangrove supports a unique group of fungi, microbes, plants and animal species including crustaceans, molluscs, fishes, water birds and a number of endangered mammals like fruit bats, dolphin and the Royal Bengal tiger. It was reported that Indian mangroves support 3985 species of flora and fauna that includes 919 (23%) flora and 3066 (77%) of fauna.⁹

Need for Mangrove Conservation and Management

Increasing human population in coastal areas is resulting in increased pressure on mangrove ecosystems in many countries, with the growing demand for timber, fuelwood, fodder and other non-wood forest products (NWFPs) (Saenger, Hegerl and Davie, 1983). To ensure the conservation of mangroves for environmental benefits, together with a sustainable supply of various forest and other products to meet the day-to-day requirements of local people, appropriate management of mangrove ecosystems is needed. Management can also open new avenues for self-employment such as ecotourism, fishing, beekeeping and cottage industries based on mangrove forest products, helping to improve the socio-economic conditions of the local communities. (Source -Conservation and management of mangroves in India, with special reference to the State of Goa and the Middle Andaman Islands, Unasylva, Vol.51, Page41)

The proposed programme/Project:

The proposed programme/project on conservation and management of mangrove wetlands including restoring mangroves in degraded areas and integrated sustainable livelihood systems around the mangrove areas is proposed to enhance the adaptive capacity of vulnerable communities in coastal areas and would be implemented with an aim to benefit highly vulnerable communities around mangrove. **The specific objectives of the project would be:**

⁶ Aditya Ghosh, et.al, 2015: The Indian Sundarbans Mangrove Forests: History, Utilization, Conservation Strategies and Local Perception) available at <http://www.mdpi.com/1424-2818/7/2/149/pdf>

⁷ Ravishankar, T., Gnanappazham, L., Ramasubramanian, R., Sridhar, D., Navamuniyammal, M. and Selvam, V. 2004. Atlas of Mangrove Wetlands of India Part 2- Andhra Pradesh, M.S. Swaminathan Research Foundation, Chennai pp 136

⁸ Selvam, V., Gnanappazham, L., Navamuniyammal, M., Ravichandran, K.K. and Karunagarn, V.M. 2002. Atlas of mangrove wetlands of India, Part-I Tamilnadu, M.S.Swaminathan Research Foundation, India pp 100

⁹ Global Journal of Environmental Research 8 (1): 01-10, 2014: Impacts of Climate Change on Indian Mangroves: A Review Paper, S. Sandilyan

	<ol style="list-style-type: none"> 1. To assess the baseline situation and vulnerability levels due to climate change including the current coping mechanisms and adaptive strategies to development sustainable livelihood measures for coastal communities 2. Capacity building of coastal communities and stakeholders to improve adaptive capacities and climate resilient livelihood options. 3. Restoration of mangroves in the project areas and building sustainable livelihood systems for coastal communities. 4. Integration of mangroves conservation & protection and livelihood activities with earlier successful projects. <p>Under the Enhanced Direct Access (EDA), the programme aims to implement projects in various states like Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha and West Bengal. Mangroves need protections from natural disasters such as sea intrusions, cyclones, tsunami, etc., strike year after year in these coastal areas.</p>
<p>B.2. Background information on project/programme sponsor</p>	<ul style="list-style-type: none"> • The Government Departments concerned at central and state government level are having necessary technical, managerial and infrastructure capability for implementation of mangrove conservation and management and associated livelihood interventions proposed under the project. • Under EDA the capability of individual project executing entity would be evaluated to ascertain project implementation capacities. • The ongoing or completed successful projects will be analysed to integrate their activities in the current programme so that sustainability of interventions can be ensured with maximum participation of stakeholders. • Financial resources of GCF will be allocated mainly for creation of public goods and enhancing capabilities of local communities. • The existing Government support for mangrove management will be converged with the project interventions for larger coverage.
<p>B.3. Market overview</p>	<p>The projects, will work with fisherman community and farmer organisations and producer groups (focusing on women and youth) to create sustainable and fair market linkages for various for livelihood interventions proposed. The project will engage with established marketing networks in the states and local regions. Finance and insurance services for fisheries, agriculture and related service provision could also be leveraged for sustainability of outcomes under the projects.</p>
<p>B.4. Regulation, taxation and insurance</p>	<p>India is endowed with mangrove forests both on the east and west coasts as well as in its island territories. There are two major types of ownership for mangrove wetlands in India. The first type includes mangrove wetlands owned and managed by the Forest Department and these mangroves are legally protected as Reserve Forests, Sanctuaries and National Parks. The second category includes mangroves present in the lands owned by the Revenue Department of the state government.</p>

	<p>For individual project under EDA, necessary state and central legal framework for conservation and management of mangroves would be followed.</p>
<p>B.5. Implementation arrangements</p>	<p>Institutional Mechanism for Implementation of Projects:</p> <ul style="list-style-type: none"> • The Nodal Dept. responsible for mangrove conservation and development in the concerned State will submit the project with all relevant details (vulnerability assessment, baseline survey, proposed interventions) to the DAE for further sanction at National Designated Agency level. So executing entity will be the nodal departments at State Government level. • The ongoing or completed successful projects will be analysed to integrate their activities in the current programme so that sustainability of interventions can be ensured with maximum participation of stakeholders. • Financial resources of GCF will be allocated exclusively for creation of public goods and enhancing capabilities of local communities. • The existing Government support for mangrove management will be converged with the project interventions for larger coverage. • Project oversight, review & monitoring by state level steering committee • Project handholding support for proposal development, monitoring and evaluation (including 3rd party evaluation) by NABARD as NIE • Project sanctioning, policy guidance, review and monitoring by MoEF&CC.

C. Financing / Cost Information	
<p>C.1. Description of financial elements of the project / programme</p>	<p>The project intervention under the project include the following:</p> <ol style="list-style-type: none"> 1. Participatory Rural Appraisal to assess the baseline situation and vulnerability levels and arrive at adaptation measures 2. Entry point activities to ensure community participation the project 3. Capacity building of stakeholders to improve adaptive capacities and understanding of climate resilient livelihood options 4. Restoration of mangroves in the project areas 5. Building sustainable livelihood systems for coastal communities. 6. Knowledge Management <p>Restoration of mangroves will be taken up in degraded, saline and unprotected mangrove areas which it will serve as a model for management of similar areas of mangroves. Restoration of degraded mangroves will be undertaken with native multiple mangrove species that will improve the</p>

health of the mangrove forest, which in turn, will avoid ingression of seawater and provide protection from storm surges. The mangrove ecosystem will also help to build the land through sedimentation of suspended solids in the root zone preventing exposure of land, water, other coastal resources and livelihood assets to saline water inundation.

Project outlay of each project under EDA would be US\$ 2.25 to 3.0 million (INR 150 to 120 million) and total outlay of EDA - GCF support requirement under the project **US\$ 20 million (i.e. INR 1320 million @ 1INR=66 USD) as grant.**

The co-funding under the project is expected from respective State Government Departments in kind form in terms of manpower support for project execution as well as convergence with existing programme.

The public goods nature of the proposed projects under EDA entails no revenue-generation or cost-recovery. Therefore 100% grant resources are sought for the proposed project.

		Financial Instrument	Amount	Currency	Tenor	Pricing
C.2. Project financing information	Total project financing (a) = (b) + (c)		.....20.....	<u>million USD (\$)</u>		
	(b) Requested GCF amount	(i) Senior Loans	.....	<u>Options</u>	() years	() %
		(ii) Subordinated Loans	.....	<u>Options</u>	() years	() %
		(iii) Equity	.....	<u>Options</u>		() % IRR
		(iv) Guarantees	.....	<u>Options</u>		
		(v) Reimbursable grants *	.....	<u>Options</u>		
		(vi) Grants *	.....20.....	<u>million USD (\$)</u>		
	<i>* Please provide detailed economic and financial justification in the case of grants.</i>					
	Total Requested (i+ii+iii+iv+v+vi)		.....20.....	<u>million USD (\$)</u>		
		Financial Instrument	Amount	Currency	Name of Institution	Seniority

	(c) Co-financing*	Options	.....	Options	.....	Options
		Options	.....	Options	.....	Options
		Options	.....	Options	.....	Options
		Options	.....	Options	.....	Options
		Lead financing institution:--.....				
	(d) Covenants	nil				
	(e) Conditions precedent to disbursement	nil				

* During the DPR development stage the details on possible cofunding in terms of manpower cost and use of existing infrastructure of executing departments as well as possible contribution from beneficiaries, if any, would be worked out and incorporated under project financial arrangements.

D. Expected Performance against Investment Criteria

Please explain the potential of the Project/Programme to achieve the Fund's six investment criteria as listed below.

<p>D.1. Climate impact potential <i>[Potential to achieve the GCF's objectives and results]</i></p>	<ul style="list-style-type: none"> • The project is expected help in creating carbon sink due to restoration of mangroves and promotion of sustainable livelihoods in the project region as an adaptation co-benefit. The quantification details on the same would be arrived during detailed project report reparation. • Direct impact on livelihoods of people due to improved livelihood opportunities • Indirect impact due to mangrove restoration on salinity reduction, increased income opportunities, reduced impact of storm surges, income opportunities to the landless • Protection and conservation of biodiversity is one of important impact expected form the project. • Details on number of direct and indirect beneficiaries would be arrived during the project implementation.
<p>D.2. Paradigm shift potential <i>[Potential to catalyze impact beyond a one-off project or programme investment]</i></p>	<p>Adaptation Logic: Enhanced climate resilient development in the most vulnerable areas of the states to ensure sustainable livelihoods In the baseline scenario, generally coastal areas and communities are prone to multiple hazards such as cyclones, floods, storm surges and tsunamis. In addition, the predicted sea level rise due to climate change increases vulnerability in at least three ways; (i) permanent submergence of some of the coastal areas, which leads to permanent loss of coastal habitats, human settlements and shoreline infrastructure; (ii) impact due to changed high tide line due to sea level rise, which results in periodical inundation of seawater into non-saline lands including agriculture areas and coastal aquifers and (iii)</p>

	<p>exposure to increased intensity of cyclones and associated storm surges.</p> <p>The project would result in the following positive externalities:</p> <ul style="list-style-type: none"> • <i>Issues:</i> Out migration of vulnerable community members results in family disintegration, drudgery for women and school dropouts. <i>Impact due to Project:</i> Improved livelihood opportunities and increased household income will assist to relieve these conditions over time • <i>Issue:</i> Lack of collectiveness and capability to address the emerging socio-economic and environmental threats. <i>Impact due to project:</i> Improved village level organization and training will assist the communities to gain confidence and find solutions • <i>Issue:</i> Land and water resources remain degraded and unproductive. <i>Impact due to project:</i> Project investments will directly rehabilitate unproductive areas • <i>Issue:</i> Productive lands and fresh water resources, both surface as well as groundwater, becoming more saline and getting degraded over time. <i>Impact due to project:</i> Project investments will directly improve these conditions. • <i>Issue:</i> Natural and social systems remain exposed to vulnerabilities. <i>Impact due to project:</i> Project investments will improve the community's capacity to improve and manage the local natural resources on a sustainable basis.
<p>D.3. Sustainable development potential [Potential to provide wider development co-benefits]</p>	<p><i>Economic co-benefits:</i> Employment opportunities in the form of wage labour will be created during the course of project implementation. The restoration of mangroves will help to improve the fish catch by enhancing fish breeding and feeding grounds and habitat for various aquatic species, as well as birds, reptiles and mammals. Significant economic benefits arise from the protective function provided by the restored mangroves including protection from natural hazards, carbon sinks and preventing coastal erosion and soil degradation.</p> <p><i>Social co-benefits: the following indirect social benefits are expected.</i></p> <ul style="list-style-type: none"> - <i>Improved access to education</i> - <i>Improved health and safety</i> <p><i>Environmental co-benefits</i></p> <ul style="list-style-type: none"> - <i>Improved soil quality</i> Soil health would improve due to promotion of sustainable agriculture practices. - <i>Improved biodiversity</i>

	<p>The project would have substantial impact of maintaining the bio-diversity.</p> <p><i>Gender-sensitive development impact</i></p> <p>The project aims to stabilize the incomer for fish farming systems which is declining. The workers are women marginal workers who depend on these activities and their jobs and income will be stabilized due to the project. In addition, the capacity building investments for alternative livelihoods for landless and women household would create substantial livelihood impact.</p> <p>Sustainability of mangrove restoration immediately after the project will be ensured by empowered village level institutions that will be established. During the last phase of the project, village level institutions and local self-government will prepare a joint management plan for sustaining the restored mangroves. The process of preparing joint mangrove management plan involves analysis of the restoration status and issues for sustainability, a joint visit to the site and identification of concerns and anticipated problems, identification of management activities to be carried out, timeline and the finance required and roles and responsibilities of different stakeholders.</p>
<p>D.4. Needs of recipient</p> <p><i>[Vulnerability to climate change and financing needs of the recipients]</i></p>	<p>India is a large developing country with diverse climatic zones. The livelihood of the vast population is dependent on climate-sensitive economic sectors like agriculture, forestry and fisheries. Climate change vulnerability and climate change impact studies in India assume a high degree of uncertainty in the assessment due to limited understanding of many critical processes in the climate system, existence of multiple climatic and non-climatic stresses, regional-scale variations and nonlinearity. The costs of not addressing climate change or to adapt to it are very uncertain, but their consequences are enormous.</p> <p>The Coastal Zone Management Subgroup of the IPCC (Dronkers et al 1990)¹⁰ broadly divided the adaptability responses to sea level rise into three categories namely, (i) retreat, (ii) accommodation and (iii) protection. Mangroves play an important role both in the accommodation and protection categories of adaptive responses to sea level rise, cyclones and storm surges. Recent research indicates that a platform of coastal wetlands such as mangroves and salt marshes rises with the rate of sea level rise¹¹. As a result, entry of seawater inland is prevented by these wetlands and this clearly indicates that diverse mangroves and other coastal wetlands can act as first line of defense against sea level rise, as well as cyclone and storm surges.</p>

¹⁰ Dronkers, J. et al.,1990. Op cit.

¹¹ McIvor, A.L., Spencer, T., Möller, I. and Spalding. M. (2013) The response of mangrove soil surface elevation to sea level rise. Natural Coastal Protection Series: Report 3. Cambridge Coastal Research Unit Working Paper 42. Published by The Nature Conservancy and Wetlands International. 59 pages. ISSN 2050-7941.

	<p>It is well established that an established mangrove wetland is rich in bio-resources such as fish, prawns and crabs and may provide livelihood security for poor and often landless fishers. However, many of the mangrove areas are managed for the purpose of coastal protection only, mostly from a forestry-only point of view. The values of the mangroves in small-scale fisheries and their role as nursery grounds for fish, prawns and crabs are largely ignored. Thus, there is an urgent need for augmentation of fishery resources potential of mangroves to enhance the livelihood security of coastal fishing families. Restoring and sustaining mangrove wetlands – which is the dominant wetland in tropical coastlines – and augmenting its fishery resources, could be an important strategy both to mitigate the impact of sea level rise as well as to enhance the adaptive capacity of local communities.</p> <p>The protection of mangroves in the areas of 4600 sq. km would require substantial resources.</p>
<p>D.5. Country ownership <i>[Beneficiary country ownership of project or programme and capacity to implement the proposed activities]</i></p>	<ul style="list-style-type: none"> • As per the 2008, National Disaster Management Guidelines for Cyclone and Tsunami Management by the National Disaster Management Authority, establishing mangroves is listed as one of the interventions for disaster management. • NATCOM report 2004 stated that rising sea levels will cause salinization of land and water resources, displacement along one of the most densely populated coastlines and measures needs to be taken up to reduce impact of such CC induced problems. • National Action Plan on Climate Change (NAPCC) identifies eight national missions to provide multi-pronged and integrated framework for addressing climate change, focusing on adaptation/mitigation, energy efficiency and natural resource conservation and capacity building/stakeholder involvement on climate change issues. • Under the National Mission on Sustainable Agriculture (NMSA), developing mangrove and non-mangrove bio-shields to minimize the impact of coastal storms and seawater inundation is one of the mission interventions suggested. • Management and conservation of mangroves has also been identified as an important intervention to tackle the problem of sea level rise, saline water ingress, increased storm surges on account of climate change. <p>The state concerned departments are capable of the implementation of mangrove restoration activities through the involvement of communities and research institutions. India has vast network of research institutions to provide technical guidance for mangrove conservation and associated livelihoods.</p>

	<p>The project formulation would involve wider community consultations and stakeholder engagement in project designing and execution.</p>
<p>D.6. Effectiveness and efficiency <i>[Economic and financial soundness and effectiveness of the proposed activities]</i></p>	<p>Following key characteristics of the programme would considerably enhance its cost effectiveness:</p> <ol style="list-style-type: none"> 1. The major project components viz. mangrove restoration are highly replicable under similar conditions in the coastal region of the country. 2. The project provides the most suitable livelihood option to the beneficiaries, thereby ensuring sustainable livelihoods. 3. Locally available mangrove and fisheries species, that are adaptable to the local conditions, are being promoted. 4. Participation of experienced CSOs and community right from inception of the project makes it community driven with high level of local ownership. 5. Being cost effective, government departments would evince interest in up-scaling of the project through various programmes. <p>An important criterion that favours mangroves as a first line of defense against sea level rise is the economic benefits of mangroves, including the availability of commercially important wood and non-wood products and aquatic products such as fish, prawn, crab, mussel and oysters. The annual economic values of mangroves, estimated by the cost of the products and services they provide, have been estimated to be (\$200,000-\$900,000 equivalent) per ha (Gillman et al 2006¹²). An estimate indicates that the value of Malaysian mangroves with respect to storm protection and flood control alone would be around (\$300,000) per km, which is based on the cost of replacing the mangroves with rock walls. It has been estimated that a hectare of mangroves is worth \$9,900 per year not just in fish production but also nutrient recycling, as a carbon sink, coastal protection, etc. (Costanza 1997¹³).</p>

¹² Gilman, E., Van Lavieren, H., Ellison, J., Jungblut, V., Wilson, L., Areki, F., Brighthouse, G., Bungitak, J., Dus, E., Henry, M., Sauni, I. Jr., Kilman, M., Matthews, E., Teariki-Ruatu, N., Tukia, S. and K. Yuknavage. 2006. Pacific Island Mangroves in a Changing Climate and Rising Sea. UNEP Regional Seas Reports and Studies No. 179. United Nations Environment Programme, Regional Seas Programme, Nairobi, KENYA.

¹³ Gunawardena, M. and Rowan, J.S. 2005. Economic valuation of a mangrove ecosystem threatened by shrimp aquaculture in Sri Lanka. Environmental Management 36: 535–550.

Convergence with the government schemes will be made during the project implementation for potential future upscaling

Mangroves are public goods and hence the output from restoration and conservation of mangroves does not envisage capital cost recovery from the project's direct and indirect beneficiaries during the project duration. Hence, a detailed financial analysis to compute financial returns is not required. However, the project would result in substantial positive economic benefits to the coastal communities.

E. Brief Rationale for GCF Involvement and Exit Strategy

Please specify why the GCF contribution is critical for the project/programme.

Please explain how the project/programme sustainability will be ensured in the long run, after the project/programme is implemented with support from the GCF and other sources.

- The coastal communities are increasing exposed to the impact of climate change such as sea level rise, salinity ingress, increased intensity and frequency of cyclones and storm water surges. Mangroves are proved to be one of important and cost effective measures to protect the coastal communities and sustain their livelihoods. The mangroves are important assets in-terms of their linkages with the coastal livelihood systems, biodiversity and defence mechanism against climate change impacts.
- India has vast coast line and the areas under mangroves are to the extent of 4628 sq km. The conservation and protection of mangroves require substantial financial resources.
- The project is under public goods category and require grant support for restoration, conservation and management of mangroves and associated livelihoods.
- GCF support under Enhanced Direct Access (EDA) would be critical to demonstrate the implementation these measures across various coastal regions of India for mainstreaming the approach.

F. Risk Analysis

The project is basically aimed at providing opportunity to marginalised community living in the programme area participation in decision making processes in project implementation s as well as to enhance their livelihood and income and as such will not have any adverse impact on other marginalised and vulnerable groups.

The project activities are also aimed at conservation of mangroves and thereby protect natural environment and biodiversity. Restoration of mangroves is envisaged to help in land and soil conservation and will not create any damage to land and soil resources.

The project implementation would include grievance redressal provision for addressing any social and environmental policy violation. Periodic Monitoring – on-site and off-site for verification of expenditures, Social audit through transparency and display of project information on sanction and progress at public places and annual project auditing and accounting are expected to mitigate financial risk, if any, that may encounter during implementation of project.

G. Multi-Stakeholder Engagement

NABARD as NIE has been implementing a project on “Conservation and Management of Coastal Resources as a Potential Adaptation Strategy for Sea Level Rise” under Adaptation Fund. The project has been under implementation since July 2015. The aim of the project is to overcome the consequences of salinization and other impacts of the coastal area due to sea level rise and seawater inundation due to increased cyclonic storms and storm surges through appropriate adaptation strategies such as restoration of degraded mangroves and demonstration of Integrated Mangrove Fishery Farming System. During, the primary stakeholder consultations under this project (done during 2013 and 2014) the fishing community (the poorest and most vulnerable of the residents) requested the development of a mangrove bio-shield as one of the major options to reduce their vulnerability to cyclones and sea level rise. They also expressed the need for lower input cost in capture and culture fishery, and diversification of income sources as measures to increase their adaptive capacity. Women in the coastal villages stated that salinization of the ground water has increased their work in obtaining fresh water. They are fetching drinking water from far off places, especially during summer. The mangrove plantation in the degraded area might help to reduce the saline water intrusion and slow the salinization process in the future. (<https://www.adaptation-fund.org/project/conservation-and-management-of-coastal-resources-as-a-potential-adaptation-strategy-for-sea-level-rise/>).

The project would also capture learnings from project viz. “[Mainstreaming Coastal and Marine Biodiversity Conservation into Production Sectors in Sindhudurg Coast in Maharashtra State of India](#)”. The project, being implemented by UNDP in partnership with the Ministry of Environment and Forests and financed by the Global Environment Facility, aims to mainstream biodiversity conservation into Sindhudurg coastal district’s production sectors. It also seeks to generate awareness among local communities on biodiversity conservation amidst the threat of unsustainable fishing practices, rising pollution from fishing vessels and maritime traffic in the region.

During the project DPR development stage a detailed stakeholder engagement / discussion would be done at the primary and secondary stakeholders level.

H. Status of Project/Programme

- 1) A pre-feasibility study is expected to be completed at this stage. Please provide the report in section J.

Based on the initial feedback from GCF Secretariat on the project a pre-feasibility study can be taken-up as per the requirement. Detailed feasibility study would be taken-up during the DPR development stage.

- 2) Please indicate whether a feasibility study and/or environmental and social impact assessment has been conducted for the proposed project/programme: Yes No
(If 'Yes', please provide them in section J.)
- 3) Will the proposed project/programme be developed as an extension of a previous project (e.g. subsequent phase), or based on a previous project/programme (e.g. scale up or replication)? Yes No
(If yes, please provide an evaluation report of the previous project in section J, if available.)

I. Remarks

Based on the initial feedback from GCF Secretariat any further details/ clarifications, if required, would be submitted to supplement the concept note.

J. Supporting Documents for Concept Note

- Map indicating the location of the project/programme
- Financial Model
- Pre-feasibility Study
- Feasibility Study (if applicable)
- Environmental and Social Impact Assessment (if applicable)
- Evaluation Report (if applicable)