

Funding Proposal

FP084: Enhancing Climate Resilience of India's Coastal Communities

India | United Nations Development Programme (UNDP) | Decision B.21/34

28 November 2018



**GREEN
CLIMATE
FUND**



Funding Proposal

Version 1.1

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: Enhancing Climate Resilience of India's Coastal Communities

Country/Region: India

Accredited Entity: United Nations Development Programme

Date of Submission: Initial submission 4 April 2017, 1st Resubmission 1 August 2017, 2nd Resubmission 16 October 2017, 3rd Resubmission 3 November 2017, 4th Resubmission 26 November 2017, 5th Resubmission 29 November 2017, 6th Resubmission 14 December 2017, 7th Resubmission 10 April 2018, 8th Resubmission 26 April 2018, 9th Resubmission 24 May 2018

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Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

A.1. Brief Project / Programme Information		
A.1.1. Project / programme title	Enhancing climate resilience of India's coastal communities	
A.1.2. Project or programme	Project	
A.1.3. Country (ies) / region	India	
A.1.4. National designated authority (ies)	Ministry of Environment, Forest and Climate Change, Government of India	
A.1.5. Accredited entity	United Nations Development Programme	
A.1.5.a. Access modality	<input type="checkbox"/> Direct <input checked="" type="checkbox"/> International	
A.1.6. Executing entity / beneficiary	<p>Executing Entity: Ministry of Environment, Forest and Climate Change, Government of India</p> <p>Direct – Approx. 1,744,970 people (of whom 50% female) in 24 target landscapes Indirect – 10 million people in 24 target landscapes benefitting from improved shoreline protection in 12 coastal districts of Andhra Pradesh, Maharashtra and Odisha States</p>	
A.1.7. Project size category (Total investment, million USD)	<input type="checkbox"/> Micro (≤ 10) <input type="checkbox"/> Small ($10 < x \leq 50$) <input checked="" type="checkbox"/> Medium ($50 < x \leq 250$) <input type="checkbox"/> Large (> 250)	
A.1.8. Mitigation / adaptation focus	<input type="checkbox"/> Mitigation <input type="checkbox"/> Adaptation <input checked="" type="checkbox"/> Cross-cutting	
A.1.9. Date of submission	Initial submission 4 April 2017, 1 st Resubmission 1 August 2017, 2 nd Resubmission 16 October 2017, 3 rd Resubmission 3 November 2017, 4 th Resubmission 26 November 2017, 5 th Resubmission 28 November 2017, 6 th Resubmission 14 December 2017, 7 th Resubmission 10 April 2018, 8 th Resubmission 26 April 2018, 9 th Resubmission 24 May 2018	
A.1.10. Project contact details	Contact person, position	Srilata Kammila Regional Technical Specialist - Adaptation
	Organization	United Nations Development Programme
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	Telephone number	+66 2 304 9100 ext. 5264
	Mailing address	United Nations Service Building, Rajdamnern Nok Avenue, Bangkok 10200 Thailand
A.1.11. Results areas <i>(mark all that apply)</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 and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)</p> <p><input checked="" type="checkbox"/> Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)</p> <p>Increased resilience of:</p> <p><input checked="" type="checkbox"/> Most vulnerable people and communities</p>		

- (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.)
- Health and well-being, and food and water security**
(E.g. climate-resilient crops, efficient irrigation systems, etc.)
- Infrastructure and built environment**
(E.g. sea walls, resilient road networks, etc.)
- Ecosystem and ecosystem services**
(E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

1. The proposed project supports the Government of India to enhance the resilience of vulnerable coastal communities to climate change through ecosystem-based adaptation (EbA). The project combines GCF grant finance with significant leveraged co-finance to shift the paradigm towards a new approach integrating ecosystem-centred and community-based approaches to adaptation into coastal management and planning by the public sector, the private sector and civil society. This will be achieved through investing in ecological infrastructure to buffer against climate-induced hazards, especially storm surges, supporting climate-resilient coastal livelihoods, and enhancing climate-risk informed cross-sectoral planning and governance of the coastal zone.
2. The project objective is to enhance the resilience of the lives and livelihoods of the most vulnerable populations, particularly women, in the coastal areas of India to climate change and extreme events, using an ecosystem-centred and community-based approach. This will contribute to the GCF's Fund Level Impacts of increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions, and improved resilience of ecosystems and ecosystem services, as well as reduced emissions from sustainable land use and forest / ecosystem management. In addition, the proposed project will contribute towards the achievement of climate priorities outlined in India's National Action Plan on Climate Change (2008), the State Action Plans, as well as commitments outlined in India's Nationally Determined Contribution (2015). The project will be aligned with India's emerging strategic investment priorities for GCF funding, which are currently being identified through a consultative process, reflecting the priorities in the aforementioned policies; and will also be aligned with the work program of UNDP as an Accredited Entity of the GCF.
3. GCF and other leveraged resources will be used at national, state, and community levels to enhance capacities for ecosystem- and community-based approaches to climate change adaptation and enable climate policy and finance shifts to catalyse climate action in all of India's coastal States and Union Territories. Specific ecosystem-based adaptation and climate-adaptive livelihood interventions will be undertaken in the target states of Andhra Pradesh, Maharashtra and Odisha, with pathways to replication and scale across all coastal states, and learning shared across the South Asian region. The project yields sustainable development benefits across coastal districts of the three target states, with more than 1,700,000 direct beneficiaries in the target landscapes whose households' current livelihoods are affected by climate change and will benefit from livelihoods activities through the project, and 10 million indirect beneficiaries living in these landscapes, who will benefit from the mitigation of economic damages and losses associated with extreme weather events, especially storm surges that can cause coastal flooding and erosion. The proposed investment demonstrates a high degree of economic efficiency, with an economic rate of return in excess of 20% for livelihood activities, of approximately 26% for paddy rice activities, and well above 30% in most coastal protection activities. The project was designed through extensive stakeholder consultations, including engagements with civil society role-players, that influenced the development of the proposal. A formal review of the funding proposal was undertaken by a Technical Working Group, including representatives of the MoEFCC and the three State Governments. Following revisions, a Project Appraisal Meeting was held in March 2017, including these implementing partners, technical experts and representatives of civil society, at which the final submission package, including all annexes, was approved, and arrangements were discussed for project implementation and operations and maintenance post-project. Following the appraisal meeting, the NDA issued a letter of no objection.

A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	4 April 2017
Expected financial close (if applicable)	TBD [Date of agreement on the FAA between UNDP and GCF]

Estimated implementation start and end date	Start: <u>01/01/2019</u> End: <u>31/12/2024</u>
Project/programme lifespan	30 years ¹

¹ This is the period over which the carbon sequestration benefits of ecosystem restoration have been calculated.

B.1. Description of Financial Elements of the Project / Programme

4. The cost of implementing the project to enhance climate resilience of vulnerable target coastal communities is estimated at \$130.27 million over the period 2019 to 2024. The GCF input of \$43.42 million will cover 33% of the costs, with the remaining 67% coming from leveraged co-financing of \$86.85 million. A grant financing mechanism is sought to support the prioritized interventions of this project. The Government of India seeks grant funding for the proposed urgent ecosystem-based adaptation interventions that will enhance the public good and benefit vulnerable communities in the coastal zones of Andhra Pradesh, Maharashtra and Odisha. This large-scale project will advance climate change adaptation across India's coastal zone, with major gains for resilience in the three target States whose coastal populations are vulnerable to extreme events and slow onset climate impacts. Historically, the focus in India, as in most countries, has been on engineering-based solutions to climate challenges, such as building concrete structures to directly increase protection from waves and flooding. However, ecosystem-based solutions are increasingly being recognized worldwide² as cost-effective approaches with additional co-benefits for enhancing climate-adaptive livelihoods.
5. The project also establishes pathways to scale for ecosystem-based adaptation across all of India's 13 coastal states, islands and union territories, where coastal districts house 14.2% of India's total population, according to India's Nationally Determined Contribution. As stated in the NDC, the country has been identified as one of the most vulnerable to the impact of accelerated sea level rise, with other climate hazards including more frequent and intense tropical cyclones and associated storm surges, as well as periodic droughts³. The lives and livelihoods of coastal communities in the targeted states are being impacted by climate change – including slow-onset impacts of sea level rise, ocean warming and acidification, already observed changes in temperature and rainfall patterns, and extreme weather events such as intensified cyclones causing storm surges, with flooding and erosion. Without the GCF project, baseline development investments will have decreasing success in delivering the expected development gains in the coastal zone because of current and future climate change impacts that are compounding the underlying vulnerabilities. Other initiatives in coastal areas, both ongoing and completed, are either rooted in integrated coastal zone management (e.g. the World Bank-financed Integrated Coastal Zone Management Project) without explicitly focusing on climate risks, or address climate risks through an engineering approach favouring “hard” infrastructure as a buffer against storm surges and sea level rise (e.g. the ADB-funded Sustainable Coastal Protection and Management Investment Programme). Existing initiatives relying on hard, engineered solutions will fail to harness the potential of coastal ecosystems for adaptation – firstly, to buffer extreme events and secondly, to provide sustainable alternatives to fishing and farming livelihoods threatened by climate change.
6. The ecosystem-based adaptation (EbA) interventions to be implemented through this project are in support of the public good, since whole coastal populations will benefit from shoreline protection. In addition, restoring coastal ecosystems will help support new livelihoods for poor fishing and farming communities threatened by slow onset climate impacts. The GoI is currently investing in socio-economic development in the coastal states of India to address poverty and promote rural development. However, these investments are being undermined by the impacts of climate change, resulting in diminishing development gains (see Section C.2 of this Full Proposal and Section 4 of the Feasibility Study – Annex II). Through co-financing this project, government at national level and in the three target states is making a commitment to integrating climate risk management into coastal development. Currently, however, the public sector lacks the knowledge and technical capacity to pursue an ecosystem-based approach to adaptation, and to engage the private sector and civil society in these efforts. The GCF investment will enable this paradigm shift, embedding a new ecosystem- and community-based approach to coastal adaptation in the way India's coast is managed. This transformational aim is reflected in the GoI's commitment to funding operations and maintenance on an ongoing basis post-project. Given that the proposed interventions do not lend themselves to financial reflows back to private sector investors, the GoI or the GCF, there will not be large-scale generation of revenue or recovery of costs. Instead, the expected small-scale financial returns that will be generated from investments into livelihood diversification will largely be experienced at the local (household and community) level, and will underpin the financial viability and sustainability of the climate-adaptive livelihoods that will be promoted through the project.

² See, for example, Rao N.S. et al. 2013. An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands. SPREP Technical Report. Apia, Samoa.

³ Government of India (2015) *India's Intended Nationally Determined Contribution: Working Towards Climate Justice*, p.23

7. GCF resources are thus sought to invest in public goods that will result in a paradigm shift in coastal zone management in India. The proposed project will promote climate-adaptive livelihoods for vulnerable coastal communities in the target states – with an emphasis on women as beneficiaries – as well as build adaptive capacity through restoration of ecosystems that buffer against the impacts of current and future climate change. GCF funds and co-finance will be used to address several barriers that constrain EbA and climate-resilient development initiatives in India's coastal states. These barriers include: i) inadequate information on climate vulnerabilities for medium- to long-term local-level adaptation planning and investments; ii) limited understanding of the potential for EbA to enhance adaptive capacity as well as limited technical capacity and financial resources for investment in planning and implementing EbA interventions; iii) limited technical and financial capacity for communities to adopt climate-adaptive livelihood opportunities; iv) weak linkages in climate-resilient value chains for commodities underpinned by coastal ecosystem goods and services; and v) limited institutional capacity for mainstreaming climate change into coastal zone planning, governance and finance (see further detail in Section C2).
8. Without GCF resources and leveraged co-finance, communities in the coastal zone of India will remain vulnerable to the impacts of climate change on their lives and livelihoods. This will exacerbate exposure to climate change-intensified extreme weather events and worsen levels of poverty and food insecurity, undermining development efforts undertaken by the GoI and other development agencies. Without the intervention, households dependent on fishing or farming will remain vulnerable to slow onset impacts of climate change, particularly women, youth and socially marginalized groups (legally categorized as Scheduled Castes, Scheduled Tribes and Other Backward Classes) – will be specifically targeted, based on the detailed vulnerability assessment conducted in Activity 1.1 and applied at community level in Activity Extreme weather events are likely to prove particularly devastating for vulnerable community members such as the very poor, the elderly and people with disabilities, and slow-onset impacts like drought will have a disproportionate impact on women and marginalized population groups, including those classified legally as Scheduled Castes, Scheduled Tribes and Other Backward Classes (see Social Inclusion Planning Framework, Appendix A to Annex VI (b)). To enhance the resilience of such vulnerable communities, project interventions are planned under the following interlinked outputs:
- Output 1. Enhanced resilience of coastal and marine ecosystems and their services
 - Output 2. Climate-adaptive livelihoods for enhanced resilience of vulnerable coastal communities; and
 - Output 3. Strengthened governance and institutional framework for climate-resilient management of coastal areas.

Co-financing

9. Public sector co-finance committed for the project – a total of USD 86.85 million – is shown in the four co-finance letters (Annex IV) from the Governments of the three states of Andhra Pradesh (USD 20m), Maharashtra (USD 26.85m) and Odisha (USD 20m), as well as contributions by the GoI at the national level through the Ministry of Environment, Forest and Climate Change (USD 20m). Table 1 below shows the co-finance to be commingled with the GCF funds in order to contribute to the project objective and to each of the project's three outputs.
10. This new and additional co-finance reflects the commitment of the Government of India to implement national policy priorities outlined in the NDC and National Action Plan on Climate Change (NAPCC), addressing climate risks in the coastal zone, as well as non-climate related drivers of ecosystem degradation. The GCF investment is a catalyst for new climate-risk informed investments by the three States, helping address their adaptation priorities and needs, as reflected in the State Action Plans on Climate Change (SAPCCs). Through providing co-finance to the GCF investment, the national and three State Governments aim to ensure that their investments in ecosystem restoration, livelihood support and infrastructure planning are in line with adaptation policies and are climate-risk informed. Participation in the project will help to direct these investments to take climate risk into account, and address it through ecosystem and community-centred approaches, so that development gains are not jeopardized. The GCF investment addresses the incremental costs of removing the barriers to EbA and climate-risk informed coastal zone management.
11. The largest portion of State co-finance will be used for activities contributing to the project's first output, by undertaking conservation and restoration of ecosystems for climate change adaptation. For example, the Maharashtra Forest Department will use funds from the State Compensatory Afforestation Fund Management and Planning Authority (CAMPA) – set aside to offset private sector impacts – to restore mangroves, corals and mudflats. In Odisha, co-finance from the Adaptation Fund through development bank NABARD will be used for riverbank protection and creek renovation.

12. A second major portion of all three targeted states' co-finance will be used to promote adaptive livelihoods opportunities, and development of associated value chains, in support of the project's second output. This will include the state Fisheries Departments' funding through the Blue Revolution Scheme, and funding from Coastal Zone Management Authorities, and various agricultural boards and schemes – particularly for aquaculture and for diversification into new climate-resilient crops. In Maharashtra, the Agriculture Department will use funding for MSMEs to fund value addition operations in coastal villages, for example, honey bottling based on mangrove beekeeping. In Odisha, co-finance will provide technical assistance for value addition to fishing and aquaculture products that benefit from coastal ecosystem restoration, including fish smoking units, fish value added products, and fishmeal plants.
13. Another significant portion of national and state co-finance will support integration of EbA principles into planning for resilient infrastructure development, including co-finance from the Smart Cities⁴ and Clean India⁵ Missions to undertake planning for climate-resilient coastal infrastructure, such as waste and sewage management systems, taking into account sea level rise and other climate impacts. National co-finance through the MoEFCC will enable the adoption of these approaches to climate-resilient infrastructure planning in other coastal States and Union Territories, through the application of tools like the Coastal Calculator, and training of engineers and planners.
14. Included in national Government co-finance to the project over the period of 2018–2024 will be staff time as in-kind contributions from relevant units under the MoEFCC, including the National Centre for Sustainable Coastal Management, the Society of Integrated Coastal Management and the umbrella programme of the soon-to-be-established National Coastal Mission. The MoEFCC will make available premises and facilities to host the national Project Management Unit, as will the three State Forest Departments for the state Project Management Units.
15. Co-financing from national and state governments will also be used to cover operations and maintenance (O&M), with the funding to be phased in during the project lifetime. Following the period of project implementation, public sector funding at state and district levels will continue to be used to maintain restored ecosystems and infrastructure associated with the livelihoods support (see O&M Plan in Annex XIII(b) for more details). Other interventions including the Decision-Support Tool (Activity 1.1) and long-term monitoring framework for coastal adaptation, and the pan-Indian Coastal Resilience Network (Activity 3.1) will also be supported by government co-financing during the project implementation period, and will be enabled beyond the project through inclusion in State government budgets and duties of personnel.
16. The four public sector co-financiers will be involved in the project steering committees at national and state levels and will report on their investments towards the project's objectives. Private sector financing leveraged during the course of project implementation will be tracked through the steering structures, including investment in businesses dependent on coastal ecosystems, such as ecotourism; investment in climate-resilient commercial infrastructure on the coast; and corporate social investment in coastal livelihoods. Loan finance is also expected to be leveraged for livelihoods activities, from local cooperative banks and regional rural banks under the license of government-owned commercial banks and state governments. All of these investments will be tracked by the National Project Management Unit and the State Project Steering Committees (see Section C.7) using an investment scorecard that captures a total \$ figure per year that is reported in the project's Progress Implementation Report.

Table 1: Financial Elements per project outputs⁶

Output	Activity	GCF funding amount (USD)	Co-financing funding amount (USD)	Amount (for entire project) (USD)	Amount (for entire project) (INR)*

⁴ Smart Cities Mission is an urban renewal and retrofitting program by the Government of India through the Ministry of Urban Development with a mission to develop 100 cities all over the country making them citizen friendly and sustainable – see smartcities.gov.in

⁵ The Clean India Mission or Swachh Bharat Abhiyan is a campaign by the Government of India to clean the streets, roads and infrastructure of the country's 4,041 statutory cities and town – see <https://swachhbharat.mygov.in>

⁶ The Accredited Entity (AE) fee for the proposed project is US\$2,170,930.30. The budget figures presented in this proposal exclude the fee.

Output 1: Enhanced resilience of coastal and marine ecosystems and their services	Activity 1.1: Conducting vulnerability assessment of the coast to inform planning of ecosystem- and community-based adaptation interventions	2,209,190	7,995,000	10,204,190	665,109,085
	Activity 1.2: Community-based conservation and restoration of coastal ecosystems for increasing ecosystem resilience	23,376,593	19,800,000	43,176,593	2,814,250,332
Output 1 Sub Total		25,585,783	27,795,000	53,380,783	3,479,359,416
Output 2: Climate-adaptive livelihoods for enhanced resilience of vulnerable coastal communities	Activity 2.1: Building climate resilient livelihoods and enterprises through value chains and strengthened access to markets	3,585,403	13,726,140	17,311,543	1,128,366,373
	Activity 2.2: Improving capacities of local communities on ecosystem-based adaptation and climate-resilient livelihoods	9,195,345	23,043,860	32,239,205	2,101,351,351
Output 2 Sub Total		12,780,748	36,770,000	49,550,748	3,229,717,724
Output 3: Strengthened coastal and marine governance and institutional framework	Activity 3.1: Network of institutions for enhanced climate resilience and integrated planning and governance in all coastal states	2,487,950	3,568,000	6,055,950	394,726,788
	Activity 3.2: Integrating ecosystem-centric approaches to climate change adaptation into public and private sector policies, plans and budgets, and scaling up finance for EbA	-	10,927,000	10,927,000	712,221,860
	Activity 3.3: Knowledge management for coastal resilience	496,830	3,390,000	3,886,830	253,343,579
Output 3 Sub Total		2,984,780	17,885,000	20,869,780	1,360,292,228
Project Management Cost		2,067,296	4,400,000	6,467,296	421,538,353
Total financing		43,418,606	86,850,000	130,268,606	8,490,907,721

*UN exchange rate as of 1 April 2018: 1 US dollar = 65.18 Indian rupees.

Please see Annex V for the budget breakdown by expenditure type (project staff and consultants, travel, goods, services, etc.) and disbursement schedule.

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
(a) Total project financing	(a) = (b) + (c)	130.269	million USD (\$)		

(b) GCF financing to recipient	(i) Senior Loans					() %	
	(ii) Subordinated Loans					() %	
	(iii) Equity					() %	
	(iv) Guarantees						
	(v) Reimbursable grants *						
	(vi) Grants *	43.419	<u>million USD (\$)</u>				
* Please provide economic and financial justification in section F.1 for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in section E .							
Total requested (i+ii+iii+iv+v+vi)		43.419	Million USD				
(c) Co-financing to recipient	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	Grant	18.000	<u>million USD (\$)</u>	MoEFCC	n/a		
	In-Kind	2.000	<u>million USD (\$)</u>	MoEFCC	n/a		
	Grant	25.650	<u>million USD (\$)</u>	Maharashtra SG	n/a		<u>Options</u>
	In-Kind	1.200	<u>million USD (\$)</u>	Maharashtra SG	n/a	() %	<u>Options</u>
	Grant	18.000	<u>million USD (\$)</u>	Andhra Pradesh SG	n/a	() %	<u>Options</u>
	In-kind	2.000	<u>million USD (\$)</u>	Andhra Pradesh SG	n/a	() %	<u>Options</u>
	Grant	18.800	<u>million USD (\$)</u>	Odisha SG	n/a		
	In-kind	1.200	<u>million USD (\$)</u>	Odisha SG	n/a		
Lead financing institution:n/a.....							
* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.							
(d) Financial terms between GCF and AE (if applicable)	Not applicable						
B.3. Financial Markets Overview (if applicable)							
17. n/a							

C.1. Strategic Context

Climate change risks and impacts on India's coast

18. The Indian coastline is expected to be amongst the regions most affected by climate change globally, negatively affecting the approximately 250 million people (14% of the country's population or 3.5% of the global population) who live within 50 km of India's coast. The Bay of Bengal and the Arabian Sea are both predicted to be subject to extreme climate variability under future climate scenarios. For example, changes in monsoon rainfall patterns and drought frequency as a result of climate change are expected to impact negatively on water resources, agricultural output, livelihoods⁷, public health and the economy^{8,9}. In addition, temperatures are expected to rise by between 1.6–2.1°C compared to the 1970s¹⁰. Moreover, the frequency and intensity of cyclones and extreme weather events are projected to increase, particularly on the eastern coastline. India has already experienced the impacts of climate change in coastal areas, with an increasing frequency of days with extreme temperature, intense rainfall and tropical cyclones over the period 2009–2014. Several climate change impacts are exacerbating the degradation being caused by direct human influences such as urbanization, overfishing and poorly planned coastal development. These climate impacts include ocean warming and acidification leading to coral bleaching, sea level rise reducing the area in which mangroves can thrive, and increasingly intense extreme events that damage coastal ecosystems. Ecosystem degradation, compounded by these climate impacts, has negative implications for coastal communities who are dependent on ecosystems for their livelihoods, and are at risk from periodic droughts, saline intrusion, coastal flooding causing loss of life and property, and saline intrusion of fields, rice paddies and groundwater supply¹¹.
19. Three target states – Andhra Pradesh, Maharashtra and Odisha – have been selected for undertaking on-the-ground activities focused on protecting and restoring coastal ecosystems and promoting livelihoods activities to enhance the resilience of coastal communities (see Section 2.7 of the Feasibility Study in Annex II). These target states were selected by Gol based on: i) high vulnerability to the impacts of climate change; and ii) representation of the range of India's coastline, including both east and west coast areas. In addition, the selection of these three states enables Gol to implement ecosystem-based adaptation to climate change across a range of circumstances, in terms of: i) biophysical vulnerability to climate impacts; ii) coastal ecosystems (including mangroves, seagrass, saltmarshes, coral reefs and coastal lagoons); and iii) socio-economic vulnerability including per capita income level (including states with very low, low and medium per capita incomes). Output 3 of the project will create platforms to scale up this work on restoration and livelihoods across India's nine coastal states, two coastal Union Territories and two island territories and their 73 coastal districts.
20. The main types of climate change, occurring and expected, are summarized below, with further detail provided in Sections 2.7 and 2.8 of the Feasibility Study (Annex II).
21. Temperature: Climate change projections predict a 2°C rise in average annual temperatures across South Asia by the mid-21st century, exceeding 3°C by the late-21st century. These projections are made in comparison to the 20th century using an Inter-Governmental Panel on Climate Change (IPCC) high emissions scenario¹². An increase in global mean surface temperatures of 2°C will make India's monsoon highly unpredictable, while a 4°C increase would result in an extremely wet monsoon (which currently has a chance of occurring only once in 100 years) occurring every 10 years by the end of the century¹³. Although temperatures within India are predicted to increase across the country, this will vary from region to region. According to CMIP3 models, the south of India is projected

⁷ MoEFCC. 2015. India: First Biennial Update Report to the United Nations Framework Convention on Climate Change.

⁸ Sharmila S et al. 2015. Future projection of Indian summer monsoon variability under climate change scenario: An assessment from CMIP5 climate models. *Global and Planetary Change*. 124: 62–78.

⁹ Mishra A & Liu SC. 2014. Changes in precipitation pattern and risk of drought over India in the context of global warming. *Journal of Geophysical Research*. 119: 7833–7841.

¹⁰ Gangwar S. 2013. Space Technology and Observation in Climate Change: Indian Perspective. *International Journal of Environmental Science: Development and Monitoring*. 4: 74–76.

¹¹ NDC.

¹² Climate & Development Knowledge Network. 2014. The IPCC's Fifth Assessment Report: What's in it for South Asia?

¹³ The World Bank. 2013. India: Climate Change Impacts. [Available online: <http://www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts>]

to experience a temperature increase of up to 3°C by 2100, while the north will experience changes of up to 4.5°C by 2100¹⁴.

22. **Rainfall:** Similarly, India is projected to experience an increase in precipitation. The CMIP3 model projections indicate an increase in overall rainfall of up to 20% or more in the western regions, while the rest of the country is predicted to experience an increase of between 5–10%¹⁵. The pattern of rainfall is expected to change as well, with an increase in the variability and unpredictability of monsoon rainfall affecting agriculture. For instance, models predict that the number of rainy days along the east coastline is likely to decrease by 1–5 days per year. However, the intensity of rainfall is expected to increase by between 1mm/day and 4mm/day. By the 2030s, rainfall is likely to increase by 0.2–4.4% compared with 1970s levels¹⁶. The combination of increased total rainfall and decreased number of rainfall days is expected to result in less frequent but more intense rain events. In coastal catchments already degraded by direct human pressures, this will mean more run-off and less available surface and groundwater.
23. **Sea level:** The effect of increased global temperatures will result in thermal expansion of seawater and the melting of glaciers. This will contribute to sea level rise, which is expected to proceed at a rate of up to 10 mm yr⁻¹ during the 21st century under a high emissions scenario¹⁷. Given that India's 7,500 km of coastline – including islands – is home to a third of the country's population¹⁸, sea-level rise is likely to result in displacement of communities, losses of livelihoods and damage to economic infrastructure, as well as a reduction in area suitable for mangroves¹⁹. Sea-level rise, combined with coastal erosion, will also contribute to growing saline intrusion into agricultural fields and aquifers²⁰.
24. **Extreme events:** India has been adversely affected by natural hazards and extreme weather events over the last decade. Heavy rainfall events have, for example, resulted in several flash floods in recent years. During 2015, a marked increase in high rainfall incidents resulted in localized flooding affecting more than 1.8 million people and caused damages of over US\$15 billion. It was estimated to be India's costliest natural disaster and eighth (in terms of cost) on the global scale for 2015²¹. Extreme weather events – e.g. storms, heat waves, cyclones and floods – are predicted to increase²² under future climate change scenarios²³, resulting in considerable losses and damages, as well as loss of life²⁴. Coastal states are particularly vulnerable to an increase in extreme cyclone activity²⁵ and coastal flooding. Extreme weather events will also increase damage to coastal infrastructure, with storm surges and a one metre rise in sea level expected to displace 7.1 million people in the coastal zone, leading to a loss of 5,764 km² of land and 4,200 km of roads²⁶. The North Indian Ocean basin experiences an average of five cyclones annually. A study examining cyclone activity in the area found an increasing trend in the length of the cyclone season and intensity of cyclones for the period 1979–2008²⁷. The heavy winds generated by cyclones assist in the formation of storm surges, which produce large variations in sea level around coastlines. Communities along the Eastern coast

¹⁴ UK Government Department of Energy and Climate Change, Met Office. 2011. Climate: Observations, projections and impacts: India. Crown copyright, Exeter.

¹⁵ *Ibid.*

¹⁶ Indian Network of Climate Change Assessment (INCCA) of Ministry of Environment, Forests and Climate Change, MoEFCC

¹⁷ Projected under all emissions scenarios to exceed that observed during the past three decades, with a rise of up to 98 cm in total (as compared to sea levels in the period 1986 – 2005) by 2100 under a high emissions scenario. See further CDKN 2014.

¹⁸ Senapati S & Gupta V. 2014. Climate change and coastal ecosystem in India: Issues in perspectives. International Journal of Environmental Sciences 5(3): 530–5435.

¹⁹ Woodroffe CD & Grindrod J. 1991. Mangrove biogeography: the role of Quaternary environmental and sea-level change. Journal of Biogeography 18:479–492.

²⁰ Mall RK, Gupta A, Singh R, Singh RS & Rathore LS. 2005. Water resources and climate change: An Indian perspective. Current Science 90:1610–1626.

²¹ Narasimhan TE. 2015. Chennai floods are world's 8th most expensive natural disaster in 2015. Business Standard.

²² Guhathakurta P, Sreejith OP & Menon PA. 2011. Impact of climate change on extreme rainfall events and flood risk in India. Journal of Earth System Science 120:359–373.

²³ Lee J-WW, Hong S-Y, Chang E-C, Suh M-S & Kang H-S. 2014. Assessment of future climate change over East Asia due to the RCP scenarios downscaled by GRIMsRMP. Climate Dynamics 42:733–747.

²⁴ Gupta V, Dobhal DP & Vaideswaran SC. 2013. August 2012 cloudburst and subsequent flash flood in the Asi Ganga, a tributary of the Bhagirathi river, Garhwal Himalaya, India. Current Science 105:249–253.

²⁵ Indian Network for Climate Change Assessment (INCCA). 2010. Climate Change and India: A 4x4 Assessment. A Sectoral and Regional Analysis for 2030s. INCCA Report #2.

²⁶ Nicholls, R. and Mimura, N., "Regional issues raised by sea-level rise and their policy implications, *Climate Research*, Vol. 11:5-18, 1998

²⁷ Deo AA & Ganer DW. 2013. Variability in Tropical Cyclone Activity Over Indian Seas in Changing Climate. International Journal of Science and Research 4:880–886.

of India are particularly vulnerable to storm surges²⁸. A summary of the impacts of cyclones and storms on coastal areas in India is provided in the table below.

Table 2. Extreme cyclone events in India in the period 2009–2014²⁹

Year	Details
2009	Cyclone Alia: 149 fatalities; more than 10,000 stranded.
2010	Cyclone Laila: winds of 120 km per hour in Andhra Pradesh region; more than 50 fatalities; US\$117 million in damages.
2010	Cyclone Jal: rice crops destroyed; mudslides and flooding; 54 fatalities in Andhra Pradesh.
2011	Cyclone Thane: ~50 fatalities.
2012	Cyclone Nilam: heavy rainfall following north-east monsoon activity; more than 100 fatalities in Andhra Pradesh and Tamil Nadu; US\$57 million in damages.
2013	Cyclone Helen: heavy rainfall, floods, and strong gale-force winds; 39 fatalities; more than one million people evacuated; US\$800 million in damages to infrastructure.
2014	Cyclone Hudhud: 81 fatalities and \$3.4 billion in damages.

25. Climate change has also impacted on ecological functioning in the coastal zone of India³⁰ with severe implications for economic sectors dependent on ecosystem goods and services delivered by mangroves, seagrass beds, salt marshes, coral reefs, lagoons, estuaries and other important coastal and marine habitats. For example, the fisheries sector is adversely affected by changes in the distribution and abundance of fish species caused by climate change. This has knock-on effects for the market prices of fish, undermining food security and rural livelihoods. Changes in temperature and rainfall patterns are also reducing agricultural productivity and thus farmer incomes, especially for rain-fed agriculture. In future, climate change is expected to result in decreased water availability across India, further threatening agricultural production³¹. Some of the main impacts of climate change on the coastal ecosystems and livelihoods in the coastal zone of India are summarized below. Further details can be found in Section 2.8 of the Feasibility Study (Annex II).
26. These coastal habitats form part of complex social-ecological systems³² which underpin the food security and economic stability of India's coastal communities. For example, they provide shoreline protection against disasters (expected to be intensified by climate change), and form the basis for economic activities such as fishing, aquaculture and tourism. Coastal ecosystems also have a natural resilience and ability to act as buffers, for example, saltmarshes stabilize shorelines by protecting them against erosion by waves, and reduce floods by storing water³³; and vegetated sand dunes allow beaches to shift with tides and reform themselves. Where coastal ecosystems are degraded by direct human pressures, however, their ability to withstand more extreme events is compromised, and their functioning becomes increasingly vulnerable to the impacts of climate change, as outlined below.
27. Impacts on coastal mangroves: India has about 6,740 km² of mangroves,³⁴ including some of the largest mangrove forests in the world. Mangrove cover along India's coastline has decreased by 50% in some areas, largely because of human pressures, including alteration of flow of freshwater from upstream.³⁵ Sea-level rise is predicted to result in further reductions, contributing directly to 10–20% of future loss of mangrove cover. Mangroves are particularly susceptible to sea-level rise where they are sediment-starved or constrained on their landward margin³⁶. Other important factors linked to mangrove degradation are changes in temperature, rainfall patterns, salinity and carbon

²⁸ INCCA 2010.

²⁹ India's First Biennial Update Report. 2015.

³⁰ India's First Biennial Update Report. 2015.

³¹ Based on the 2001 estimate of ~1,820 m³ per year decreasing to ~1,140 m³ per year by 2050. See further INCCA 2012.

³² Walker, B. & Salt, D. 2006. Resilience Thinking: Sustaining Ecosystems and People in a Changing World. Island Press: Washington DC.

³³ http://ec.europa.eu/environment/integration/research/newsalert/pdf/37si1_en.pdf

³⁴ Envis.nic.in

³⁵ Available at: http://wwf.panda.org/about_our_earth/blue_planet/coasts/mangroves/mangrove_threats/

³⁶ Nicholls RJ, et al. 2007. Coastal systems and low-lying areas. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry ML, et al. Eds., Cambridge University Press, Cambridge, UK, 315-356.

- dioxide concentrations – all of which can negatively influence the timing of flowering and fruiting as well as the range of habitats. Furthermore, the increasing frequency and intensity of extreme weather events related to climate change will cause direct damage to mangroves across India, particularly where they are already degraded.
28. **Impacts on seagrass ecosystems:** Seagrass ecosystems in India are threatened by climate change impacts such as rising sea levels, ocean acidification, changes in salinity, storm surges and temperature increase. These result in increased growth of epiphytes, sediment anoxia and increased prevalence of diseases. The impacts of climate change will exacerbate the underlying stressors caused by direct human pressures – such as pollution, disturbances and eutrophication. The combination of climate change and non-climate impacts are likely to lead to: i) changes in habitat distribution; and ii) widespread die-off of seagrass ecosystems.
 29. **Impacts on coral reefs:** Climate change is compounding existing threats to coral reef ecosystems. Human pressures such as coastal development, over-fishing and diving are having detrimental effects on the health of coral reefs^{37:38}. This is compounded by climate change causing rises in ocean temperatures that lead to coral bleaching³⁹. For example, mass bleaching of coral reefs took place in the Lakshadweep Islands of India during the El Niño event of 2016⁴⁰. In addition, ocean acidification significantly reduces the ability of reef-building corals to produce their skeletons. Increased seawater temperatures are also likely to increase the incidence of diseases that will further degrade coral reefs⁴¹.
 30. **Impacts on salt marshes:** Salt marshes are affected by climate change impacts such as altered hydrological regimes caused by changing precipitation patterns⁴², changes in sediment loading caused by flooding events, and the physical effects of wave energy during extreme weather events. These impacts result in degradation of salt marshes as their growth rates – and particularly recovery after storms – are reduced. Such climate change impacts exacerbate human pressures such as aquacultural expansion, pollution, drainage and introduction of invasive species to impair the ecological functioning of salt marshes.
 31. **Impacts on coastal dunes:** Dune ecosystems are particularly affected by increased intensity of extreme weather events – a component of climate change. Such extreme events cause erosion, flooding and direct damage of dunes through wave action and intense rainfall. Other climate change-related impacts such as sea-level rise and saltwater intrusion also destabilize dune systems. Moreover, such impacts exacerbate anthropogenic pressures that are already contributing to alteration of dune systems along India's coast. A leading cause of degradation of dune systems is the expansion of coastal development and urbanization. For example, wide and sandy beaches with extensive dunes are often disrupted by construction of coastal infrastructure such as tourism facilities and ports.
 32. **Impacts on agriculture:** The agricultural sector is the biggest contributor to India's gross domestic product. 70% of the population is dependent on agriculture for subsistence, income or work, and approximately 650 million people in the country are dependent on the monsoons for crop irrigation. The effects of unpredictable rains, dry spells, floods and intense rainfall events will consequently have significant implications for food production and rural income. Climatic variability is also impacting on the agriculture sector and seasonal crops by *inter alia*: i) decrease in winter rainfall negatively affecting winter crops – known as *Rabi* crops⁴³ – in the rain-fed areas; ii) temperature fluctuations negatively affecting *Rabi* crops; iii) dryland areas receiving less than 550 mm of annual rainfall which results in farming not being viable; and iv) a decline in soil fertility across many regions as a result of an increase in the use of fertilizers in response to lack of rain⁴⁴. Agriculture is also negatively impacted by saltwater intrusion caused by human activities interacting with sea-level rise and cyclonic storm surges.
 33. With the sector plays a central role in the country's food security and economic stability. Coastal ecosystems also play an important role in underpinning rural livelihoods in India. Approximately 68% of India's population is

³⁷ Spalding M & Grenfell A. 1997 New estimates of global and regional coral reef areas. *Coral Reefs* 16(4): 225–230.

³⁸ Cesar H & Burke L. 2003. The economics of worldwide coral reef degradation. Cesar Environmental Economics Consulting. ICRAN/WWF 23.

³⁹ Obura D. 2001. Can differential bleaching and mortality among coral species offer useful indicators for assessment and management of reefs under stress? *Bulletin of Marine Science* 69:421–442.

⁴⁰ Available at: <http://ncf-india.org/projects/coping-with-catastrophe> [accessed on 7 October 2016].

⁴¹ Available at: <https://news.mongabay.com/2016/05/indias-coral-reefs-experiencing-catastrophic-bleaching-heart-wrenching-scientist-says/> [accessed on 4 October 2016].

⁴² Burkett V & Kusler J. 2000. Climate change: Potential impacts and interactions in wetlands of the United States. *Journal of American Water Resources Association* 36(2):313–320.

⁴³ *Rabi* crops include *inter alia* wheat, barley, oats (cereals), chickpea/gram (pulses), linseed and mustard (oilseeds). The *Kharif* crops include *inter alia* rice, maize, sorghum, pearl millet/bajra, finger millet/ragi (cereals), arhar (pulses), soyabean, groundnut (oilseeds) and cotton.

⁴⁴ SAPCC. 2012.

categorized as rural⁴⁵. India has experienced rapid rural-urban migration in recent decades, a trend that is expected to continue with its ongoing economic growth⁴⁶. This includes migration from coastal fishing and farming villages impacted by climate change to urban areas, often to impoverished informal settlements and low-earning work in the informal sector.

34. **Impacts on fisheries:** Climate change and climatic variability have been linked to considerable negative impacts on fisheries; such effects are predicted to increase in future, with a severe impact on the estimated 30% of coastal dwellers directly involved with fishing activities and aquaculture. For example, climate change is predicted to cause changes in the distribution of fishing grounds and the migratory habits of marine fishery resources⁴⁷. Hatcheries will also be affected by temperature fluctuations, leading to reduction in hatchery outputs. Climate change can impact on the fisheries in both direct and indirect ways⁴⁸. Direct effects include the increase in frequency and intensity of extreme climate events which affect fishing operations and infrastructure as well as the abundance and distribution of targeted species. Examples of indirect effects include *inter alia* changes in quality of aquatic habitat and the distribution and abundance of aquatic competitors, predators and diseases. Spawning fish are especially sensitive to temperature; thus water temperature changes may result in spawning occurring earlier, later or not at all. Furthermore, increases in water temperature affect the migration and subsequent harvesting of certain fish species because of shifts in fish abundance. Temperature increases are also combining with ocean acidification to degrade coral reefs, affecting their function as fish nurseries. These changes are resulting in reduced catch of several species in India, affecting nutrition, livelihoods and jobs⁴⁹.

India's vision and policy response to climate change

35. The Gol's Twelfth Five Year Plan (2012–2017)⁵⁰ has a focus on national development actions, with an emphasis on improved socio-economic conditions in rural areas. The priorities of the Five Year Plan include:
- achieving rapid and sustainable economic growth, particularly in the agricultural and manufacturing sectors;
 - reducing poverty and generating new off-farm employment opportunities;
 - increasing education levels, with a focus on reducing the gender gap in education;
 - improving health and nutrition;
 - increasing investment in infrastructure, the area of irrigated agricultural land, provision of electricity and drinking water supply in rural areas;
 - improving environmental sustainability and reducing the GDP emission intensity; and
 - improving access to banking and welfare services.
36. India's National Action Plan on Climate Change (NAPCC) of 2008 identifies priority interventions for addressing climate change adaptation and mitigation, to be implemented through eight National Missions. Relevant missions are the Green India Mission, which aims to restore/reforest 6 million hectares of degraded forest lands; the National Mission for Sustainable Agriculture, which will support climate adaptation in agriculture through climate-resilient crops, weather insurance and improved agricultural practices; and the National Mission on Strategic Knowledge for Climate Change. Overall implementation of the NAPCC is coordinated through the Ministry of Environment, Forest and Climate Change (MoEFCC) and will be facilitated through appropriate mechanisms – e.g. public-private partnerships and civil society actions – for effective delivery of each specific National Mission's objective.
37. Four new National Missions are in the process of being established under the NAPCC. One of these is the new National Coastal Mission, which will provide the overarching policy and institutional framework for the GCF project. The project, in turn, will help to shape the direction of the new Mission to include ecosystem-centred and community-based approaches to climate change adaptation in the coastal zone. The National Coastal Mission's objectives will

⁴⁵ <http://www.worldometers.info/world-population/india-population/>

⁴⁶ Urban population increased from 28% to 31% from 2001 to 2011.

⁴⁷ CCAP. 2010–2015.

⁴⁸ MSAAPC. 2014.

⁴⁹ Nambi A.A. & Bahinipati CS. 2013. Adaptation to climate change and livelihoods: An integrated Ciase study to assess the vulnerability and adaptation options of the fishing and farming communities of selected East coast stretch of Tamil Nadu, India. *Asian Journal of Environment and Disaster Management* 4:297.

⁵⁰ Planning Commission, Government of India. 2013. Twelfth Five Year Plan (2012/2017).

include promoting vulnerability mapping, sustainable coastal development, resilient communities and settlements, environmental conservation and mitigation of GHG emissions.

38. India's Nationally Determined Contribution (NDC) in terms of the Paris Agreement through the UNFCCC outlines the country's commitment to a low carbon emission pathway. It identifies priorities for clean energy, energy efficiency in various sectors of industry, non-fossil based electricity generation, and a building sector based on energy conservation. The proposed project is aligned with one of the 8 main contributions outlined in the NDC: "To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, the Himalayan region, coastal regions, health and disaster management". The NDC includes a target for 2030 to reduce the emissions intensity of India's GDP by 33-35% from 2005 levels and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030. This ties in with a related commitment mentioned in the NDC to increase forest and tree cover "eventually" from 24 to 33% of the country's terrestrial area.
39. Each of the target states have also identified priorities in their State Action Plans on Climate Change to address climate-related threats to coastal zones. These plans are summarised below (see Section 3.2 of the Feasibility Study in Annex II for further details on each state's Plan).
40. The **Andhra Pradesh State Action Plan on Climate Change** identifies the following climate and non-climate related threats to the coastal zone: i) increases in the frequency and intensity of cyclones; ii) loss of lives and infrastructure following cyclones, flooding, and other climatic events; iii) coastal erosion; and iv) marine pollution⁵¹. The plan identifies a number of adaptation priorities for the state including: i) reducing the impact of climate change on household incomes, particularly in agriculture; ii) reducing the impact of climate change on forests, biodiversity and water resources; iii) protecting vulnerable populations against climate-induced disasters; and iv) promoting environmental sustainability, including mitigation measures.
41. The **Maharashtra State Adaptation Action Plan on Climate Change** notes that low-lying coastal communities are particularly vulnerable to climate change impacts such as sea level rise. It outlines four priority areas for reducing the impacts of climate change on local communities, namely: i) hydrology and water resources; ii) agriculture and food production systems; iii) coastal areas, marine ecosystems and biodiversity; and iv) livelihoods.
42. The **Odisha Climate Change Action Plan** identifies a number of priorities for promoting adaptation to climate change, including *inter alia*: i) improving coastal protection measures; ii) promote best practices for climate-resilient agricultural production; iii) reducing the impact of climate change on aquaculture; iv) improving management of critical watersheds; and v) conserving and restoring mangrove ecosystems along the coast.

Climate change impacts on targeted coastal states of Andhra Pradesh, Maharashtra, and Odisha

Andhra Pradesh

43. Andhra Pradesh is the eight largest state in India, covering 160,205 km² with a population of 50 million people. It has the second longest state coastline in the country, stretching over 972 km. Approximately 40% of the state's total population lives in the coastal zone⁵², while 23% of the rural population and 18% of the urban population of the state live below the poverty line⁵³. Andhra Pradesh has a tropical climate with moderate to subtropical weather, including extreme weather events such as cyclones, with associated storm surges and flooding that periodically damage farming and aquaculture operations. Humid to semi-humid conditions prevail in the coastal areas, which receive 700–1,500 mm of rain during the monsoon season (June to December). This rain underpins agriculture, which is the most important livelihood activity in Andhra Pradesh and covers ~41% of the surface area. Besides the staple crop of rice, other important crops are chilli and sugarcane. Fisheries and aquaculture are important livelihood activities, as Andhra Pradesh comprises 10% of the country's fisheries and has the highest aquaculture production. In addition, the state is home to a number of industries, with large concentrations around the port cities Visakhapatnam and Kakinada. These industries are set to further expand, as the state government promotes industrial development in various sectors to increase exports.
44. A variety of ecosystems occur in Andhra Pradesh, including mangroves as well as deciduous and evergreen forests. There are also several notable wetlands along this coastline, such as Coringa, Krishna, Kolleru and Pulicat. Mangrove ecosystems are particularly important to the livelihoods of local communities. For example, mangrove

⁵¹ State Action Plan on Climate Change for Andhra Pradesh (SAPCC). 2012. Ministry of Environment and Forests.

⁵² Ministry of Environment and Forest. 2010. Coastal Issues and Concerns.

⁵³ www.aponline.gov.in/Apportal/Downloads/Socio%20Economic%20Survey/Poverty,%20Employment%20and%20UnEmployment.pdf

trees are used for firewood, as well as timber. There are a number of direct human causes of ecosystem degradation and loss, such as pollution, conversion of natural habitats to agriculture/aquaculture, inappropriate coastal development, and over-extraction of resources. The ~30% decline of mangrove cover recorded for the period 1987–2013 across Andhra Pradesh was driven by overharvesting of wood, conversion of mangrove habitat to prawn aquaculture and construction of infrastructure that directly damages mangrove ecosystems and disrupts hydrology⁵⁴. Industry, agriculture and infrastructure development, are causing environmental impacts such as water pollution, chemical run-off from intensive agriculture, and saltwater intrusion from groundwater extraction. These anthropogenic pressures, and their impact on sensitive coastal livelihoods and ecosystems, will be compounded in many areas in future by the impacts of climate change, including sea level rise and increased coastal flooding and erosion from storm surges (see Section C.2 for more detail).

45. The coastal region of Andhra Pradesh is prone to frequent storm surges and extreme weather events. For example, an analysis of the frequencies of cyclones on the east coast of India during 1891–1990 showed that 262 cyclones occurred in this period, 92 of which were considered severe⁵⁵. As climate has changed, these severe cyclones have become common events, now occurring every two to three years. Of the 32 million people living in the coastal districts of Andhra Pradesh, approximately three million people are vulnerable to cyclones⁵⁶. These cyclones have resulted in government prioritising the need to address climate change in the state. Climate change also has slow onset impacts that affect the agricultural and fishing sectors. For example, rice yields in Vizianagaram district have decreased by 9% for each 1°C increase in the seasonal mean temperature⁵⁷, confirming projections of crop simulation models⁵⁸. The adverse impacts of climate change on Andhra Pradesh's fishing sector include ocean acidification that reduces fish populations⁵⁹, increased erosion and rising sea temperatures. These impacts exacerbate non-climate threats such as marine pollution, resulting in “dead zones” off the state's coast as well as changing species compositions of catches, as tropical species migrate to cooler waters⁶⁰. This has occurred in various *mandals* of the Krishna district of Andhra Pradesh, putting fisher folk under increasing economic pressure as they have to increase the depth at which they fish^{61,62}.
46. Flooding is also a frequent occurrence in Andhra Pradesh. Natural and artificial banks of rivers such as Godavari and Krishna are capable of carrying flood discharges – with the exception of their delta areas, which do flood on occasion. However, improper upkeep of drainage systems and mismanagement of discharges from dams are often factors contributing to flooding, and are likely to be exacerbated by climate change. In addition to flooding, Andhra Pradesh has historically been prone to drought conditions. Indeed, the State of Andhra Pradesh is more prone to droughts than any other state in India apart from Rajasthan and Karnataka⁶³. The extreme heat that often accompanies droughts is also negatively affecting rural communities in Andhra Pradesh. For example, in 2003 – between May and June – heat wave conditions claimed more than 3,000 lives. The Andhra Pradesh government have identified that the severity of cyclones and storm surges is expected to increase because of climate change⁶⁴.

Maharashtra

47. Maharashtra covers 307,700 km² and has a population of 112 million people, 17% of which live below the poverty line. Rainfall in Maharashtra varies – from Konkan Division in the West with highest average rainfall at ~2578.2 mm per year, to Aurangabad division in central Maharashtra which receives only ~708.8 mm. Agriculture is the main livelihood for most of Maharashtra's population, mostly rain-fed, supporting ~61% of the state's population. The main crops cultivated in Maharashtra include i) rice; ii) wheat; iii) pulses; iv) groundnuts; v) soybeans; vi) cotton; vii) sugarcane; viii) vegetables; and ix) fruits. A series of droughts has recently severely impacted on rain-fed agriculture

⁵⁴ The New Indian Express. 24 February 2014. Mangroves Depleting Due to Rampant Urbanisation.

⁵⁵ GoAP. 2010. State Disaster Management Plan.

⁵⁶ GoAP. Revenue (Disaster Management II) Department.

⁵⁷ Personal communication. State Focal Point, Andhra Pradesh.

⁵⁸ Kropff MJ, Centeno G, Bachelet D, Lee MH, Mohan Dass S, Horie T, De Feng S, Singh S. & Penning de Vries FWT. 1993. Predicting the impact of CO₂ and temperature on rice production. IRRI Seminar Series on Climate Change and Rice. International Rice Research Institute, Los Baños, Philippines.

⁵⁹ EPRTI 2012. State Action Plan on Climate change for Andhra Pradesh. Survey No. 91/4, Gachibowli, Hyderabad.

⁶⁰ EPRTI 2012. State Action Plan on Climate change for Andhra Pradesh. Survey No. 91/4, Gachibowli, Hyderabad

⁶¹ Salagrama V. 2012. Climate Change and Fisheries: Perspectives from Small-Scale Fishing Communities in India on Measures to Protect Life and Livelihood. International Collective in Support of Fishworkers (ICSF).

⁶² EPRTI 2012. State Action Plan on Climate change for Andhra Pradesh. Survey No. 91/4, Gachibowli, Hyderabad.

⁶³ Drought in Andhra Pradesh: Long term impacts and adaptation strategies, South Asia Environment and Social Development Department, World Bank, September 2005

⁶⁴ State Action Plan of Climate Changes for Andhra Pradesh (SAPCC). 2012.

in more than 20,000 villages resulting in declining agricultural output and adverse effects on the rural economy. By contrast, the weather pattern in the west of Maharashtra means that communities experience higher rainfall that leads to flash floods and landslides. Climate change is expected to further increase variability of rainfall patterns along the Maharashtra coastal plain, with more intense rainfall events causing more frequent flooding and reduced groundwater infiltration, and longer dry spells affecting planting seasons. Fishing is also an important livelihood activity for coastal populations in the state, with Maharashtra contributing approximately one third of India's marine fisheries production. Coastal villages within 100 m of the high tide line are at risk to climate change impacts such as sea-level rise and flooding from storm surges (see more detail in Section C.2).

48. There are also highly urbanized areas in the state, including the greater metropolitan area of Mumbai situated on the coast. Maharashtra is one of the most developed states in India, contributing 13% to the country's industrial output. Around the urban areas, important industries such as petroleum refineries, production of chemicals and pharmaceuticals, biotechnology, IT and financial services are the main economic activities. Such industrialization is set to expand with coastal areas near ports expected to experience the greatest levels of industrial intensification. However, this industrialization is having negative impacts on the state's ecosystems and rural livelihoods, including displacement of fishing and farming communities as well as pollution from industrial activity, municipal wastewater and solid waste carried to the coast by rivers. Other environmental threats include over-abstraction of groundwater which leads to intrusion of sea-water into coastal aquifers, and the presence of oil refineries that can result in oil spills. The impacts of pollution, over-abstraction of water and inappropriate development in the sensitive coastal zone are likely to be compounded in future by climate change impacts, especially sea level rise (see Section C.2).
49. Analyses of monthly extreme rainfall in Maharashtra have shown trends of increasing frequency of extreme rainfall events⁶⁵. For example, Mumbai had massive floods in July 2005 where over 900 people perished and over US\$ 67 million of damage to property was reported⁶⁶. This state is also prone to frequent cyclones. In November 2009, Cyclone Phyan brought strong winds, unseasonal heavy rainfall and tidal surges, resulting in the loss of four lives and causing damage to property in the coastal districts of Ratnagiri, Raigad, Sindhudurg, Thane and Palghar in Maharashtra⁶⁷. These extreme weather events are predicted to increase in frequency and intensity under future climate change. A mean temperature increase of 1.0–1.5 °C by 2030, 1.8–2.1 °C by 2050 and 2.1–3.0 °C by 2070 is also predicted for the state (under the National Climate Centre, Indian Meteorological Department's 2m model projections). Similarly, rainfall is predicted to increase across the state under future climate change. The projected increase is estimated to be between 69 and 110 mm over the course of a year. However, this increase will not be consistent throughout the seasons. The summer monsoon is predicted to increase in rainfall, while winter rainfall is predicted to show a net decline⁶⁸. An additional effect of climate change that poses a threat to Maharashtra is sea level rise. The Energy and Resources Institute (TERI) conducted an analysis to assess the historical sea level rise anomaly over the Maharashtra and Mumbai coast. A preliminary analysis using the tidal observational record available online at *PSMSL13* over the Mumbai region showed a high inter-annual variability from the 19th century and also an increasing trend over the region. An increase of 0.8 mm per year was observed. Taking into consideration the Glacial Isostatic Adjustment (GIA) corrections of -0.43mm per year, the net sea level rise trend for Mumbai coast is 1.2 mm per year, which is consistent with the value given in MoEFCC's INCCA report⁶⁹. Maharashtra has also experienced severe and successive years of drought in 1970–1974 and 2000–2004⁷⁰, the latter using more of the state's budget than its planned expenditure on agricultural and rural development for the period 2002–2007⁷¹.

Odisha

50. Odisha is the ninth largest state in India, covering 155,820 km² with a population of 43.7 million people. Approximately 32.6% of the state's population lives below the poverty line, particularly in rural areas⁷². The high rural poverty rate and seasonal unemployment have resulted in large-scale seasonal migration of rural populations. A large part of the population lives in the nine coastal districts of the state. Agricultural production comprises 22% of Odisha's domestic product, with more than 50% of farmers practicing subsistence farming. The main crops cultivated are rice, sugarcane and maize. Fishing is also an important economic activity in both the inland and coastal

⁶⁵ Jamir et al. 2008.

⁶⁶ Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC). 2014.

⁶⁷ <http://www.thehindu.com/news/national/cyclone-phyan-kills-four-in-maharashtra/article46758.ece>

⁶⁸ GoI, 2007

⁶⁹ MoEF, 2010

⁷⁰ Maharashtra State Adaptation Action Plan on Climate Change (MSAAPCC). 2014.

⁷¹ World Bank Report No. 43946-IN. 2008. Climate Change Impacts in Drought and Flood Affected Areas: Case Studies in India.

⁷² <http://www.newindianexpress.com/states/odisha/Odisha-2nd-in-Poverty-Ratio/2014/07/10/article2323603.ece>

waters. Aquaculture is practiced in *inter alia* ponds, estuaries, lagoons, canals and lakes. However, fish production from rain-fed aquaculture systems has been decreasing because of erratic rainfall, while marine fishers have also registered declining catches due to stock depletion and are adopting unsustainable fishing practices to increase their catch. Weather patterns along the coast include frequent cyclonic activity with high waves and winds causing damage to coastal infrastructure which is likely to be further exacerbated due to climate change.

51. There are several important coastal wetlands located in Odisha including Chilika and Gahirmatha. The Odisha coastline also hosts highly diverse mangrove systems, particularly in the deltas of the Mahanadi, Brahmani and Baitarani rivers. However, the goods and services provided by these ecosystems are being negatively impacted by development pressures. Industrial development – such as production of steel, chemicals and fertilizers – is expanding in coastal areas of Odisha. The Special Economic Region between Paradip and Gopalpur is attracting investments in petrochemicals, steel production and manufacturing, with further development being anticipated with the expansion of port facilities. These industrial activities – as well as run-off from agricultural lands and wastewater discharge from factories – are causing water pollution that threatens community livelihoods such as farming and fishing. Odisha's coastline is also impacted by beach mining and other industries. Coastal pollution and erosion caused by inappropriately sited infrastructure is causing degradation of coastal ecosystems including mangroves and seagrasses. These anthropogenic impacts are likely to be compounded by climate impacts in future, including more frequent, larger storm surges caused by intensified cyclonic activity (see Section C.2 for more detail).
52. Climate projections for the state of Odisha indicate a change in rainfall frequency and intensity, which will negatively impact agriculture and other coastal livelihood activities. The state is prone to extreme weather events, such as frequent droughts, floods and cyclones. For example, in 1999, a super-cyclone impacted the entire coast of Odisha causing huge loss of life and damage to property. In 2013, Cyclone Phailin caused devastation across the state, with Ganjam district suffering damages to property and infrastructure of more than Rs3,000 crore⁷³. Furthermore, heavy rainfall and floods have been experienced 88 times in the last 20 years⁷⁴. Climate change will exacerbate the current trends floods and droughts by increasing their frequency and intensity. The current predicted climate change effects for Odisha include *inter alia*: i) a high variability of rainfall, leaving people with two peak periods of food shortage; ii) drought and dry spells every two years in western Odisha, with a major drought every 5 to 6 years; iii) flash floods during the rainy season; iv) heat waves in summer; and v) intense coastal flooding and cyclones. These climate change effects could have serious negative impacts in Odisha. For example, paddy fields in the coastal areas are prone to frequent erosion, salinization and inundation. Climate projections indicate that drier areas will become drier and flood-prone areas will be subject to more flooding⁷⁵. With almost 60% of land devoted to rain-fed agriculture in Odisha, these climatic changes will have significant impacts on the livelihoods and food security of local communities. Other problems such as pest and disease outbreaks are also likely to increase due to climate variability. Being water dependent, the fisheries sector in Odisha will be impacted by climate change. The livelihoods of the fishermen will also be affected, not only because of sea level rise and climate mediated hazards, but also due to erratic rainfall that affects the open reservoirs and ponds/tanks. Furthermore, climate change has the potential to aggravate vector-borne, water-borne and food-borne diseases.

C.2. Project / Programme Objective against Baseline

Baseline investment and efforts

53. The GoI is currently investing in socio-economic development in the coastal states of India to address poverty and promote rural development. However, these investments are being undermined by the impacts of climate change, resulting in diminishing development gains. Economic and social development efforts are guided by the Planning Commission, to be phased out after 2017, and replaced by the National Institute for Transforming India (NITI Aayog), with the emphasis on a bottom-up approach. The Commission's Twelfth Five Year Plan (2012–2017) recognizes that national development actions need to focus on bringing macro-economic imbalances under control and speeding up delivery of infrastructure projects, whilst improving rural socio-economic conditions and promoting private investment. In July 2016, Government announced plans to bring about a 'blue revolution' over the next five years, which will involve investment (largely private sector) of US\$ 58.79 billion⁷⁶ in developing eight major ports, establishing 27 industrial clusters on the coast, and developing rail and road connectivity with ports. This includes the Sagarmala Program – the Ministry of Shipping's flagship port-led development initiative to bring down logistics

⁷³ Available at: <http://www.desdemonadespair.net/2013/10/cyclone-phailin-impact-spreads.html> [Accessed on 26 January 2017]

⁷⁴ Orissa Climate Change Action Plan 2010-2015. Government of Orissa.

⁷⁵ Odisha Climate Change Action Plan (OCCAP). 2010.

⁷⁶ <http://www.ibef.org/industry/ports-india-shipping.aspx>

cost and boost investment, exports and jobs – involving investment of US\$ 10.29 billion⁷⁷ in 12 major ports in the next five years. This will be accompanied by continued expansion of Special Economic Zones (SEZ) as duty free enclaves to strengthen export-led development and accelerate economic growth, with 206 SEZs currently operational, and over 200 more applications approved.⁷⁸

54. In line with the Twelfth Five-Year Plan, baseline investments by governmental – and non-governmental – agencies in the three target states are addressing underlying development challenges. These baseline investments relate to *inter alia*: i) conservation of ecosystems; ii) industrial development; iii) socio-economic growth; and iv) agricultural intensification. National and state governments are currently making substantial investments in coastal areas, applying Integrated Coastal Zone Management approaches to new agricultural, industrial and export zone development, to ensure that trade-offs between economic development and environmental impact are balanced appropriately. The GoI is also investing in rural livelihoods security, with US\$ 5.5 billion allocated in 2015-16 to the Mahatma Gandhi National Rural Employment Guarantee Scheme. Such initiatives focus on strengthening the natural resource base of the rural economy, but without an explicit focus on climate change resilience. The government is also investing in reforestation, working through the Green India Mission to expand India's forest cover from 24 to 33%. A total area of 6,747 km² has been afforested, with just over \$1 billion spent in States through the State Compensatory Afforestation Fund Management and Planning Authority (CAMPA) funds to offset private sector impacts. The focus has been largely on monocrop plantations for mitigation benefits, however. Greening strategies do not currently emphasize the role of biodiverse forests and other natural ecosystems in adapting to climate change through buffering extreme events and providing resilient livelihoods. A case in point is that India's existing mangrove management strategy involves a combination of conservation through legislative policy, community awareness and sustainable use of forest resources through cooperative management⁷⁹, but does not systematically tackle climate change adaptation and mitigation.
55. The baseline scenario is thus that India is committed to climate change adaptation at a policy level, and is seeking now to put these policies into action at scale. The public and private sectors are making significant investments in coastal development – in industry, agriculture, conservation, afforestation and rural livelihoods, but these are not yet systematically addressing climate risks. Without the project intervention, these investments are likely to have decreasing success in delivering expected development gains, because of current and future climate change impacts compounding underlying vulnerabilities. The natural ecosystems of India's coastal zone will continue to be undervalued and will be increasingly degraded and lost, sacrificing their significant contribution to reducing climate risk by buffering disasters and supporting livelihoods. Coastal communities will remain vulnerable to loss of life and damage to property through flooding, erosion and saline intrusion, expected to intensify as storm surges and sea level rise worsen. Poor coastal communities reliant on small-scale fishing and farming will remain vulnerable to impacts of temperature rise and increasingly erratic monsoons on their livelihoods. The infrastructural investments being made to promote development will also remain vulnerable to climate change impacts, loss and damage.

Adaptation alternative and key barriers to achieving it

56. The adaptation alternative is that the climate resilience of India's coastal communities is secured through harnessing the power of India's ecological infrastructure for climate change adaptation. In this alternative scenario, investment in the coastal zone will become more climate-risk informed, using ecosystem- and community-based approaches to adapt to climate change impacts. The natural ecosystems of India's coastal zone will be protected and restored, and their contribution to buffering climate shocks and stresses and supporting diversified livelihoods will be fully recognized and utilized. This will be achieved through interventions in target landscapes in the three states of Andhra Pradesh, Maharashtra and Odisha to i) protect and restore ecosystems such as mangroves and seagrass, and the services they provide, especially buffering storm surges, and ii) help communities adopt climate-adaptive livelihoods and value chains. GCF resources and co-finance will also be used to iii) mainstream EbA principles into coastal planning and governance, enabling intersectoral coordination for addressing climate risk across all of India's coastal states.
57. The use of "ecological infrastructure" in the form of natural ecosystems to buffer against climate change risks, for example, to dissipate wave energy and reduce the intensity of storm surges, has been well documented. The

⁷⁷ <http://pib.nic.in/newsite/PrintRelease.aspx?relid=138881>

⁷⁸ <http://www.sezindia.nic.in/writereaddata/pdf/factsheet.pdf>

⁷⁹ Ghosh S, Bakshi M, Bhattacharyya S, Nath B & Chaudhuri P. 2015. A Review of Threats and Vulnerabilities to Mangrove Habitats: With Special Emphasis on East Coast of India. *Journal of Earth Science and Climate Change*. 6: 270.

Feasibility Study (Annex II, Section 6.2) summarizes the evidence that functional ecosystems protect coasts from storm surges and sea-level rise, ameliorate shoreline erosion, regulate coastal water quality, form critical habitats for marine species, and provide food and livelihood security to coastal communities. This includes a growing literature from South Asia and worldwide that shows the power of ecological infrastructure to buffer extreme events. For example, during the 1999 cyclone in Odisha, damage caused to property in areas without significant mangrove ecosystems was estimated to be US\$ 154 per household as compared to US\$ 33 for households that were protected by mangroves⁸⁰. This protection was also evident in the aftermath of the 2004 tsunami where coastal vegetation acted as a natural barrier and significantly reduced the physical impacts of coastal surges. Mangroves and saltmarshes contribute towards elevating the sea floor by trapping sediment suspended in seawater. Mangroves have average sediment accretion rates of 5.5 mm per year and average sea floor elevation rates of 1.87 mm per year⁸¹, while saltmarshes have even higher rates - average sediment accretion rates of 6.73 mm per year and average elevation rates of 3.76 mm per year⁸². This seafloor elevation can help buffer coastal areas against sea-level rise. Comparisons of storm event and sea-level rise scenarios in areas with and without habitats have shown that coastal habitats reduce the proportion of people and property exposed to these climate change impacts⁸³ by approximately 50%. The potential for coastal ecosystems to support climate-adaptive livelihoods is also well documented – see Section 7.6 in the Feasibility Study (Annex II).

58. The proposed project will address a number of barriers that currently exist that constrain the achievement of this adaptation vision are as follows:

Barrier 1: Inadequate information on climate vulnerabilities for local-level adaptation planning for the coastal zones

59. To date, several assessments have been undertaken on the impacts of climate change in India's coastal zones. Examples of these are: i) an assessment of climate change impacts on four key sectors – agriculture, forests, human health and water – in India's four main regions, including the coastal region⁸⁴; and ii) a coastal vulnerability map detailing the risk posed by factors such as coastal erosion and changes in sea level⁸⁵. However, such studies generally focus on bio-physical factors related to exposure to climate change risks and impacts. There is still insufficient information on the sensitivity, socio-economic vulnerability and adaptive capacity of coastal communities in the face of climate change. This means that policy- and decision-makers at all levels tend to not have access to up-to-date holistic information on climate risks and vulnerabilities. In particular, many decision-makers and local communities do not have access to data from comprehensive assessments of climate change vulnerability that include information on: i) exposure to current and future climate change risks; ii) potential for ecological restoration and EbA measures; and iii) socio-economic vulnerabilities including sensitivity and adaptive capacity of local communities. Without detailed and comprehensive spatial data on vulnerability in India's coastal zone, decision-making for climate-resilient planning by national ministries, state-level departments and local communities will remain sub-optimal in the face of current and future climate change impacts.

Barrier 2: Limited knowledge of and support for the role of EbA in enhancing adaptive capacity

60. At present, there is limited understanding of the benefits of coastal ecosystems in reducing negative impacts of climate change. EbA has been established as an effective and cost-effective practice^{86,87,88} for adapting to climate change in coastal areas⁸⁹, but there is limited transfer and uptake of such knowledge by relevant institutions. Technical information on EbA as an adaptation option is not readily available to technical staff and decision-makers in India's national ministries, state-level departments, NGOs and CBOs, particularly operational guidelines for EbA in the context of planning for climate change in sectors such as roads/transport infrastructure, agriculture, rural development and disaster risk reduction. Coastal adaptation thus remains largely focussed on "hard" engineering

⁸⁰ 2012, Bahinipati and Sahu, Asian Journal of Environment and Disaster Management, Vol 4. No 2

⁸¹ Duarte CM, Losada IJ, Hendriks IE, Mazarrasa I & Marba N. 2013. The role of coastal plant communities for climate change mitigation and adaptation. *Nature Climate Change* 3:961–968

⁸² Shepard CC, Crain CM & Beck MW. 2011. The protective role of coastal marshes: a systematic review and meta-analysis. *PLoS ONE* 6:e27374. doi:10.1371/journal.pone.0027374

⁸³ Arkema, K.K, et al Coastal Habitats Shield People and Property from Sea Level Rise and Storms, *Nature Climate Change* 3, 913-918 (2013).

⁸⁴ Indian Network for Climate Change Assessment. 2010. Climate Change and India: A 4x4 Assessment. A Sectoral and Regional Analysis for 2030s.

⁸⁵ Indian National Centre for Ocean Information Services. 2012. Coastal Vulnerability Atlas of India.

⁸⁶ UNEP-WCMC. 2006. In the front line: shoreline protection and other ecosystem services from mangroves and coral reefs. UNEP-WCMC, Cambridge, UK.

⁸⁷ Jones, H.P., D. G. Hole & E. S. Zavaleta. 2012. Harnessing nature to help people adapt to climate change. *Nature Climate Change* 2: 504-509.

⁸⁸ Rao N.S. et al. 2013. An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands. SPREP Technical Report. Apia, Samoa.

⁸⁹ For example, mangroves dissipate wave energy and reduce flooding during extreme weather events.

solutions such as seawalls, dykes and groynes and fails to consider the full suite of adaptation options, including “soft” ecosystem-centric options. “Hard” measures have greater construction and maintenance costs than “soft” measures, and often have detrimental effects on the natural environment, for example, the impact of groynes on sedimentation and their frequent long-term effect of actually exacerbating coastal erosion.

61. Coastal communities have similar limitations regarding their knowledge and awareness of EbA. Traditional livelihood practices which are considered sustainable are becoming more marginal as climate change impacts erode the natural resource base upon which these livelihoods depend. Without knowledge on EbA, local communities will remain unable to adopt livelihood practices that are resilient to the current and future impacts of climate change. If communities remain unaware of the potential environmental, socio-economic and adaptation benefits afforded by functional coastal ecosystems such as mangroves, coral reefs, seagrass beds and saltmarshes, there will be little incentive for them to protect and restore these ecosystems. At a deeper level, this lack of understanding throughout society is driven by the fact that the value of goods and services from coastal ecosystems is not reflected in markets or prices, and is often not even quantified – so coastal ecosystems are gradually over-utilised and degraded, experiencing the “tragedy of the commons”.
62. Overall, the economic and financial case for implementing EbA in coastal ecosystems has not been adequately made in India. This is in part because of limited proof-of-concept concerning the ecological, social and economic value of coastal ecosystems, particularly in the light of climate change adaptation needs. This has resulted in minimal support for investments by either the public or private sectors into large-scale EbA interventions, despite the multiple benefits of such interventions, including: i) climate regulation; ii) sediment and nutrient retention; iii) water purification; iv) coastal hazard protection; v) support to fisheries and aquaculture, and vi) tourism and recreation. An understanding of the value of ecological infrastructure on the coast, and the cost of allowing it to degrade, is required in order to unlock innovative financing mechanisms and catalyse future investments into EbA. As a result of the limited knowledge and understanding of the value of coastal ecosystems for climate change adaptation, their protection, restoration and maintenance remains under-reflected in policies and investment decisions by government at various levels and by the private sector.

Barrier 3: Limited technical and financial capacity for communities to adopt climate-adaptive livelihood opportunities

63. Local communities in India's coastal areas are presently vulnerable to the impacts of climate change on their economic activities and livelihoods, particularly farming and fishing. There is limited community-level awareness and knowledge of current and predicted impacts of climate change on livelihood activities, as well as the potential for adopting climate-resilient practices to reduce the vulnerability of livelihoods to climate change impacts, and for undertaking new livelihood activities to spread household risk. In particular, communities have little knowledge of the potential for diversifying livelihood options that are underpinned by the conservation and restoration of coastal ecosystems through an EbA approach. For example, crab farming and oyster cultivation have the potential to supplement harvesting wild populations of these organisms. However, these and other aquaculture systems depend on healthy, resilient, well-functioning ecosystems to support their productivity. Without knowledge and awareness of the strong linkages between ecosystem conservation and adaptive and sustainable livelihood options, coastal communities remain unable to take advantage of such synergies to expand such activities on a sustainable basis. In addition to livelihoods based on intertidal ecosystems, coastal communities may also adapt existing livelihoods to climate impacts, for example through adopting the System of Rice Intensification (SRI) techniques.
64. However, there are a number of barriers to communities expanding or undertaking new livelihoods. Communities lack technical assistance and support to business planning needed to switch to adaptive activities, and although there is government support for livelihoods in poor communities, e.g. through sewing co-operatives, there is no systematic attempt to promote livelihoods that are climate-adaptive. Despite the wide penetration of micro-finance, and growing presence of local cooperative banks and regional rural banks under license of government-owned commercial banks and state governments, many small-scale community organizations along India's coast (self-help groups, producer organizations, fisher associations) lack the necessary credit record and collateral to access bigger loans for climate-adaptive livelihoods. Climate-risk and ecosystem services and valuation is also poorly understood by the financing intermediaries, hindering access to finance to support a switch to climate-adaptive livelihoods.

Barrier 4: Weak linkages in climate-resilient value chains for commodities underpinned by ecosystem goods and services

65. The adoption of sustainable and climate-adaptive livelihood activities is also hindered by weak linkages in value chains for commodities that are underpinned by coastal ecosystem goods and services. Without such value chains, coastal livelihoods will not be sustained over time, as climate risks evolve. In particular, there is insufficient access as yet to potential markets for many of these commodities, reducing the economic viability and uptake of diversified, climate-adaptive livelihoods. Crabs, for example, are sold at modest prices on local markets, rather than reaching urban coastal or even export markets where they could fetch a significantly higher price – because of limitations in cold chain and transport, and absence of deals with buyers. In addition, there are few opportunities for value addition – such as processing and packaging fish into consumer-ready products – closer to the source of commodities. Markets are mostly local and, despite the prevalence of middlemen, there are untapped opportunities to facilitate deals with buyers in larger towns and cities and even export markets for diversified, climate-resilient value-chains. (also affected by lack of storage, refrigeration, and processing to create higher value products for these markets). There is a need for support in analysing climate-resilient value chains, identifying market opportunities, developing business plans, promotion market linkages, and accessing finance for livelihood and value-chain development. This kind of technical assistance and business development support, necessary now in order to switch to and sustain adaptive livelihoods, is largely missing in the rural areas of India's coast, especially for poor communities and women.

Barrier 5: Limited institutional capacity for mainstreaming climate change into coastal zone planning, governance and finance

66. Coastal management and planning in India is governed by legislative instruments that are largely sectoral in their approach, and are focused on regulatory functions. This means that there is little cross-sectoral coordination of planning and implementation of measures for climate change adaptation within the coastal zone. In particular, there is insufficient coordination of climate change adaptation and climate-resilient planning at the landscape-level, through institutions that are able to represent the various adaptation priorities of multiple stakeholders – including government, local communities and the private sector. This results in: i) coastal development occurring in areas where it is vulnerable to climate impacts; ii) coastal development replacing valuable ecological infrastructure; and consequently iii) greater costs of losses and damages caused by current and future climate change impacts. Available knowledge of climate change risks and vulnerabilities of coastal communities and ecosystems is thus not factored into planning and decision-making processes within national, state- and district-level government institutions, or in affected economic sectors. For example, at a national level, EbA is not widely recognized as a potential benefit of reforestation through the CAMPA fund, and at state level, EbA is not usually considered as a complementary measure to protect roads, urban areas and port infrastructure from climate change risks like extreme weather events and severe coastal erosion. Indeed, the potential for EbA as an adaptation measure is not widely taught or advocated as a means for adapting to climate change and therefore has limited uptake, support and financing. Consequently, development planning along the coast of India does not take climate risks into account in a systematic and integrated manner. There is little consideration of the potential for co-management – i.e. cooperative management agreements between government, communities and CBOs/NGOs – of coastal ecosystems, and the implementation of EbA approaches to protect infrastructure and maximize ecosystem-based livelihoods. Coastal interventions for climate change adaptation thus largely rely on “top-down” and “hard” infrastructural and engineering approaches, without adequate consideration of blended approaches that integrate “soft” approaches such as EbA into design considerations, and involve communities in long-term co-management.

Project objective, outcomes, and impacts

67. The key **objective** of the proposed project is to support the Government of India to enhance the resilience of the lives and livelihoods of rural populations – particularly women and other vulnerable population groups – in the coastal areas of India to climate change and extreme events. The focus of the project is on **enhancing the climate resilience of India's coastal communities through an ecosystem-based, community-centred approach to adaptation**. The proposed project will address the barriers described above, in order to enable planning and implementation of ecosystem- and community-based adaptation measures to promote climate-resilient development in India's coastal zone.

68. Important baseline investments are being made through national and state public expenditure, and through donor-funded initiatives. Many initiatives focus on climate change adaptation but fail to harness the power of natural ecosystems, or narrowly focus on biodiversity conservation, but do not consider climate risks. A few have begun to use ecosystem-based approaches as part of a suite of adaptation strategies. The proposed project draws lessons

from and builds on baseline efforts related to addressing climate change, including the following (further detail provided in Section 4 of Feasibility Study in Annex II):

69. The **Integrated Coastal Zone Management Project (World Bank, GoI, 2010–2017, US\$ 286 million)**⁹⁰ focuses on: i) building national capacity for implementation of a comprehensive coastal management approach across India and; ii) piloting the integrated coastal zone management approach in the states of Gujarat, Odisha and West Bengal. The project supports capacity building for effective coastal zone management at the national level and a Phase II will replicate the approach in a new set of states including Andhra Pradesh. One of the components of ICZM project is to map Ecologically Sensitive Areas (ESAs) along the coast and include their conservation as part of ICZM planning. The GCF project will take this mapping work done in Odisha to the logical next step of restoring degraded ecosystems to support adaptation to climate change. This model will then be applied more widely through the National Coastal Mission which will work along the whole coastline of India to prioritize restoration of degraded ESAs by superimposing ESAs map over the vulnerability map and select areas that would have the maximum impact in terms of vulnerability mitigation and enhancing coastal protection, using the existing InVEST model which facilitates this approach by calculating vulnerability 'with' and 'without' natural habitat.
70. The project **Conservation and Management of Coastal Resources as a Potential Adaptation Strategy for Sea Level Rise (NABARD, 2015–2019, US\$ 689,264)**⁹¹ is applying an ecosystem-based approach to adaptation, and will be an important source of learning. Funded through the Adaptation Fund, the project focuses on overcoming the consequences of: i) salinisation and other impacts on the coastal area caused by sea level rise; and ii) seawater inundation caused by an increase in cyclonic storms and storm surges. The project aims to achieve this by implementing appropriate adaptation strategies such as restoration of degraded mangroves and demonstrations of Integrated Mangrove Fishery Farming System (IMFFS).
71. The project **Mainstreaming Coastal and Marine Biodiversity Conservation into Production Sectors in Sindhudurg Coast in Maharashtra (UNDP, MoEFCC, 2011–2016, US\$ 3,438,294)**⁹² was funded through the Global Environment Facility and focused on: i) a cross-sectoral planning framework that mainstreams biodiversity conservation considerations; ii) enhanced capacity of sector institutions for implementing biodiversity-friendly fisheries and ecotourism management plans; and iii) sustainable community livelihoods and natural resource management. The project also generated awareness among local communities on the importance of biodiversity conservation amidst the threat of unsustainable fishing practices and increasing pollution from fishing and other maritime vessels. These challenges were addressed through partnerships with relevant sectors to improve livelihoods of coastal communities by implementing: i) sustainable fishing practices; ii) sustainable agriculture and horticulture; iii) value addition to fishery operations; and iv) eco-tourism – such as adventure sports, dolphin viewing and scuba diving.
72. The project **Mainstreaming Coastal and Marine Biodiversity Conservation into Production Sectors in the East Godavari River Estuarine Ecosystem (EGREE), Andhra Pradesh (UNDP, MoEFCC, 2011–2018, US\$ 6,023,636)**⁹³ is funded through the Global Environment Facility and focuses on mainstreaming biodiversity conservation into the production sectors of the EGREE through: i) cross-sectoral planning; ii) enhanced capacity of sector institutions to implement biodiversity-friendly sector plans; iii) improved community livelihoods and sustainable natural resource use. The goal of the project is to mainstream biodiversity conservation into production activities currently underway in 80,000 ha of the EGREE.
73. In addition, following relevant current and planned initiatives have been considered in the design of the proposed project:
74. **The Sustainable Coastal Protection and Management Investment Programme**, begun in 2010, is being implemented by the Maharashtra Maritime Board and the Asian Development Bank, aiming to manage coastal ecosystems and reduce the loss of property in Karnataka and Maharashtra. This includes innovative interventions for coastal protection, and improved shoreline management planning. Phase II (2016–2019) is currently in development, and is expected to address coastal erosion along selected Karnataka beaches, and will include

⁹⁰ <http://projects.worldbank.org/P097985/integrated-coastal-zone-management?lang=en&tab=financial>

⁹¹ <https://www.adaptation-fund.org/project/building-adaptive-capacities-of-small-inland-fishers-for-climate-resilience-and-livelihood-security-madhya-pradesh-2/>

⁹² http://www.in.undp.org/content/india/en/home/operations/projects/environment_and_energy/mainstreaming-coastal-and-marine-biodiversity-into-production-se.html

⁹³

http://www.in.undp.org/content/india/en/home/operations/projects/environment_and_energy/mainstreaming-coastalandmarinebiodiversityintoproductionsectors.html

addressing immediate coastal protection needs, capacity building and institutional development, modelling and other analytical work, and analyses of sand deficits of selected beaches.

75. **Mangroves for the Future (MFF)** is an initiative that promotes investment into coastal ecosystem conservation for sustainable development in 10 member countries (Bangladesh, Cambodia, India, Indonesia, Maldives, Pakistan, Seychelles, Sri Lanka, Thailand and Vietnam). MFF is co-chaired by the IUCN and UNDP, and is currently in its third phase (2014-2018), with additional funding from the Swedish International Development Cooperation Agency (Sida), focusing on building the resilience of ecosystem-dependent coastal communities to natural disasters and climate change related impacts.
76. The **Gol-World Bank-Govt of Odisha: National Cyclone Risk Mitigation Project, Odisha** where constructing cyclone shelters, and cyclone shelter management committees are being formed to support preparedness, response and relief measures. Discussions will be held between the steering committees of this project and the GCF project to seek synergies in work in coastal districts where both projects operate. This may include using shelters could be used for joint awareness-raising meetings on climate change impacts and trainings on climate-adaptive livelihoods and early warnings systems. The Forestry Department will ensure that the management committees support collection and monitoring of data for the GCF project where relevant, including the impact of cyclonic activity on ecosystem restoration and new climate-adaptive livelihoods. The project District/Landscape-Level Coordination Committees will liaise with this and other relevant related initiatives by government and donors in the districts that are preparing disaster management plans covering preparedness, response, rehabilitation and recovery, including financial recovery for any extreme weather events.
77. **Ground water recharge and Solar Micro Irrigation to ensure food security and enhance resilience in vulnerable tribal areas of Odisha** is a project proposal that has been submitted to the GCF (planned for 2017–2021) through NABARD. The project is enhancing groundwater recharge in community ponds through the construction of a Ground Water Recharge System in the state of Odisha, aiming to improve the water table in rural areas through the adoption of recharge systems in existing village ponds and tanks, and implement the use of solar pumps for irrigation as part of a climate-resilient, crop-planting strategy.
78. **Bay of Bengal Large Marine Ecosystem (BOBLME) Project** is a multi-country collaboration between Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, and Thailand, seeking to improve the lives of coastal populations by improving the regional management of the Bay of Bengal environment and its fisheries. The BOBLME Strategic Action Programme (SAP) is a policy document that address issues relating to fisheries management, environmental and socio-economic issues. The latest version of the SAP was signed by member countries in March 2015. The BOBLME Project is finalising the Project Information Form (PIF) for a 2nd phase – the SAP Implementation Project – for submission to the GEF and implementing partners.
79. However, a number of gaps exist in past and ongoing initiatives that will continue, under a business-as-usual (BAU) scenario, to hinder climate-resilient and sustainable development in India. There has been little integration of EbA measures into BAU investments for biodiversity, conservation, and sustainable development. Climate change impacts and the potential for EbA are not considered in baseline investments because of limited downscaled climate data, inadequate technical capacity for planning of EbA, and undervaluation of both coastal ecosystem goods and services and the potential of EbA to build the adaptive capacity of local communities. A number of past and ongoing baseline investments have not fully achieved their objectives also because of limited inter-sectoral planning, particularly with regards to climate change adaptation.
80. While there have been a number of baseline investments into community-based natural resource management for livelihoods, there has been little consideration of climate change impacts upon these investments and the livelihoods themselves. Such investments are likely to be unsustainable in the long term, as they will be undermined by climate change. Other baseline investments are addressing human pressures on ecosystems in the coastal zone of India by undertaking desiltation of rivers, dredging of lakes, contouring of agricultural fields, terracing of hill slopes and restoration of degraded ecosystems. These investments are also potentially jeopardized by climate change impacts. For example, intense rainfall events can result in: i) rapid resiltation of rivers and lakes; ii) severe erosion on contoured agricultural land; iii) damage to terrace infrastructure; and iv) washing away of newly planted seedlings. There is a need to integrate climate risk management, and the role of natural ecosystems, into all such baseline initiatives.
81. The proposed project will shift away from this business-as-usual (BAU) scenario to transform coastal management and adaptation by harnessing the power of India's ecological infrastructure for coastal resilience. GCF investment and GOI co-finance will enable best practice in restoring ecosystems, improving livelihoods and strengthening

adaptive coastal governance, creating pathways to scale up effective ecosystem and community-based adaptation, with additional mitigation benefits. The project investment will be complemented by new and additional co-finance by national Government and the Governments of the three target States. It will also crowd in financing from private sector, financial institutions, donors, and local communities in coastal restoration efforts. This will involve building partnerships for using forest compensation funds, promoting complementary engineered solutions for shoreline protection, efforts to enhance the resilience of coastal property and infrastructure, climate-adaptive livelihood support, as well as vulnerability mapping and community-based early warning systems.

82. Through the GCF intervention, supported by significant co-finance from the public sector, the natural ecosystems of India's coastal zone will be protected and restored, and their contribution to buffering climate shocks and stresses and supporting diversified livelihoods will be fully recognized and utilized. This new community-based and ecosystem-centric approach to adaptation will be achieved through: i) protecting and restoring ecosystems such as mangroves and seagrass, to ensure the flow of ecosystem services they provide; ii) helping communities enhance their adaptive capacity through livelihoods strengthening; and iii) mainstreaming ecosystem-based adaptation into coastal management by public and private sector actors nationwide. These measures are detailed below.
83. Firstly, GCF resources and co-finance will be invested in ecosystem-based adaptation measures that will restore ecosystems, providing critical goods and services to enhance the resilience of coastal communities to climate change impacts and enhance carbon sequestration. The National Coastal Mission will provide a framework for work in all coastal states on incorporating ecosystem considerations into vulnerability assessment and establishing a system with a decision-support tool to guide planning, decision-making and monitoring of adaptation measures. Based on these assessments, ecosystem-based adaptation measures will be implemented in the three target states of Andhra Pradesh, Maharashtra and Odisha. These measures will focus on mangroves, seagrasses, coral reefs, salt marshes and coastal watersheds. Restoration and conservation of these coastal ecosystems will improve the delivery of critical ecosystem goods and services that will buffer local communities against the current and predicted impacts of climate change (e.g. sea-level rise, cyclones, storm surges) as well as underpin the sustainability of coastal livelihoods (e.g. fisheries, aquaculture). Protected and restored coastal ecosystems will also contribute to climate change mitigation, since coastal ecosystems (particularly mangroves and seagrasses) have been demonstrated to capture and store significant amounts of carbon – known as “blue carbon”.
84. Secondly, GCF resources and co-finance will support climate-adaptive livelihoods to enhance the adaptive capacities of coastal communities in the target states of Andhra Pradesh, Maharashtra and Odisha. Vulnerable fishing and farming household will receive support on new climate-adaptive livelihoods, and co-finance will support value chain development, in order to cope with the current and predicted effects of climate change. This will be done i) through adapting current farming practices by switching to new crops and new methods to deal with climate impacts on agroecosystems; and ii) through promoting new adaptive livelihood opportunities, based on the coastal ecosystems being restored to buffer climate impacts. Capacities of communities and sub-national government institutions will be strengthened so that they can continue beyond the project to adapt economic activities in line with evolving climate risks over time. Particular attention will be paid to the needs of women, youth and socially marginalized groups.
85. Thirdly, frameworks will be strengthened for landscape-level coastal and marine governance at the national and sub-national levels. Institutional strengthening will focus on establishing a network of institutions that are capacitated to undertake integrated planning for climate resilience in coastal landscapes, with a focus on ecosystem-based and community-centric adaptation measures. Climate change considerations will be mainstreamed into relevant policies, plans and regulations for coastal governance and management, and opportunities sought for new financial mechanisms that enable such measures to be scaled up. GOI co-finance will also build the capacities of local communities, government officials and other relevant stakeholders to integrate ecosystem-based approaches to climate change adaptation into planning, policy-making and investment decisions at all levels, including planning for climate risk-informed coastal infrastructure.

C.3. Project / Programme Description

86. The proposed project will combine GCF resources with co-financing from GoI (public expenditure allocations and investments) to enhance the resilience of coastal communities throughout India. The project will lead to the achievement of the following key results:
- Output 1. Enhanced resilience of coastal and marine ecosystems and their services;

- Output 2. Climate-adaptive livelihoods for enhanced resilience of vulnerable coastal communities; and
 - Output 3. Strengthened governance and institutional framework for climate-resilient management of coastal areas.
87. The work in Outputs 1 and 3 will be carried out both at national level and across all of India's 13 coastal States and Union Territories. In Outputs 1 and 2, specific ecosystem-based adaptation and climate-adaptive livelihood interventions will be undertaken in the three target states of Andhra Pradesh, Maharashtra and Odisha. These target states were identified through a country-driven, consultative and multi-criteria approach that assessed climate change vulnerability (CCV), climate change exposure (CCE) and the presence/extent of coastal ecosystems. Within these states, a total of 24 target landscapes were selected for investments in ecosystem restoration and climate-adaptive livelihoods, through a country-driven, consultative and multi-criteria approach (for further details, see Section 7.2 of the Feasibility Study in Annex II). The landscapes are typically clusters of villages within an area defined by socio-geographical features, e.g. a coastal lake basin with surrounding farmlands. The average size of a landscape is 66,108 hectares (see table of sites as Annex 5 to the Feasibility Study – 24 of the 34 listed landscapes were selected). Communities in these landscapes practice largely a combination of fishing and farming, and are directly dependent on surrounding natural ecosystems for their livelihoods. Wherever possible, the landscapes include the catchment area supplying freshwater to farmlands and estuaries, facilitating a “ridge to reef” approach to planning ecosystem-based adaptation measures across the landscape. The locations of the 24 target landscapes are shown on the maps of Andhra Pradesh, Maharashtra and Odisha in Annex IX.
88. Global datasets were used in conjunction with data from national- and state government to identify underlying baseline development challenges as well as expected vulnerabilities to the effects of climate change. Prioritization of sites was based on vulnerability and exposure to climate change impacts, as well as the presence and extent of relevant coastal ecosystems. For each state, districts were ranked and assessed according to these selection criteria. In particular, districts within each state were selected based on the vulnerabilities of local communities and their livelihoods to climate change impacts. The populations of these districts are largely rural, and depend primarily on agriculture and fisheries for their livelihoods. These livelihoods are particularly vulnerable to the impacts of climate change because: i) increased climate variability, rising temperatures, and increasing frequency/intensity of droughts and floods are reducing agricultural productivity; ii) storm surges are damaging agricultural land and property through erosion, coastal floods and saline intrusion; and iii) climate change effects on ocean temperatures and acidity resulting in migration and reduction in fish populations and damage to breeding grounds.
89. A preliminary livelihood assessment was undertaken and a portfolio of livelihoods options was developed, based on community consultations, past experiences and best practices for rural development in specific areas. The assessment took into account current livelihoods practiced in the targeted states, climatic suitability for new activities, and potential markets for products, as well as the projected impacts of climate change in these areas (see detail on this process in the Feasibility Study Section 7.5). See also Annex III and a report developed by the National Institute of Ocean Technology as an input to the project development process.⁹⁴ Support to climate-adaptive livelihoods will be targeted specifically at households experiencing the impacts mentioned above, to reduce their vulnerability and enhance their adaptive capacity. In addition, the project will target very poor households and those belonging to marginalized groups, and select interventions will benefit women, youth, elderly and disabled people, all of whom are additionally vulnerable. A description of the parameters and the results of the district prioritisation is presented in Section 7 of the Feasibility Study – Annex II. Gender and social assessment was conducted with various stakeholders in the selected sites to understand the specific challenges and opportunities facing women and socio-economically marginalized groupings, especially tribal communities. The assessment explored the existing livelihood opportunities of vulnerable groups; their coping strategies during climate-intensified disasters, access to and control over productive resources; participation in the decision-making process at the societal and household levels; access to services, inputs, technology, and markets for sustainable livelihoods. The findings of the assessments were incorporated in the feasibility study to increase the outreach of the programme to these particularly vulnerable communities; gender and social assessment is presented in the Annex XIII (c) - Gender Assessment and Action Plan.

Output 1: Enhanced resilience of coastal and marine ecosystems and their services

⁹⁴ Integrated Coastal and Marine Area Management Project Directorate & National Institute of Ocean Technology. 2016. An Integrated Approach to Assess the Biophysical Vulnerability of Coastal Areas (Andhra Pradesh, Odisha And Maharashtra) – A Feasibility Study

90. Activities undertaken under this output will generate a range of adaptation and sustainable development benefits through the conservation, restoration and maintenance of coastal and marine ecosystems to enhance their resilience. At a national scale and in all the coastal states, a long-term system will be established for undertaking vulnerability assessment of the coast, for undertaking restoration of coastal ecosystems, and for systematic monitoring of the results, including for carbon sequestration. In the 24 target landscapes in the three states, communities will collaborate closely with the Forestry Department in a co-management approach, both as recipients of work opportunities in restoration efforts, and as ongoing partners in maintaining the resource in a healthy condition – managing harvesting of timber on non-timber forest products, controlling pollution and helping to prevent illegal activities.
91. Protocols and guidelines will be established, and restoration efforts undertaken, including i) mangrove restoration through hydrological rehabilitation, e.g. restoring free tidal flow by constructing main and branch canals and opening access to tidal source; ii) mangrove restoration through planting of seedlings/saplings; iii) restoration of catchments through afforestation to prevent erosion and sedimentation of coastal ecosystems; iv) rehabilitation of seagrass beds and saltmarshes through hydrological rehabilitation; v) artificial regeneration of coral reefs through structure placement; vi) hydrological rehabilitation of coastal lagoons, e.g. dredging/breaching river mouths; vii) restoration of dune vegetation; and viii) establishment of shelter belts using a variety of suitable tree species. The operations and maintenance plan for this restoration of ecological infrastructure is outlined in Annex XIII (b).

Activity 1.1. Conducting vulnerability assessment of the coast to inform planning of ecosystem- and community-based adaptation interventions

92. Although vulnerability to climate change along India's coast has been studied and described, there is a need for fine-scale mapping of climate vulnerabilities in each coastal district to underpin local-level planning for effective adaptation interventions. This will also pave the way for future GOI projects through India's GCF Direct Access Entities. Information that is currently available largely focuses on bio-physical exposure to climate change risks and impacts, without fine-scale data on sensitivity and adaptive capacity of coastal communities, including ecological and socio-economic climate vulnerabilities (see Section C.2 for more details). A physical vulnerability map detailing exposure to climate change impacts has been developed for the coast of India. The Ministry of Earth Sciences' Indian National Centre for Ocean Information Services has developed a Coastal Vulnerability Index (CVI) using seven parameters (shoreline change, sea level change, coastal slope, significant wave height, tidal range, coastal regional elevation and geomorphology). In addition, MoEFCC has prepared shoreline change maps and identified ecologically sensitive areas for India's. However, these existing initiatives only detail biophysical exposure to climate change risks.
93. During the first few months of project implementation, information and analysis from existing studies – including the CVI and the Feasibility Study – will be complemented by a fine-scale assessment of the climate vulnerabilities of India's coast, focusing on aspects that are not currently included in the available studies. In particular, it will integrate measures of exposure, sensitivity and adaptive capacity to calculate a comprehensive vulnerability index for the entire coastline. This fine-scale assessment will serve two purposes, namely to: i) establish a methodology and baseline dataset for long-term monitoring and tracking of climate vulnerability along India's coast; and ii) inform community-centric and localized planning of ecosystem restoration (see Activity 1.2) and climate-adaptive livelihoods (see Activities 2.1 and 2.2) under this GCF project. Undertaking this assessment along the entire coast, supported by co-finance from the MoEFCC, will also facilitate undertaking of similar EbA interventions in other states.
94. The two main components to this assessment will be:
- **Ecosystem extent and integrity.** The assessment will include detailed analyses of the presence and condition of coastal ecosystems that provide critical goods and services that buffer against the expected effects of climate change, e.g. mangroves, coral reefs, seagrass beds and saltmarshes. The assessment will map the historic and present extent of these ecosystems, and identify drivers of ecosystem degradation. Based on this, a map of restoration potential will be developed, with specific reference to areas where ecosystem restoration/rehabilitation using an EbA approach can reduce the impacts of climate change on local communities.
 - **Socio-economic factors.** In addition to bio-physical exposure to climate change impacts, the vulnerability of local communities will be determined by their sensitivity⁹⁵ to specific impacts as well as their adaptive capacity⁹⁶ for coping

⁹⁵ Sensitivity is a factor of *inter alia* communities' dependence on their environment for livelihoods and other needs, their capacity for decision-making and other socio-economic factors including inequality, gender biases and traditions.

⁹⁶ Adaptive capacity is determined by the resources that communities are able to mobilise, e.g. social networks, financial means, knowledge, access to technology.

with climate change. The fine-scale assessment will include parameters for measuring both sensitivity and adaptive capacity, such as climate change awareness, income, gender, sources of livelihood, level of food and water security, access to technology and level of education.

95. The outputs of this process will include a system for producing a periodic detailed climate vulnerability map for the entire coastal zone of India, identifying areas of high vulnerability to the impacts of climate change. This first iteration of this map, and its GIS layers, will be housed within the National Centre for Sustainable Coastal Management (NCSCM), an autonomous centre of the MoEFCC, which will take responsibility for updating the map on a regular basis, beyond the lifetime of the GCF project, guided by the vision of the National.. The vulnerability assessment and map will be scientifically robust, based on existing methodologies derived from the IPCC and other best practices, and tailored to the national socio-economic, climate and environmental contexts.
96. The assessment will form the basis for a decision support tool that will be dynamic, enabling continuous updating as new climate and other information becomes available. This decision support tool will be applied to improve the state of knowledge on vulnerability to climate change in all of India's coastal districts, providing information on site-specific, local-level priorities for EbA interventions, and concerns of the specific vulnerable groups. National and state governments as well as NGOs and local communities will have access to the decision support tool, supporting them to design and implement site-specific, local-level adaptation measures that are ecosystem-based and community-centric, and addressing vulnerability of most marginalized groups.
97. To establish this vulnerability assessment system, the following steps will be undertaken:
- Supporting coastal research and management institutions to add ecosystem-related parameters to methodologies for guiding vulnerability assessment and national- and state-level planning and decision-making on adaptation and management measures to address climate change.
 - Applying the enhanced/revised methodology to establish a system for periodic detailed assessment of vulnerability and adaptive capacity along the entire coastline of India, using the analysis to inform planning of restoration and livelihoods activities for climate change adaptation.
 - Developing a Decision-Support Tool for adaptation planning at state and national levels that integrates district-level data with site-/district-level assessments to provide decision-makers with dynamic information that is regularly updated using data from census, ecological surveys and other sources.
 - Creating an online platform and associated app to facilitate access to information in the Decision-Support Tool for decision-makers, communities, NGOs/CBOs and other relevant stakeholders, as well as to allow them to upload data for tracking changes in ecological and socio-economic vulnerability to climate change in coastal areas.
 - Producing a national series of restoration guidelines based on the information used for the Decision Support Tool – one booklet /pdf per ecosystem type, drawing on site-level experience.

Activity 1.2: Community-based conservation and restoration of coastal ecosystems for increasing ecosystem resilience

98. In this activity, conservation, restoration and management of coastal ecosystems will be carried out, using both GCF funding and co-finance from national and all three State governments, in 24 target landscapes in 12 coastal districts (see locations on maps of Andhra Pradesh, Maharashtra and Odisha States in Annex IX). In addition to conservation and better management of coastal ecosystems, this will involve the restoration of 10,575 hectares of mangroves, 700 hectares of saltmarshes, 85 hectares of seagrass beds, 35 hectares of coral reefs and 3550 hectares of coastal watersheds (see Annex II Feasibility Study Section 7.4 for costs per hectare). These figures are based on the number of hectares of these ecosystems in the target landscapes with potential for restoration – see the table of target landscape sizes and hectares of ecosystem types in Annex 5 to the Feasibility Study (Annex II to this proposal – 24 of 34 landscapes selected). These interventions are necessary for two reasons – firstly to respond and adapt to negative impacts of climate change on coastal ecosystems, e.g. ocean warming and acidification causing coral bleaching, or sea-level rise and storm surges causing saline intrusion that disturbs the hydrological balance in estuaries. Secondly, the coastal ecosystems are themselves important as buffers protecting human lives and livelihoods from damage by extreme events, and as the basis for coastal communities' livelihoods. In response to iTAP review, an additional assessment has been done of the return on investment on restoration of coral and seagrass systems, given the high cost of the proposed restoration, and a justification provided for the approach and why it has been chosen above other alternatives (see *Annex XIII n*).

99. The coastal ecosystems prevailing in the project's target states include mangroves, coral reefs, saltmarshes, seagrass beds and coastal/dune vegetation, linked together into wider catchment areas that form an interactive and integrated large coastal system "from ridge to reef", in which the physical presence of each ecosystem helps to support the others. The presence of a coral reef, for example, provides protection from excessive wave action, allowing a seagrass ecosystem to develop in the back lagoon and a mangrove at the landward edge. In turn, mangroves and seagrass ecosystems trap sediments, thereby improving water quality and clarity in the immediate subtidal zone, providing suitable conditions for coral reefs to thrive, and nurseries for fish species. In combating the impacts of climate change, these ecosystems contribute in different ways to the protection of coastal livelihoods and limit damage to ecological as well as built infrastructure. For example, mangroves provide protection from storm surges caused by cyclones⁹⁷ and saltmarshes trap sediment, raising the level of the seabed and helping to combat the combined effect of storm surges and sea level rise.⁹⁸
100. Investments in ecological infrastructure to build climate resilience will be overseen by the Forest Department at state level, with a key role by the State Coastal Zone Management Authorities currently being established to ensure coordinated implementation of Coastal Zone Regulations. The field activities will be implemented by the respective line departments at state, district and sub-district levels, NGOs and CBOs under the overall guidance and supervision of the state and district level coordination mechanism as above. At the village level, Village Organizations (federations of Self-Help Groups) and Eco Development Committees will be involved in project implementation through the establishment of co-management structures involving government and CBOs/NGOs. Restoration work will be undertaken by Eco Development Committees within protected areas, and Van Samrakshan Samitis outside PAs (e.g. on state-owned Revenue lands), and these organizations will pay community participants for work carried out. Co-management of natural resources – which has been implemented across India for the past 30 years and the project will build on this tradition. Site restoration protocols will be discussed for each site between the Forestry Department and community structures to clarify community roles in co-management and arrangements on sustainable harvesting. This process will be coordinated and monitored across the project by the Natural Resource Management Officer in the national PMU and by the Ecological and Adaptation Specialists in the State PMUs. In the target landscapes the development, implementation and monitoring of site protocols will be undertaken by the NGOs contracted by the Forestry Department, working with community co-management structures and the Ecological and Adaptation Specialists.
101. The protocols will feed into Target Landscape Integrated Management Plans (TLIMPs) that will be developed for each of the 24 target landscapes. These will meet the requirements of the Coastal Regulation Zone Notification (2011) for Integrated Management Plans in Critically Vulnerable Coastal Areas (CVCAs). Where appropriate, these Plans will include Biodiversity Conservation Action Plans (which will ensure that in areas of critical habitat, no project activities will be implemented unless the requirements of paragraph 17 of IFC Performance Standard 6 can be met). In some cases, the initial phases of restoration work will necessitate the exclusion of community members from areas where they previously had access, for example to harvesting resources. Such restrictions will be explained and awareness raised on the medium and long-term benefits, and where possible, alternative sites will be provided for compensatory access to resources (see Annex VI (b) for further details). In some cases, the initial phases of restoration work will necessitate the exclusion of community members from areas where they previously had access, for example to harvesting resources. Such restrictions will be explained and awareness raised on the medium and long-term benefits, and where possible, alternative sites will be provided for compensatory access to resources (see Annex VI (b) for further details).
102. Conservation and restoration of coastal ecosystems will, in this project, be achieved through the following general practices: i) severely degraded ecosystems will be restored; ii) slightly to moderately degraded ecosystems will be managed to allow for natural regeneration; iii) where potential exists, new ecosystem areas that provide protection against climate change impacts will be created; and iv) existing functional ecosystems will be protected and maintained. More details on specific restoration interventions in particular ecosystem types are outlined in Section F.2 of this proposal, based on the detailed methodological recommendations contained in Section 7.4 of the Feasibility Study (Annex II). This Activity will involve:
- Supporting participatory planning in target landscapes of site-specific EbA measures for conservation and restoration of six ecosystem types (see Annex II Feasibility Study Section 7.4), based on the analysis of vulnerability to climate change impacts and adaptive capacity undertaken through Activity 1.1.

⁹⁷ Duarte, C.M., et al, The Role of Coastal Plant Communities for Climate Change Mitigation and Adaptation, *Nature Climate Change* 3, 961-968 (2013)

⁹⁸ Shepard CC, Crain CM & Beck MW. 2011. The protective role of coastal marshes: a systematic review and meta-analysis. *PLoS ONE* 6:e27374. doi:10.1371/journal.pone.0027374

- Developing detailed, ecosystem- and site-specific protocols and guidelines – based on global and national best practices – for restoration of the various ecosystem types (mangroves, saltmarshes, coral reefs, seagrass beds, dune vegetation, etc.) using an EbA approach.
- Establishing co-management structures in target landscapes to foster community support for and participation in conservation and restoration activities, including pollution management to minimize impact on ecosystems.
- Undertaking ecosystem conservation, restoration and management (including pollution control) activities – based on the EbA protocols and through the co-management structures – in the project sites in the three states.
- Developing and implementing community-based/participatory monitoring and maintenance programmes through the co-management structures to maintain restored ecosystems and capture lessons learned and best practices from the project sites.
- Training and supporting communities in 24 target landscapes – with a focus on local youth as well as NGOs/CBOs – to use the coastal adaptation Decision-Support Tool to track the restoration and conservation of coastal ecosystems in 3 target states, including extent of restored ecosystems and carbon sequestered.
- Producing a video in each of the three target States on the restoration and conservation work of the multi-stakeholder partnerships in the target landscapes

Output 2: Climate-adaptive livelihoods for enhanced resilience of vulnerable coastal communities

103. GCF funding and co-finance will be used to support vulnerable communities, whose current fishing and farming livelihoods will be increasingly negatively affected by climate change, to adapt their livelihoods to climate change in the 24 target landscapes in the three states (see Feasibility Study in Annex II for detailed outline of the sites and their selection based upon criteria of socio-economic vulnerability to climate change impacts, bio-physical exposure to such impacts, and the presence of coastal habitats and intertidal ecosystems). The output will help enhance adaptive capacity, including capacity to adapt existing livelihood activities and diversify to climate-resilient options, and to do business planning and access finance for scaling up harvesting, agri-and aquaculture operations. This will also include developing value chains to ensure uptake and the long-term sustainability of these adaptive livelihoods, including support on business planning, access to finance, certification and labelling of eco-products, and access to markets.

104. A study was undertaken on a suite of climate-adaptive livelihood activities, including understanding their value chains and assessing market potential for their products, in order to ensure adoption and the long-term sustainability of these livelihoods alongside evolving climate risks. These activities were outlined in several community consultations, and feedback was incorporated into the design of the activities (see record of stakeholder consultations in Annex XIII(d)). The work on livelihood options is detailed in Section 7.6 of the Feasibility Study (Annex II). This initial identification of suitable livelihood options and viable value-chains (based on the sub-assessment of the Feasibility Study) has been further developed to provide a suite of suitable activities for each target landscape, building on a detailed assessment of community vulnerabilities (see Annex XIII (i) “Restoration of Livelihoods and Activities per Landscape”). Technical assistance will be provided to livelihood activities in two categories: Category A livelihoods based on coastal ecosystems restored to buffer climate impacts, and establishing value chains to sustain these livelihoods alongside evolving climate impacts; and Category B livelihoods that adapt current farming practices to deal with climate impacts on agro-ecosystems. These are detailed in Table 3 below:

Table 3: Climate-adaptive livelihoods

Category of Climate-adaptive livelihoods	Households vulnerable to climate change targeted	Climate-adaptive livelihoods and value chains activities to be supported	Rationale: how these livelihoods link to the overall EbA Strategy	How these livelihoods and value chains are adaptive
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<p>Category A <i>Livelihoods are based on coastal ecosystems restored to buffer climate impacts</i></p>	<p>These opportunities are targeted at fishing households whose current livelihoods are threatened by climate change impacts on fisheries and aquaculture (including ocean warming and acidification)</p>	<p>1. Aquaculture GCF funding and co-finance: Crab farming, mussel farming, oyster farming, crab hatcheries, ornamental fisheries, seaweed farming Co-finance only: Duck-fish farming</p>	<p>These livelihoods take place in creeks and ponds in the intertidal zone and benefit from EbA measures to conserve, restore and manage ecosystems such as mangroves, seagrasses and saltmarshes (being undertaken also to buffer coastal communities and assets against storm surges)</p>	<p>Households whose livelihoods are largely dependent on fishing activities, which are being impacted negatively by climate change, are able to diversify into aquaculture, ecotourism and other activities that are adaptive because they:</p> <ul style="list-style-type: none"> a) Enable diversification away from reliance of all household members on near-shore fishing b) Utilize conserved and restored ecosystems that are also providing buffers against storm surges c) Utilize conserved and restored ecosystems whose nursery function for fish and shellfish is enhanced d) Provide powerful co-benefits in sustaining community livelihoods in the face of evolving climate risks, strengthening the case for conserving and restoring these ecosystems e) Expanding value chains for the products of climate-resilient aquaculture and agriculture helps ensure the sustainability of these operations beyond the project lifetime f) Adding value to climate-resilient aquaculture and fishing products strengthens the case for restoring the ecosystems on which these operations depend g) Expanding value chains for these products creates diversified livelihoods opportunities, taking pressure off natural and agricultural ecosystems, which have a finite ecological carrying capacity
		<p>2. Processing of aquaculture products Co-finance only: MSMEs for value-added fish products, fishmeal plants, fish and shellfish / bivalve processing units</p>	<p>Support is provided to the entire value chain of the livelihood in order to ensure its sustainability. Technical assistance is provided for value addition to fishing and aquaculture products that benefit from EbA measures to conserve, restore and manage ecosystems. This value addition forms a critical part of the strategy to sustain these livelihoods over time, alongside evolving climate risks.</p>	
		<p>3. Coastal ecotourism Co-finance only: Scuba diving, tour guiding</p>	<p>These livelihoods take place close to the intertidal zone and benefit from the scenic beauty derived from EbA measures to conserve, restore and manage ecosystems, especially coral reefs in the case of scuba diving</p>	
		<p>4. Coastal non-timber forest products Co-finance only: Mangrove beekeeping for honey production</p>	<p>This livelihood takes place in and near mangroves, which benefit from EbA measures. In addition to year-round nectar and water, the stability of mangroves provides protection from storms intensified by climate change⁹⁹</p>	

⁹⁹ <http://mangroveactionproject.org/wp-content/uploads/2013/08/MAP-Mangrove-Apiculture-Info.pdf>

<p>Category B <i>Livelihoods are adapted to specific climate change impacts on agro-ecosystems</i></p>	<p>These opportunities are targeted at households whose agricultural livelihoods are threatened by climate impacts (including temperature increase and more erratic monsoons) helping to adapt through more climate-resilient practices.</p>	<p>5. Climate-smart intensification GCF funding and co-finance: System of Rice Intensification (SRI) for paddy farming</p>	<p>This livelihood - the System of Rice Intensification, and more water-efficient crops such as aromatic plants, form part of a strategy to promote climate-resilient agro-ecosystems – managing soil and water resources better to withstand erratic monsoons with longer dry spells</p>	<p>Households whose farming activities are being negatively impacted by climate change impacts are able to adopt adaptive practices, including switching from traditional paddy rice to the System of Rice Intensification, as well as cultivating new water-efficient crops. These new methods are adaptive because:</p> <ul style="list-style-type: none"> a) New crops like aromatic and medicinal plants require little irrigation b) SRI uses less water overall than traditional inundated paddy rice farming, and is more drought-resistant c) SRI achieves yields consistently at least 40% higher than traditional farming despite climate stressors d) SRI planting patterns and deeper roots mean greater resistance to rain and wind damage from storms e) SRI has mitigation co-benefits as it reduces the methane gas emissions from the paddy fields, and increases sequestration through higher grain and straw yield and more root biomass.¹⁰⁰
		<p>6. Climate-adapted crops Co-finance only: - Cultivation of aromatic and medicinal plants, mushroom cultivation</p>	<p>These livelihoods form part of a strategy to promote climate-resilient agro-ecosystems through changing cropping patterns – cultivating new crops that use less water and/or can tolerate increased temperatures</p>	

Activity 2.1. Building climate-adaptive livelihoods and enterprises through value chains and strengthened access to markets

105. In this activity, the results of the vulnerability assessment in each of the 24 target landscapes will be combined with the suite of options identified in the livelihoods assessment and value chain analysis, to select specific livelihoods, beneficiary groups, participating community organizations and locations. Beneficiaries will become involved through a range of organizations at community level – including Gram Panchayats (local self-governance institutions), Self-Help Groups, Village Organizations (federations of Self-Help Groups), Fishermen Cooperative Societies, Farmer Producer Organizations, Eco Development Committees, Van Samrakshan Samitis and Joint Forest Management Committees. Selection of organizations for involvement will be guided by the District/Landscape-Level Coordination Committees and carried out by the NGOs responsible for climate-adaptive livelihoods training and technical support, whose contractual services will be procured by the State Forestry Departments. Detailed criteria and methodologies for selection, including specific criteria for the engagement of Scheduled Tribes, will be discussed at the project inception workshop and included in the terms of reference for the NGOs' contracts. The NGOs will be assisted by the Socio Economic and Livelihoods Specialists, who will be supporting the work of Output 2 in the target landscapes in two coastal districts each.
106. The coordination of livelihoods activities to meet the overall project beneficiaries totals will be undertaken by the National Project Coordinator, in cooperation with the three State Project Managers. The Livelihoods Specialists will

¹⁰⁰ http://sri.ciifad.cornell.edu/conferences/IRC2014/booth/SRI_climate_smart_rice_production_%20handout_2014.pdf

play a facilitation role throughout the project, supporting the development of value chains around the selected livelihoods, helping to determine and facilitate opportunities for processing of climate-adaptive aquaculture and agriculture products, as well as packaging, storage and refrigeration, and linkages for transport and market access. Where appropriate, this will also include support to establish certification schemes for “eco” products, and to access loan finance. GCF resources will not be used to provide such loans, but to provide technical support in accessing loans. NGOs will be contracted by the Forestry Department to provide technical support to community groups undertaking processing of the products of climate-adaptive aquaculture and agriculture, and to provide training to extension officer and community mobilizers involved in co-financed schemes. For assets in the villages created to undertake processing of the products of climate-adaptive aquaculture and agriculture, community structures such as self help groups will be encouraged to take out state-subsidized insurance on the assets created, against disasters such as flooding, storm damage or fire. Support in accessing such insurance products will be provided through this work, which will include:

- Undertaking participatory, user-centric livelihoods planning in target landscapes – evaluating climate-adaptive livelihood options based on vulnerability assessment and preliminary livelihoods assessment, and producing value-chain development strategies^[1]_{SEP}
- Providing technical support to community groups to set up the adaptive livelihoods and add value to the products of climate-adaptive aquaculture¹⁰¹
- Providing training for extension officers and community mobilizers on ensuring that planned livelihoods and value addition activities are climate-risk informed
- Supporting the development of value chains for climate-adaptive livelihoods, facilitating backward linkages for input supply, and forward linkages for processing, packaging, storage, refrigeration, transport and market access
- Providing technical assistance to community groups to set up certification schemes for “eco” products, and to develop bankable business plans to access loan finance for expansion, during or post-project.

Activity 2.2. Improving capacities of local communities for community-based adaptation and climate-adaptive livelihoods

107. In parallel with Activity 2.1, vulnerable fishing and farming households and community groupings in the target landscapes will benefit from capacity development opportunities. This will include general capacity building around understanding the impacts of climate change on ecosystem functioning and livelihoods based on natural resources, and specific skills development opportunities. Skills development training will be carried out by NGOs contracted by the Forestry Department, and will cover a range of climate-adaptive livelihoods in aquaculture, ecotourism and non-timber forest products, as well as climate-smart intensification and climate-adapted crops (see Table 3 above for details of the livelihoods options and how they are climate adaptive), with technology transfer through demonstration projects. The district-level Livelihoods Facilitators will also provide support to ensure that women, youth and marginalized groups are participating fully in livelihoods activities and decision-making processes, and will help facilitate learning and sharing between communities. State-wide awareness campaigns will also be supported, ensuring broad public support for the importance of ecosystem restoration to buffer extreme events and as the basis for sustainable livelihoods in coastal communities. This work will involve:

- Conducting multimedia public education and awareness campaigns across the three states on climate change and its impacts, and the need to conserve and restore ecosystems to underpin livelihoods and buffer extreme events
- Undertaking village-level capacity building on climate change and EbA in target landscapes in light of evolving climate risks - involving women’s groups, self-help groups, producer and fisher organizations, CBOs, NGOs and Panchayat Raj institutions, with focus on women, youth, and marginalized groups
- Delivering training courses for climate-adaptive aquaculture¹⁰², ecotourism¹⁰³ and non-timber forest products¹⁰⁴, as well as climate-smart intensification¹⁰⁵ and climate-adapted crops¹⁰⁶ through relevant community-based organizations (e.g. self help groups) and local self-governance institutions (e.g. Gram Panchayats)
- Facilitating sharing of lessons between target landscapes on effective techniques for climate-adaptive livelihoods, including through exchange visits between communities, with focus on women, youth, and marginalized groups.

Output 3: Strengthened governance and institutional framework for climate-resilient management of coastal areas

108. This output provides pathways to replication and scale by extending the approaches to ecosystem restoration carried out in Output 1 and approaches to climate-adaptive livelihood support carried out in Output 2, across all of India's 13 coastal States and Union Territories, and also shares knowledge on coastal resilience with countries in the wider South Asian region. This includes integrating adaptation into public and private sector policies, plans and budgets (Activity 3.2) in all coastal states through a network of institutions (Activity 3.1), and undertaking targeted valuation and cost-benefit analyses, to motivate for new investments in EbA as well as knowledge sharing on the evidence base for such investments (Activity 3.3).

Activity 3.1: Network of institutions for enhanced climate resilience and integrated planning and governance in all coastal states

109. The new National Coastal Mission (anticipated in 2018) will harness national Government co-finance to provide a framework for coordination amongst institutions responsible for coastal and marine governance in all 13 coastal States and Union Territories, and the State Forestry Departments will promote intersectoral coordination in the 24 target landscapes. At present, institutional capacity for integration of climate change considerations into local- and state-level economic and sectoral planning and decision-making is inadequate to fully address the impacts of climate change. MoEFCC co-finance will enhance linkages between existing institutions, in order to strengthen institutional arrangements and facilitate dialogue and collaboration on coastal climate resilience. This will involve the integration of climate change adaptation into policies, plans and budgets (see Activity 3.2) as well as sharing of knowledge and information on climate change adaptation using EbA approaches (see Activity 3.3).

110. In the target landscapes and/or the districts into which they fall, multi-stakeholder coordination structures¹⁰⁷ – comprising representatives from relevant state-level ministries¹⁰⁸, district-level government¹⁰⁹, NGOs and academic/research institutions – will be established to promote dialogue and coordination concerning climate-resilient planning in coastal areas. Existing interdepartmental platforms will be used in the 13 coastal states/territories to facilitate incorporation of ecosystem- and community-based adaptation approaches. A pan-Indian Coastal Resilience Network will also be established to share knowledge. These institutions will then be responsible for ensuring coordination and collaboration between relevant stakeholders including government institutions, development partners, donor agencies, local communities, CBOs/NGOs and the private sector. Interventions to develop and support this network of institutions will include:

- Establishing multi-stakeholder coordination structures in target landscapes in the three states to provide a platform for dialogue on and coordination of climate-resilient development planning and co-management of coastal ecosystems.
- Using existing interdepartmental platforms in 13 coastal states – particularly State Action Plans for CC and CZM Authorities – to facilitate integration of EbA approaches into relevant policy and legislation, and to share lessons learned and best practices from target landscapes and states.
- Establishing a pan-Indian Coastal Resilience Network of organizations, tertiary institutions, coordination platforms and coastal districts – to promote knowledge exchanges on integration of climate change adaptation into coastal development planning, with a focus on EbA.
- Supporting the proposed National Coastal Mission in integrating climate change adaptation – and particularly EbA – into its programme of work.

Activity 3.2: Integrating ecosystem-centric approaches to climate change adaptation into public and private sector policies, plans and budgets, and scaling up finance for EbA

¹⁰¹ Processing of climate-adaptive aquaculture products: for example fish drying, production of value-added prawn products

¹⁰² Aquaculture: including crab farming, mussel farming, oyster farming, crab hatcheries, ornamental fisheries, integrated duck-fish farming, seaweed farming, integrated multitrophic aquaculture

¹⁰³ Coastal ecotourism: including scuba diving, tour guiding

¹⁰⁴ Coastal NTFPs: including mangrove beekeeping for honey production

¹⁰⁵ Climate-smart intensification: including System of Rice Intensification (SRI) for paddy farming

¹⁰⁶ Climate-adapted crops: including Cultivation of aromatic and medicinal plants, mushroom cultivation

¹⁰⁷ Similar to the Chilika Development Authority.

¹⁰⁸ E.g. forests, environment tourism, revenue.

¹⁰⁹ E.g. district collectors.

111. Climate change adaptation using ecosystem-based, community-centric approaches is not adequately mainstreamed into policy, planning and regulatory frameworks for coastal governance, nor are there currently sufficient sources of funding for scaling it up across India. The proposed project will support improved dialogue for mainstreaming and integration of climate change adaptation into existing policies and plans, particularly for local- and state-level spatial and development planning. At national level this will include work through the new National Coastal Mission to integrate climate risk management and EbA principles into national policies and schemes, including the CAMPA afforestation fund and Smart Cities Mission. At state level, interdepartmental platforms in all coastal states will be used to facilitate scenario planning and policy dialogues, and hold public and private sector dialogues. The aim of this process will be to ensure that land use planning undertaken at state and district level, integrates climate risk management, such that natural habitats with potential to buffer extreme weather events and provide a basis for climate-adaptive livelihoods are preserved or restored wherever possible, and that the footprint of new urban and industrial infrastructure is directed into areas of land that are already transformed.
112. This activity will also enhance capacities for undertaking climate-resilient planning in urban areas along the coast, using a Coastal Calculator Tool to support climate-resilient design of coastal infrastructure. Government currently has a Smart Cities Mission under the Ministry of Urban Development (and linked to the Mission on Sustainable Habitat), which focuses on citizen-friendly and environmentally sustainable cities, but does not systematically address climate change risks. The project will work in the four coastal Smart Cities in the three target States (Kalyan in Maharashtra; Kakinada and Visakhapatnam in Andhra Pradesh; and Bhubaneswar in Odisha) to develop climate change adaptation plans that harness ecological infrastructure to combat sea-level rise and intensified storm surges, promoting safety of lives, livelihoods and property, and smooth functioning of drainage, irrigation and drinking water systems. This work will include:
- Supporting the new National Coastal Mission to integrate climate risk management and EbA principles into national policies and schemes, including CAMPA afforestation fund and Smart Cities Mission
 - Facilitating biennial intersectoral dialogues under the National Coastal Mission - engaging public and private sector role-players on coastal adaptation as a risk management strategy, incl. fisheries, agriculture, tourism, ports and shipping, oil and gas
 - Equipping the interdepartmental CZM platforms in 13 coastal states to use scenario planning for business as usual vs ecosystem-based adaptation in the coastal zone
 - Developing ecosystem-based adaptation plans for four coastal Smart Cities (Kalyan in Maharashtra; Kakinada and Visakhapatnam in Andhra Pradesh; and Bhubaneswar in Odisha)
 - Working through state-level interdepartmental platforms to provide coastal town planners and engineers with training on the Coastal Calculator tool, using EbA for shoreline protection and climate-resilient infrastructure

Activity 3.3: Knowledge management for coastal resilience

113. A major focus of this activity will be the transfer and replication of lessons and best practices – between target landscapes, between coastal states, and between coastal countries in the South Asian sub-region. Lessons learned from the project's EbA investments will be generated through rigorous, frequent and long-term monitoring. Investment in knowledge management through this activity, co-financed through the MoEFCC, will enable sharing of information on global best practices, facilitating the gathering and sharing of lessons learned and evidence gathered during the project, and underpinning the integration of climate change adaptation into policy- and decision-making (see Activity 3.2).
114. The monitoring of EbA investments will be guided by scientists, but conducted wherever feasible by community members. The long-term data sets created will be used for adaptive management of project interventions through the duration of the project and to inform future EbA investments in the coastal zone of India. The full socio-economic and ecological benefits of EbA investments are often maximized a decade or more after the time of intensive ecosystem restoration. For this reason, the long-term data sets from the project will be archived within Indian research institutions and the long-term monitoring of the GCF project's investments will also be institutionalized. Similarly, detailed, long-term Operations and Maintenance (O&M) Plans will be developed for all ecological and physical infrastructure constructed by the project. Government funding for O&M will include: i) financing of ongoing restoration, conservation and management of those ecosystems restored by the project; and for maintaining the mechanisms and tools established by the project (e.g. the Decision-Support Tool, the network of governance institutions and Pan-Indian Resilience Network).

115. National level co-finance during the project through the MoEFCC will facilitate the embedding the coordination and operation of these mechanisms and structures in budgets and mandates beyond the life of the project. These plans will also include long-term funding commitments for enhancing the ecological infrastructure and maintaining the physical infrastructure associated with livelihoods interventions. The condition of ecological infrastructure will be maintained by protecting the ecosystems, minimizing human pressures and promoting natural ecological processes that facilitate recovery of ecosystems from a degraded state. Physical infrastructure will be maintained by ensuring that regular inspections take place and that required repair work is undertaken timeously. The monitoring of all the project's restoration investments will include at a minimum: plant survivorship, plant vigour, rate of growth, soil/sediment chemistry (where applicable) and water chemistry. Where feasible, monitoring of the following will be included: stream flow, sedimentation, erosion, groundwater volume, wave energy, size of storm surges, supply of non-timber forest products and supply of timber.
116. Lessons learnt from the restoration of coastal ecosystems, improved livelihoods and strengthened local governance practices will also be shared through the various platforms and coordination structures strengthened in Activity 3.1, ensuring coverage of women and other vulnerable groups' experiences. Partnerships with academic institutions through the state-level platforms will support the generation of new research findings and publications, and new curricula will be developed for relevant learning institutions. Knowledge products will be generated to build and strengthen awareness about the effectiveness of ecosystem- and community-based adaptation. This will be used to inform the integration of ecosystem-centric approaches to climate change adaptation into sector policies, plans and budgets (see Activity 3.2). Moreover, an enabling environment will be created to foster exchange of knowledge and ideas for innovative and sustainable solutions to climate change impacts. Successful case studies and lessons learned from similar initiatives in India and other countries will be documented and disseminated widely, and knowledge exchange visits arranged within and beyond India.
117. Knowledge management will take place through the following means:
- Supporting the National Coastal Mission to establish a system for collating data and information on global best practices, lessons learned, evidence from the field and scientific knowledge on ecosystem- and community-based approaches to adaptation in the coastal zone of India.
 - Establishing a series of annual workshops under the auspices of the pan-Indian Coastal Resilience Network, involving tertiary institutions, research organizations and relevant NGOs to share research findings related to coastal EbA
 - Developing and piloting a training course or curricula on EbA, for delivery through administrative training and other relevant institutes at national and state levels, incorporating project experience and lessons especially on community-based adaptation.
 - Working through the Pan-India Coastal Resilience Network to develop and disseminate knowledge products at national, regional and international levels and to share experience and learning.
 - Developing nation-wide knowledge products translated into local languages for use in the community-level training courses for village self-help groups and CBOs, and women's capacity development programmes.
 - Undertaking exposure and exchange visits for national-, state- and district-level government officials and community leaders to promote knowledge sharing on cross-sectoral coastal governance, climate change adaptation and EbA.
 - Creating a knowledge exchange platform involving South Asia's five coastal countries for dialogue and sharing learning on ecosystem-and community-based adaptation to climate change in the coastal zone, building on existing forums.

C.4. Background Information on Project / Programme Sponsor (Executing Entity)

118. The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India will be the Implementing Partner for the project, and will be responsible for activities at national level and for coordinating the upscaling of project activities in the other 10 coastal states. The state governments of Andhra Pradesh, Maharashtra and Odisha, as Responsible Parties, will carry out state-level activities in these three states through an agreement with the MoEFCC.

119. In the Central Government, MoEFCC is responsible for planning, promotion, co-ordination and overseeing the implementation of India's environmental and forestry policies and programmes. This ministry is the nodal ministry for all matters relating to climate change and coordinates implementation of the National Action Plan on Climate Change (2008). The MoEFCC also hosts the National Adaptation Fund, which provides resources to the state governments for adaptation actions, and serves as the nodal agency in the country for the UN agencies and programmes pertaining to environment and climate change.
120. MoEFCC also has extensive experience in executing donor-funded projects. It is the executing partner of the GEF-funded projects "Conservation of Coastal and Marine Biodiversity in East Godavari River Estuarine Ecosystem" (total financing: US\$ 24 million) and "Mainstreaming Coastal and Marine Biodiversity Conservation into Production sectors in Sindhudurg Coast in Maharashtra" (total financing: US\$ 15 million). MoEFCC is also administering the Compensatory Afforestation Fund Management and Planning Authority initiative (total budget: US\$ 5 billion across all states), to promote: i) conservation and restoration of forests; ii) infrastructure development; iii) wildlife conservation; and iv) training of forest departments. In addition, the portfolio of initiatives and development projects managed by MoEFCC also includes investments into pollution abatement and watershed management through the National River Conservation Directorate (total expenditure of US\$ 244 million through six initiatives).
121. As the Implementing Partner using UNDP's National Implementation Modality, MoEFCC will provide support for project management as well in-kind contributions to project implementation through its technical and administrative staff and systems at the national level. This will include operations and management support from MoEFCC staff, as well as funding officials' travel for the project, housing the dedicated National Project Management Unit, and facilitating project meetings. The Joint Secretary: CRZ of MoEFCC will be the functional executive in the national project steering committee.
122. The National Centre for Sustainable Coastal Management (NCSCM) and the Society of Integrated Coastal Management (SICOM) are autonomous centres of the MoEFCC, and will both be represented on the national project steering committee, along with relevant national Ministries. The NCSCM helps implement the Coastal Regulation Zone Notification 2011, and developed national guidelines for Integrated Coastal Zone Management. It has a key role in the national Coastal Mission under the NAPCC (2008), and has conducted relevant research studies on shoreline change assessment, and mapping ecologically sensitive areas. SICOM hosts a project management unit for implementing Phase II of the World Bank-assisted Integrated Coastal Zone Management (ICZM) project. The national project management unit of the GCF/GOI project will be hosted separately in the MoEFCC under the Joint Secretary: Coastal Regulation Zone.
123. The targeted coastal states of Andhra Pradesh, Maharashtra and Odisha have prepared State Action Plans on Climate Change, in which building climate resilience of coastal areas is a significant component. As co-sponsors of the project, the three State Governments and their Forestry Departments have made a commitment to co-financing the project, aiming to bring about the incorporation of new ecosystem-based adaptation approaches into ongoing development planning, to enhance their efforts in implementing the SAPCCs. These national and state partners will be vital to all operational matters, as outlined in the section on Implementing Arrangements.

C.5. Market Overview (if applicable)

124. Through Activity 2.1, the project will support local communities and CBOs such as self-help groups, producer organizations and fisher associations – with a focus on women and other vulnerable population groups – to undertake sustainable and climate-adaptive livelihood options, particularly those based on ecosystem goods and services, through support for value-chain development, business planning and access to finance. Specific products and services supported by the project will include climate-smart agricultural practices, sustainable fisheries and aquaculture, for diversifying and climate-proofing livelihoods. A financial analysis has been conducted for each of these livelihood opportunities, to assess their financial soundness and their expected financial rate of return (see Annex III).
125. Value addition to the products of these coastal livelihoods forms a critical part of the strategy to sustain them over time, alongside evolving climate risks. Critical linkages are currently missing between farmers and markets, resulting in fragmented agricultural value chains; and untapped opportunities exist for adding value through processing of

agricultural and aquacultural products, as well as producing products with an intrinsically higher value¹¹⁰. There is a large scope in India for the growth of the value-added agricultural products market sector, given the presence of both the necessary supply of diverse raw agricultural products and significant consumer demand. Crop diversification can open new value chains for communities and broaden their reach to national and international markets. Value chains for fisheries and aquaculture products include: i) production/supply chains; ii) distribution, transportation and logistics; and iii) marketing products to the final consumer^{111,112}. Forward value chain linkages such as seafood processing/storage and the development of value-added products increase income for communities and individual farmers. Value-added fisheries products include processed fish, crustacean and bivalve products which generate more value through the export – as opposed to domestic – market¹¹³.

126. Lack of access to resources to prolong the life of produce and/or enable sale in markets at a distance, such as drying or freezing facilities is a challenge for most fishermen and aquaculture farmers¹¹⁴. The establishment of smoking and drying facilities as well as refrigeration/freezing facilities under Activity 2.1 will facilitate the creation and distribution of value-added products. Backwards value chain linkages include the production of fishing nets and boat building, as well as the production of crab feed. Further market mapping and analysis of value chains will also be conducted as part of participatory livelihoods planning in target landscapes and villages.

C.6. Regulation, Taxation and Insurance (if applicable)

127. There are no applicable licenses for the implementation of the project. No foreign exchange regulations are involved, as no import of machinery/equipment is required. In addition, there are no tax implications applicable to ecosystem restoration or coastal governance and planning. The project will promote livelihoods activities that will generate small amounts of revenue, but promotion of MSMEs through the project is likely to result in enterprises generating less than the threshold for tax exemptions for small business units (annual turnover of up to Rs 2 crore or US\$ 300,000) in terms of the Income Tax Act.
128. For any activities related to procurement of services through UNDP, taxes are exempted by refund. Section 7 of the Convention on the Privileges and Immunities of the United Nations provides *inter alia* that the United Nations and its subsidiary agencies are exempt from all direct taxes (except charges for utilities services) as well as from customs duties and charges of a similar nature in respect of articles imported or exported for official use. If the services are procured directly by GoI implementing partners, then national and state legislation will apply, including payment of taxes such as VAT according to the national or state rates, as applicable.
129. There are no specific insurance policies relevant for the project activities. In terms of the Environment Protection Act, any activities being financed through the project, or in parallel with it, that are obliged to conduct an Environmental Impact Assessment will do so, including activities in Special Export Zones, ports, harbours, building and construction projects, (enumerated in Schedule of EIA notification, 2006) as well as all ecosystem restoration and other work.

C.7. Institutional / Implementation Arrangements

130. The project will be implemented following UNDP's National Implementation Modality (NIM), according to the Special Agreement concerning Technical Assistance between UN organizations and the Government of India (signed by both Parties on 14 February 1952) and the Agreement between UN Special Fund and the GOI concerning Assistance from the Special Fund (signed on 20 October 1959), and according to policies and procedures outlined in the UNDP POPP (see: <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=245&Menu=BusinessUnit>).
131. The national executing entity - also referred to as the national 'Implementing Partner' in UNDP terminology - is required to implement the project in compliance with UNDP rules and regulations, policies and procedures, including the NIM Guidelines. These include relevant requirements on fiduciary, procurement, environmental and social safeguards, and other performance standards. In legal terms, this is ensured through the national government's signature of the Special Agreement concerning Technical Assistance between UN organizations and the Government of India (signed by both Parties on 14 February 1952) and the Agreement between UN Special Fund

¹¹⁰ Kumar S & Sharma A. 2016. Agricultural value chains in India: prospects and challenges. CUTS International discussion paper.

¹¹¹ NS/Oxfam, 2005.

¹¹² De Silva 2011.

¹¹³ http://mpeda.gov.in/MPEDA/different_products.php#

¹¹⁴ Ibid.

and the GOI concerning Assistance from the Special Fund (signed on 20 October 1959), together with a UNDP project document which will be signed by the Implementing Partner to govern the use of the funds. **The (national) Implementing Partner** for this project is the **Ministry of Environment, Forest and Climate Change (MoEFCC)**, which is accountable to UNDP for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources. The MoEFCC is also the National Designated Authority of the Green Climate Fund and all the national level coordination mechanisms will be under the aegis of the ministry.

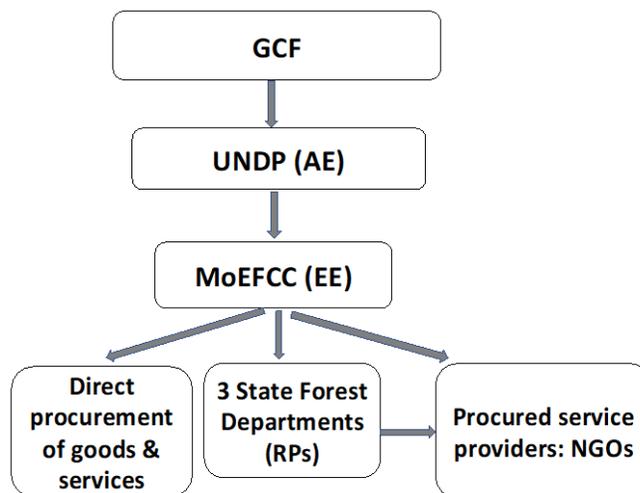
Contracts and flow of funds

132. Under the National Implementation Modality, guided by the Special Agreement concerning Technical Assistance between UN organizations and the GOI (signed by both Parties on 14 February 1952) and the Agreement between UN Special Fund and the GOI concerning Assistance from the Special Fund (signed on 20 October 1959), and in terms of the Project Document to be signed between UNDP and GOI (Subsidiary Agreement under the FAA), UNDP will advance cash funds on a quarterly basis to the MoEFCC as EE. The major agreements to be entered into are those between the MoEFCC and:

- the Environment, Forests, Science and Technology Department in the State of Andhra Pradesh
- the Revenue and Forest Department in the state of Maharashtra
- the Forest and Environment Department in the state of Odisha.

As the AE, UNDP will disburse funding (received from the GCF according to the FAA disbursement schedule), to the Ministry of Environment, Forest and Climate Change (MoEFCC), as the Executing Entity, for the purposes of undertaking the project. The MoEFCC will conclude agreements with the three State Forest Departments, and these Letters of Agreement (LOAs) will be attached to the Project Document. In terms of these LOAs, the State Forest Departments will be made Responsible Parties (RPs), responsible for delivering particular projects outputs as set out in detailed terms of reference attached to the agreements.

Flow of Funds



Roles and responsibilities

133. UNDP provides a three-tier oversight and quality assurance role involving UNDP staff in Country Offices and at regional and headquarters levels. The quality assurance role supports the National Project Steering Committee by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate project management milestones are managed and completed. Project Assurance must be independent of the Project Management function; the National Project Steering Committee cannot delegate any of its quality assurance responsibilities to the National Project Coordinator. The project assurance role is covered by the accredited entity fee provided by the GCF. As an Accredited Entity to the GCF, UNDP is required to deliver GCF-specific oversight

and quality assurance services including: (i) Day-to-day oversight supervision, (ii) Oversight of project completion, (iii) Oversight of project reporting.

134. The MoEFCC, as the lead ministry on climate change in India, both houses the NDA for the GCF and forms the Executing Entity for the project. Day-to-day execution of the project will be under the Joint Secretary for Coastal Regulation Zone, whilst overall coordination with other GCF projects and climate change initiatives will be undertaken by the Joint Secretary for Climate Change, who is also the NDA for the GCF. It is proposed that the NDA will sit on the National Project Steering Committee (see below) in an advisory capacity.

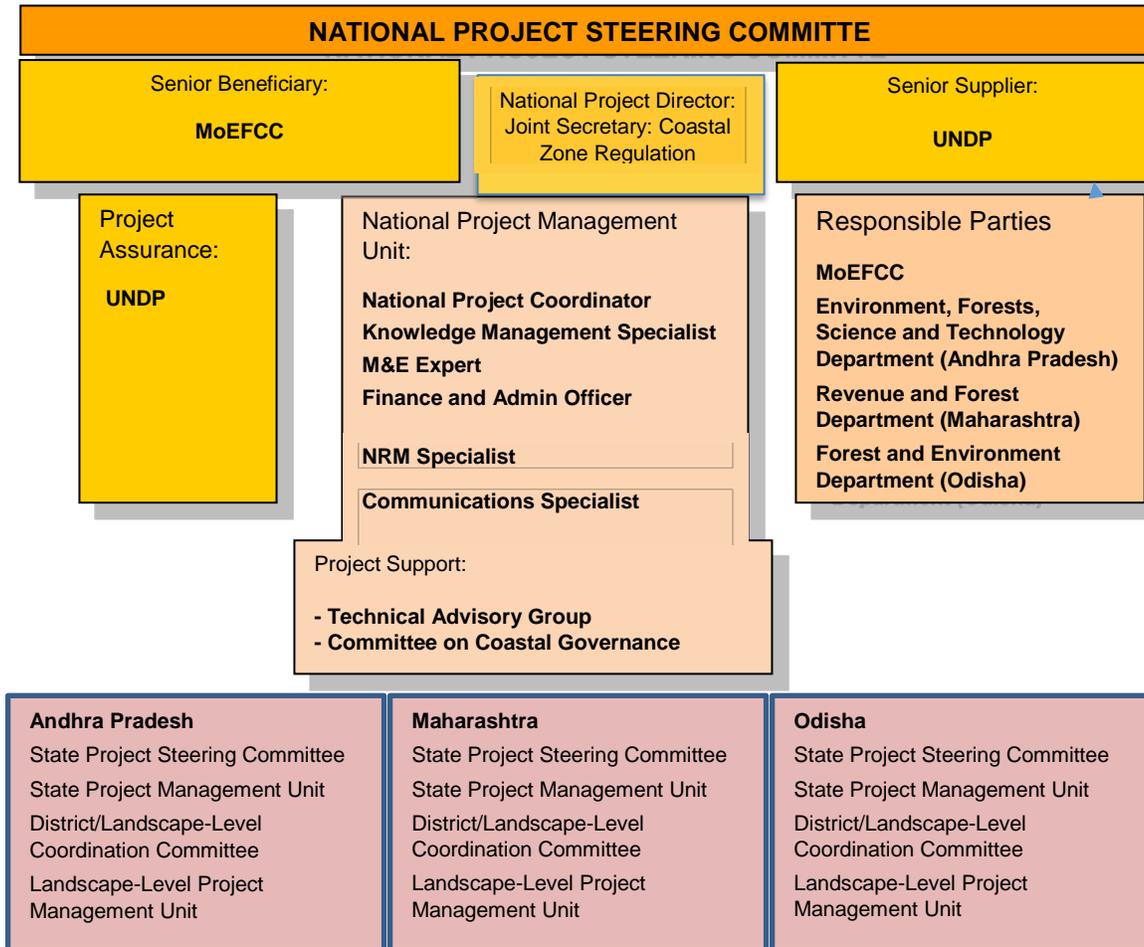


Figure 1: Project governance structure

135. **National Project Steering Committee (NPSC):** The MoEFCC will convene the National Project Steering Committee (NPSC), which will be constituted and chaired by the Joint Secretary: Coastal Regulation Zone, who will assume the role of member secretary of the NPSC, and will be the National Project Director. The steering committee will also include UNDP, and will convene at least twice annually, to review and contribute to the annual work plans of the project states as well as discuss and approve national level project activities. The NPSC will also be a platform for sharing learning and good practices across all the Indian coastal states, union territories and islands.

136. Coordination between line ministries on the project implementation be achieved through having the relevant ministries represented on the NPSC. It is proposed that this will include the Ministry of Agriculture and Farmers Welfare, Ministry of Earth Sciences, Ministry of Finance, Ministry of Micro, Small and Medium Enterprises, Ministry of Rural Development, Ministry of Shipping, Ministry of Skill Development and Entrepreneurship, Ministry of Tourism, Ministry of Tribal Affairs, and the Ministry of Urban Development. All the coastal states of India will be represented in the NPSC, including members of the Coastal Zone Management Authorities. The NPSC will also

include representation from relevant coastal institutes and organizations such as the National Centre for Sustainable Coastal Management (NCSCM) and the Society of Integrated Coastal Management (SICOM). The focal points for the State Action Plan on Climate Change (SAPCC) for the coastal states would also be represented in the NPSC. In addition, the committee will also include representatives of the private sector and relevant NGOs.

137. **National Project Management Unit (NPMU):** The NPSC will be supported by the National Project Management Unit (NPMU), who will be responsible for day to day coordination of relevant components of the project at the national level and will work in close coordination with the three project states of Andhra Pradesh, Maharashtra and Odisha. The NPMU will be headed by a National Project Coordinator, who will be supported by a Knowledge Management Specialist, Monitoring and Evaluation Expert, a Finance Officer and an Administration Officer, as well as specialists in Natural Resource Management and Communications.
138. **Technical Advisory Group (TAG):** A Technical Advisory Group (TAG) will be established comprising subject matter experts who will provide their expertise and guidance for achieving the project objectives, as required. The TAG will be chaired by the Joint Secretary: Coastal Regulation Zone at MoEFCC and will be hosted at the NPMU. The successful implementation of this project will require strong technical leadership and high levels of coordination due to its multi-sectoral nature. The TAG will help to steer this process, and will meet on a quarterly basis, or as and when required.
139. **Committee on Coastal Governance:** A Committee on Coastal Governance will be established, with its secretariat hosted at the NPMU and chaired by the Joint Secretary: Coastal Regulation Zone at MoEFCC. This committee will be comprised of governance experts and will convene at least once a year, or as needed, to provide guidance and technical support related to decisions on coastal governance. The CCG will also foster South-South partnerships by providing a knowledge exchange platform in Output 3.3 for engagement with other countries in the region that share common concerns on coastal climate change vulnerabilities and impacts. The CCG will be represented in the NPSC.
140. The three target project states will enter into agreements with MoEFCC as Responsible Parties (in UNDP terminology) to assist in successfully delivering project outcomes, and will be directly accountable to MoEFCC as outlined in the terms of their agreement. Each of the states will have its decentralized implementation arrangements to support execution of state-level activities:
141. Andhra Pradesh: The Project will be implemented by the **Environment, Forests, Science and Technology Department in the state of Andhra Pradesh** through its executive units, particularly primarily the Andhra Pradesh Coastal Zone Management Authority (AP CZMA). The Environment, Forests, Science and Technology Department will be a Responsible Party in terms of an agreement between the national Ministry of Environment, Forest and Climate Change and the Environment, Forests, Science and Technology Department, Andhra Pradesh.
142. Maharashtra: The Project will be implemented by the **Revenue and Forest Department in the state of Maharashtra** through the Mangrove and Marine Biodiversity Conservation Foundation of Maharashtra, (established under the Revenue and Forest Department – *vide* Government Resolution No. S-30/2015/CR 219/F-3 dated 23rd September 2015). The Revenue and Forest Department will be a Responsible Party in terms of an agreement between the national Ministry of Environment, Forest and Climate Change and the Revenue and Forest Department, Maharashtra.
143. Odisha: The Project will be implemented by the **Forest and Environment Department in the state of Odisha**. The Forest and Environment Department will be a Responsible Party in terms of an agreement between the national Ministry of Environment, Forest and Climate Change and the Forest and Environment Department, Odisha.
144. Each of the three states will have the following basic structures for project execution:
145. **State Project Steering Committee (SPSC):** A State Project Steering Committee (SPSC) will be set up with representation from all important state departments/agencies to direct and oversee project implementation and management at the state level, as well as representatives of UNDP in the states. Other members will include representatives of the relevant State Departments, Agencies, and other stakeholders including private sector / industries, NGOs nominated by the State Government, and representatives of UNDP and MOEFCC. The SAPCC

focal point in the state would also be a member of the SPSC. The SPSC shall meet at least twice in a year to review the progress of project implementation in the state and take appropriate decisions for the smooth implementation of the project within the state.

146. **State Project Management Unit (SPMU):** The SPSC will be supported by the State Project Management Unit (SPMU), which will be responsible for coordinating the project at the state level. The SPMU will be overseen by the State Project Director (SPD) who will be the Principal Secretary (Forest) or their representative. The SPD will be responsible for overall implementation of the project at the state level, including adherence to the AWP and achievement of planned results as outlined in the Project Document, and for the use of project funds through effective management and well established project review and oversight mechanisms. The SPD also will i) ensure coordination with UNDP, MoEFCC, various departments and agencies; ii) provide guidance to the project team; iii) review reports and iv) look after other administrative and financial arrangements related to the project. The SPD will be supported by the State Project Manager whose responsibilities shall include: i) coordinating project implementation with all stakeholders, State Government and central government agencies and UNDP-GCF; ii) organizing the project evaluations; iii) ensuring that there is adequate documentation by all implementing partners at all stages and in collating this documentation into reports; and iv) facilitating the publication of project outputs. Each SPMU will include state project manager, administration cum finance officers, as well as specialists in communications and monitoring and evaluation.
147. **District/Landscape-Level Coordination Committee (DLCC/LLCC):** At the district level, there will be a district/landscape level coordination committee (DLCC/LLCC), which will be chaired by the respective District Collectors (DC) or a senior level officer, such as the Chief Conservator of Forests. The Divisional Forest Officer will coordinate the district level project activities. Members of the DLCC/LLCC will include all relevant departments, agencies, and representatives of all village level committees as well as the community mobilisers/village facilitators. The DLCC/LLCCs will also be linked to the SPSCs and the NPSC through representation at the national and state PSCs. The DLCC/LLCC will be responsible for district level planning, implementation, monitoring and coordination. In addition, this committee will endeavour to ensure adequate coordination with the various production sectors at the district level.
148. **Landscape-Level Project Management Unit (LLPMU):** At the district level, the LLPSC will be supported by a District Project Management Unit (DPMU), which will be adequately staffed by persons of relevant expertise who will provide technical leadership for project implementation, monitoring and evaluation, and adaptive management. This will include a livelihood specialist, an ecosystem and climate change adaptation expert, a communication and outreach specialist, and a financial-cum-administrative assistant for performing the day-to-day administrative and financial functions of the PMU. Additional specialists who will be based in the districts and work in the target landscapes will include District Project Coordinators, Socio Economic and Livelihood Specialists, Ecological and Adaptation Specialists, and field associates/UNVs.
149. The field activities will be implemented by the respective line departments at state, district and sub-district levels, with the involvement of NGOs and CBOs under the overall guidance and supervision of the state and district level coordination mechanism as above. At the village level, Village Organizations (federations of Self-Help Groups) and Eco Development Committees will be involved in project implementation, especially for ecosystem restoration and other direct interventions. Village facilitators or community mobilisers will be responsible for coordinating these activities at the village level.

C.8. Timetable of Project/Programme Implementation

150. The timetable attached as Annex X shows when the Activities under each Output will commence and end, including activities financed with both GCF funding and co-finance. It also shows the sequencing of activities, for example, how detailed vulnerability assessment with communities in the target landscapes feeds into participatory planning of restoration and livelihoods activities on the ground in the landscapes. A period of 6 years was considered by the Government of India to be an appropriate time period for a specific project intervention, designed to unlock barriers so that further EbA work can continue beyond the project period. The results of specific restoration interventions through project Activity 1.2 will be monitored and tracked, both within and beyond the project lifetime, and data generated will be used to adaptively manage all restoration interventions. After 6 years of such management, it is envisaged that the operations and maintenance of all restored sites will be relatively routine and will no longer require technical inputs/guidance as previously received through the GCF project structures. Key project interventions also focus on climate-adaptive livelihoods, ensuring that the capacities of vulnerable populations are built up, alongside value-chains to enable enterprise and market development. The proposed project duration is

thus necessary to invest in capacities across the beneficiaries as well as the government institutions; monitor, track, and adapt investments during implementation; and generate the knowledge related to EbA planning, best practices, and lessons learned to sustain the impacts post-project as well as enable pathways to scale and replication.

D.1. Value Added for GCF Involvement

151. GCF resources are sought to invest into the incremental costs of climate change adaptation and bring about a paradigm shift in coastal zone management in India. The coastal areas of India are undergoing rapid economic development owing to industrial expansion and urbanisation. At the same time, large proportions of the population of India's coastal states remain rural and dependent on agriculture, aquaculture and fisheries for their livelihoods. The GoI is promoting economic and social development at national and local scales with a focus on improving rural socio-economic conditions. Baseline investments into underlying development challenges are thus concentrated on ecosystem conservation, industrial development, socio-economic growth and agricultural intensification. Substantial investments are being made at the state level in coastal development, including using Integrated Coastal Zone Management approaches to balance economic development and environmental impacts. Such initiatives strengthen the natural resource base of the rural economy, but do not include systematic consideration of climate resilience. Without additional funding for adaptation, baseline investments into socio-economic development in coastal areas of India will be unable to deliver development gains because of underlying vulnerabilities exacerbated by climate change and such investments will be undermined. Therefore, GCF investment is critical to enabling the paradigm shift envisioned in the following three ways:
152. **Addressing the information, technical, financial, and institutional barriers to investments into EbA:** Key barriers impeding adequate consideration of climate change impacts and EbA potential in baseline investments include: i) inadequate information on climate vulnerabilities for local-level adaptation planning; ii) limited knowledge of and technical capacity concerning the role of EbA in enhancing adaptive capacity; iii) limited technical and financial capacity for communities to adopt climate-adaptive livelihood opportunities; iv) weak linkages in climate-resilient value chains for commodities underpinned by ecosystem goods and services; and v) limited institutional capacity for mainstreaming climate change into coastal zone planning, governance and finance. Moreover, adaptation measures largely generate public goods, creating little incentive for private investment in such measures. The GoI and the private sector in India require support in systematically addressing these barriers, in order to address vulnerabilities in the three target states and climate-proof development. Removing barriers will also enable scaling up of ecosystem and community-based approaches and unlock new investment into climate change adaptation at scale in the coastal areas.
153. **Crowding in public and private sector financing and mobilizing community-level investments for EbA:** GCF resources will catalyze government investments in EbA to build the resilience of vulnerable coastal communities through co-financing towards ecosystem restoration, resilient livelihoods and value-chain support. This includes commitments of staff and resources support for implementation of project activities, operations and maintenance, and sustained impact post-project. The overall budget for this project includes committed co-financing of a total of US\$ 86.85 million from the Governments of the three states and the Ministry of Environment, Forest and Climate Change. The unlocking of additional funds for large-scale EbA will be catalyzed in a number of ways, including: i) quantifying economic benefits of EbA to reduce uncertainty, thereby de-risking the investment for potential investors; ii) changing policies and regulations to create an enabling environment for EbA investors; and iii) building the technical and financial skills of government officials and private sector operators to design and manage EbA investments. This will be complemented by mainstreaming of climate change adaptation into private and public sector policies and plans (see Activity 3.2) to promote sustained investment into coastal adaptation measures beyond the project life-span and outside of the project's targeted landscapes. An example is the enormous potential of the US\$ 5 billion CAMPA, the industrial offsets fund for reforestation, to be applied to scaling up EbA. Private sector investment in the coastal zone will be enabled through the project's work on removing barriers to understanding the value of coastal ecosystems, and planning for their sustainable usage. Private sector investors will be crowded in to develop enterprises based on restored ecosystems, such as ecotourism facilities in the form of lodges and boat trips, as well as enterprises based on climate-adaptive livelihoods, such as oyster rafts or crab farming, and value addition facilities, e.g. processing fish into consumer-ready products. Coastal developments will be influenced to address climate risk through dialogues with sectors such as financial services, oil and gas, ports and shipping, power generation and energy, tourism, commercial fishing and agriculture, as well as agri-processing industries. GCF resources will also support communities to develop climate-adaptive livelihoods, which will, over time, leverage loan finance for expansion of activities. For example, vulnerable community members will be supported through technical support, access to finance and value chain development.

This will include support to develop bankable, financially viable business plans for micro-enterprises based on climate-adaptive livelihoods (see Activity 2.1) that would attract microcredit/bank loans. GCF resources will not be used to provide such loans, but to provide technical support in accessing loans.

154. **Reaching the most vulnerable:** Communities in coastal India are particularly vulnerable to climate change impacts, particularly in rural areas where the main livelihoods are agriculture and fishing. These include the impacts of ocean warming and acidification on fish nurseries and fish stocks, the impact of erratic monsoons and temperature increases on farming, and the impact of increased cyclonic activity damaging houses and fields in the immediate coastal zone. Under a business-as-usual scenario, such communities will continue to have inadequate technical and financial capacity to adapt their livelihoods to the impacts of climate change, and will be at risk of falling back into poverty or being forced to migrate to urban areas. GCF resources will be used to address these vulnerabilities through focusing on communities whose current livelihoods are most at risk to climate change. The project activities will target fisher folk experiencing declining catches and farmers who are experiencing decreasing yields and crop failures as a result of climate change. These communities' climate resilience will be strengthened through adapting current practices to climate change effects (e.g. promotion of the System for Rice Intensification), developing new livelihoods based on restored and better managed coastal ecosystems, and strengthening value chains for commodities derived from these ecosystems, with support from co-financing from the three state governments. This will result in increased income generation, enabling beneficiaries to make investments into adaptation and other socio-economic outcomes at the household level. Interventions will focus in particular on women, the youth, and members of Scheduled Castes, Scheduled Tribes and Other Backward Classes, as these population groups lack resources and are often particularly vulnerable to climate change.
155. In the absence of the GCF project, coastal communities will remain vulnerable to loss of life, and damage to property, as climate impacts like cyclonic activity and sea-level rise worsen. In addition, poor coastal communities reliant on small-scale fishing and farming will remain vulnerable to impacts of temperature rise, saline intrusion from sea level rise, and increasingly erratic monsoons. The infrastructural investments currently being made to promote development will also remain vulnerable to climate change impacts, loss and damage. In this scenario, where local communities and their adaptive capacity are not placed at the centre of adaptation efforts, and coastal ecosystems continue to be lost or degraded by both climate change impacts and direct human causes, the potential of ecological infrastructure to buffer disasters and support resilient livelihoods will remain under-utilised and eventually be lost.

D.2. Exit Strategy

156. The proposed project was designed through consultation with government agencies, NGOs/CBOs and local communities. These consultations were used to identify adaptation priorities and interventions that will be implemented through engagement with local communities and government officials in the target states as well as at the national level. The project is centered on community participation and engagement with CBOs – such as self-help groups, producer organizations and fisher associations – to foster ownership and empowerment of local communities for implementation of project interventions. This will promote the integration of climate-smart practices into traditional livelihoods, facilitating adoption of such practices in the long term. Targeted capacity building and training will inform planning, design, and implementation of adaptation measures based on the local socio-economic and environmental contexts, taking into account the various and differentiated vulnerabilities of men, women, the youth, the elderly and marginalized groups. EbA interventions will restore ecosystem functioning, thereby strengthening the role of natural ecosystems in buffering against current and future climate change impacts as well as enhancing climate-adaptive livelihoods.
157. **Participatory approaches and co-management for investments into ecosystems.** Sustainability will be enhanced through the co-management structures that will be created in the 24 target landscapes and the 12 coastal districts into which they fall (see maps in Annex IX). Project activities will adopt a fully participatory approach that will ensure engagement of local communities in the project. This process began during the formulation of the Concept Note and Funding Proposal for this project, during which coastal communities and local CBOs (including women's groups) were consulted on climate vulnerabilities and adaptation priorities, and also on a suite of climate-adaptive livelihood options. During project implementation, this process will continue, with communities being engaged in planning to ensure that their priorities are taken into account during initial phases

of the project (see Activities 1.1 and 2.1), as well as in implementation and monitoring of project achievements. For example, co-management structures will be established with local communities on ecosystem restoration and management to promote community ownership and responsibility for restored areas (see Activity 1.2). This will contribute to long-term sustainability of project interventions. Similarly, these communities will be involved in monitoring the success of ecosystem restoration through participatory monitoring systems (see Activity 1.2.5). This will further serve to promote community engagement in project activities, particularly after the project implementation period. Such approaches have proven successful in ecosystem restoration and livelihood development initiatives such as the UNDP/GEF-funded project “Mainstreaming coastal and marine biodiversity conservation into production centres in the Sindhudurg Coast, Maharashtra”.

158. **Post-project operations and maintenance.** Operations and maintenance will be necessary for restoration efforts in ecological infrastructure, and for “soft” infrastructure supporting livelihoods activities. Co-finance from the three target State governments will be used to phase in O&M plans during the project implementation, with gradual phasing out of GCF financing and phasing in of government expenditure towards the end of the project (see O&M Plan in Annex XIII(b)). Ongoing conservation and management of coastal ecosystems post-project will be undertaken by relevant state-level government institutions, including the Environment, Forests, Science and Technology Department in Andhra Pradesh, the Revenue and Forest Department in Maharashtra and the Forest and Environment Department in Odisha, and including community contributions in-kind through the co-management approach outlined above. Ongoing maintenance of livelihoods-related infrastructure in the villages will be undertaken through District governments in the coastal districts of the target states. Relevant national-level government institutions will have ownership of mechanisms put in place by the project such as the Decision-Support Tool, and network of institutions for climate-resilient governance and knowledge management. This ownership will be ensured through public sector co-finance of these activities during the project period, maximising the likelihood of continued operation beyond the project implementation period.
159. **Capacity building of local communities, government institutions and CBOs.** Capacity building will promote the adoption of climate-resilient, integrated solutions for coastal management using landscape-scale approaches (see Output 2). The proposed project will promote mainstreaming of climate change concerns into institutional planning and coordination within government institutions to foster cross-sectoral and comprehensive approaches to climate change adaptation (see Output 3). Project activities will build institutional and technical capacities of government officials, local communities, NGOs/CBOs and private sector institutions to plan and implement measures for climate change adaptation, and will work to embed these into public sector budgets and officials’ key performance areas following the project’s end (see Outputs 2 and 3). Strong engagement with government agencies, relevant institutions and local communities in planning and implementation will ensure that project interventions are responsive to the needs and priorities of the targeted beneficiaries as well as ensuring that the relevant technical, institutional and financial capacities are built to support ongoing climate change adaptation after the project’s implementation period.
160. **Integrating EbA into coastal planning and governance.** Sustainability will be promoted by integrating ecosystem- and community-based approaches to managing the coastal zone for effective climate change adaptation into local- and state-level planning and governance (see Outputs 2 and 3). Learning and knowledge management platforms will also ensure that the new approach to adaptation is continued (see Activity 3.3). Given substantial co-financing by the state governments, their ownership of the project will ensure that adequate financial resources are made available to maintain restored ecosystems. Past experience in India has shown that once initial barriers are overcome through project investments, sustainability is usually ensured through establishment of effective institutions that are aligned with the national and state priorities, as witnessed with the Gulf of Mannar Trust in Tamil Nadu which was sustained after the closure in 2012 of the UNDP-managed GEF-financed project implemented through the Tamil Nadu State government on “Conservation and Sustainable Use of the Gulf of Mannar Biosphere Reserve’s Coastal Biodiversity”. Similarly, the implementation arrangements envisaged under the project in the form of a coordination mechanism and cross-sectoral institutions will ensure the sustainability even after the project is completed. To ensure social inclusion and equity, project activities that focus on local communities will be founded on extensive stakeholder participation, and the involvement of women will be actively promoted (see Activity 2.2).

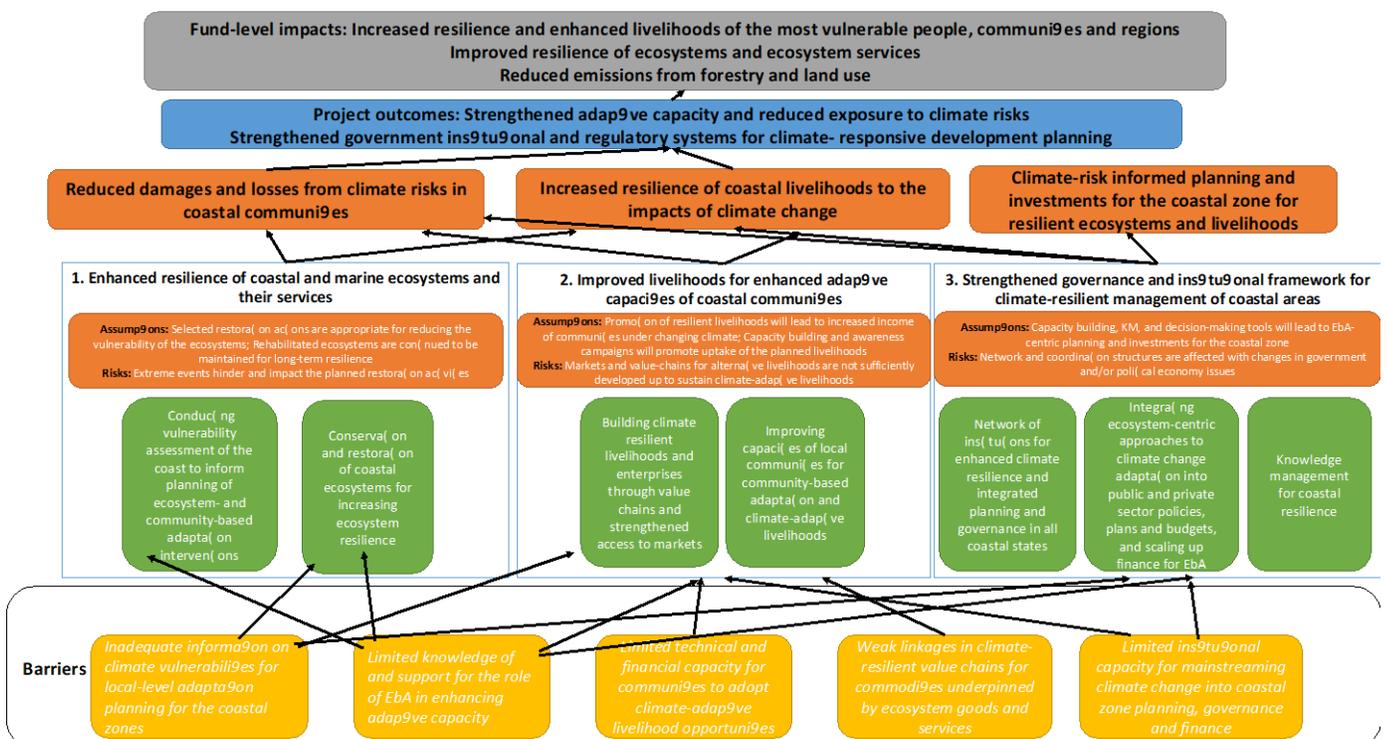
161. **Climate-resilient and sustainable community livelihoods.** The project will have sustained impact through the creation of livelihoods opportunities, including co-financed value-addition, market linkages, and access to finance (see Activity 2.1). This will follow a participatory approach, to ensure that livelihood support is focused on the most vulnerable populations – particularly fishers and farmers – while being socially inclusive by targeting women, the youth, and members of Scheduled Castes and Tribes who have historically been excluded from such participation. Promotion of climate-adaptive livelihoods will include *inter alia*: i) skills development to build knowledge and capacity on such livelihoods; ii) business planning for climate-adaptive livelihood options; and iii) value-addition for increased revenue generation. This support will enhance the financial viability of such climate-adaptive livelihoods, resulting in sustainability and greater access to finance in the long-term. In particular, the support for business plan development as well as the financial and socio-economic benefits will incentivize beneficiaries to sustain such livelihoods, while also promoting replication and upscaling.
162. **Incentivization of private sector investments into coastal adaptation.** No GCF funding will flow to the private sector through the project, but it is anticipated that the project will leverage private sector investment in coastal EbA through capacity building and awareness raising work that engages private sector actors. Leveraging of investment by the private sector will be promoted through the project in various ways. Firstly, the many coastal developments by private actors have potential for inclusion of EbA principles within design and this will be facilitated through dialogues and application of the Coastal Calculator tool. Secondly, there is potential for private sector actors to provide financing in the form of investment into small enterprises based on restored ecosystems (e.g. ecotourism) as well as enterprises based on climate-adaptive livelihoods (e.g. bivalve aquaculture, crab farming) or co-financed value addition (e.g. fish products). Thirdly, many corporations in coastal areas of India have Corporate Social Investment programmes that are used to support community development initiatives. GCF funding will be used to catalyse and leverage private sector co-financing during the project period, through capacity building and awareness raising on the potential for: i) investing in coastal EbA to reduce damages and losses to coastal development infrastructure from climate change impacts; ii) the long-term sustainability, viability and profitability of climate-adaptive livelihood activities; and iii) the potential for Corporate Social Investments to provide environmental and socio-economic benefits. This will facilitate the investment by private sector role-players into project activities both during and after project implementation, as well as replication and upscaling into other areas. Smaller private sector institutions such as micro-finance institutions will also receive capacity building and sensitization on the potential for supporting viable, bankable enterprise development. This will leverage loan finance for climate-adaptive livelihood activities, supporting ongoing implementation and upscaling beyond the project lifespan.

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

163. This project will contribute to the GCF's Paradigm shift objective of "Increased climate-resilient sustainable development" by integrating climate change adaptation – particularly ecosystem restoration and climate-adaptive livelihoods – into coastal management and planning. GCF resources – combined with government co-financing – will be used to restore coastal ecosystems through EbA approaches, promote diversified, sustainable and climate-adaptive livelihood options for local communities, and strengthen coastal governance for climate change adaptation. These interventions will provide direct benefits to 1,744,970 people in households in the 24 target landscapes in Andhra Pradesh, Maharashtra and Odisha States (see maps in Annex IX), and indirect benefits to 10 million people in these landscapes – from reduced risk exposure through enhanced integration of climate change considerations into coastal governance and planning. The theory of change of the project is shown in the diagram below:



164. The adaptation impact of the proposed project for India's coastal communities is significant. These communities are vulnerable to impacts of climate change, particularly: i) damage to infrastructure and economic from sea-level rise and more intense storm surges; ii) loss of lives from coastal flooding as a result of intensified cyclonic activity; and iii) declines in the productivity of fisheries, agriculture and aquaculture through ocean warming and acidification, and changing temperature and rainfall patterns. The main adaptation impacts will be achieved through work in the three target states on Activity 1.2 (restoration) and Activities 2.1 and 2.2 (livelihoods), supported by technical assistance and capacity building through the other activities. Activity 1.2 will conserve, restore and manage coastal ecosystems to provide natural buffers to minimize the damage mentioned in i) above, and prevent the loss mentioned in ii) above. Output 2 will support climate-adaptive livelihoods targeted specifically at households experiencing the impacts mentioned in iii) above, to reduce their vulnerability and enhance their adaptive capacity.

165. Maintenance of functional coastal ecosystems – such as mangroves, seagrass beds, forested watersheds, dunes and coral reefs – is a cost-effective means of buffering the impacts of climate change, while also supporting a range of coastal livelihoods underpinned by ecosystem goods and services crucial for the wellbeing of local communities. The disaster buffering potential of intact natural systems on the Indian coast is highly significant. For example, mangroves ecosystems were critical in protecting lives during the Odisha super-cyclone of 1999. It was estimated that 211 deaths were averted owing to the presence of mangroves, against a predicted 603 deaths if there were no mangroves. Moreover, ecosystem services that support coastal livelihoods are estimated to be worth more than US\$1.6 billion each year globally from mangroves alone. Arkema *et al.* (2013) highlights the role of coastal habitats in mitigating damage to coastal communities and assets by using the InVEST model to compute an exposure index ‘with’ and ‘without’ coastal ecosystems, showing that intact natural habitats reduce by approximately 50% the proportion of people and property along the US coastline that are most exposed to storms and sea-level rise¹¹⁵. This has been supported in other international literature, see for example Spalding *et al.* (2014)¹¹⁶ and Shepard *et al.* (2011)¹¹⁷. A growing literature documents the role of mangroves in disaster mitigation – see a summary by Unnikrishnan, S. *et al.* (2012)¹¹⁸. Mangrove conservation is shown as an appropriate adaptation option to reduce climate risk in India by Bahinipati *et al.* (2012)¹¹⁹. Das (2007)¹²⁰ demonstrates the role played by mangroves in mitigating the impacts of the super cyclone which struck the Odisha coast in 1999, showing that in Kendrapada District:
- Mangroves were able to significantly lower house damage within 10km of the coast.
 - The number of deaths would have been 54% higher if there had been no mangroves.
 - If mangroves had remained intact at 1950 level, 92% of the deaths could have been avoided.
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168. The project is expected to result in “Strengthened adaptive capacity and reduced exposure to climate risks” through reducing the exposure of 10 million people (direct and indirect beneficiaries) in the targeted landscapes (Outcome Indicator A7.0). The project will also contribute to two GCF Fund-Level Impacts for adaptation. It will support “increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions” through the promotion of climate-resilient, sustainable and diversified livelihoods for 11,744,970 people in 24 target landscapes in 12 coastal districts of Andhra Pradesh, Maharashtra and Odisha States (Fund-Level Impact A1.0). In addition, the project will promote “improved resilience of ecosystems and ecosystem services” through restoration and conservation of 14,945 ha of various coastal ecosystems (Fund-Level Impact A4.0). Finally, the project will promote improved governance of and a strengthened institutional framework for climate-resilient development planning through the strengthening of the Coastal Mission and the establishment of a Pan-Indian Coastal Network for improved coordination and sharing of lessons learned on climate change adaptation.
169. Although this project has adaptation benefits at the core, the project is also expected to contribute to the GCF paradigm shift to low-emission sustainable development pathways. In relation to the core Mitigation impact indicator “Expected tonnes of carbon dioxide equivalent (t CO₂ eq) to be reduced or avoided”, the project involves restoration of 14,945 hectares of coastal ecosystems that will result in capturing and storing significant amounts of carbon, which would be released into the atmosphere if these ecosystems were to be severely degraded or lost. Through the project interventions, a total of 122,766 tonnes of carbon dioxide equivalent (t CO₂ eq) are expected to be sequestered in restored ecosystems per year, with 3,682,980 t CO₂ eq sequestered over a 30-year period. This makes a contribution towards India’s commitment (as detailed in the country’s Nationally Determined Contribution) to achieve 33% of the national land area under forest cover through sustainable forest management and afforestation/reforestation initiatives¹²⁷.
170. Mitigation benefits will be achieved through reduced emissions from protecting and restoring natural ecosystems. The levels of “blue carbon” sequestered in intertidal ecosystems, as well as terrestrial carbon in watersheds in the target landscapes, will be maintained in areas that are protected, and will be enhanced, over time, in areas that are restored. These levels will be calculated on an annual basis, and reported on through the project’s monitoring and evaluation system. The anticipated impacts and methodology are elaborated upon in Section 7.5 of the Feasibility Study (Annex II) in relation to the areas of mangroves, saltmarshes and seagrass beds to be restored, protected and maintained.
171. Globally, blue carbon ecosystems are known to be significant CO₂ sinks (see Feasibility Study) with average carbon sequestration rates of:
- Mangroves – 829 g CO₂ m⁻² yr⁻¹ (or 226 g C m⁻² yr⁻¹);

¹¹⁵ Arkema, K.K., et al, “Coastal habitats shield people and property from sea-level rise and storms”, *Nature Climatic Change* 3, 913-918 (2013)

¹¹⁶ Spalding, M.G. et al., “The Role of Ecosystems in coastal protection: Adapting to climate change and coastal hazards”, *Ocean and Coastal Management*, March, 2014

¹¹⁷ Shepard CC, et al. (2011) The Protective Role of Coastal Marshes: A Systematic Review and Meta-analysis. *PLoS ONE* 6(11): e27374. <https://doi.org/10.1371/journal.pone.0027374>

¹¹⁸ Unnikrishnan, S. et al., “The Role of Mangroves in Disaster Mitigation: A Review”, *International Journal of Environment and Sustainable Development*, 11(2): 164 – 179, September (2012)

¹¹⁹ Bahinipati, C.S. and Sahu, N.C., “Mangrove Conservation as Sustainable Adaptation to Cyclonic Risk in Kendrapada District of Odisha”, India, *Asian Journal of Environment and Disaster Management*, Vol.4, No.2 (2012), 183-202.

¹²⁰ Saudamini Das, Storm Protection by Mangroves in Orissa: An Analysis of the 1999 Super Cyclone (SANDEE Working Papers, ISSN 1893-1891; 2007- WP 25)

¹²¹ Arkema, K.K., et al, “Coastal habitats shield people and property from sea-level rise and storms”, *Nature Climatic Change* 3, 913-918 (2013)

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¹²³ Shepard CC, et al. (2011) The Protective Role of Coastal Marshes: A Systematic Review and Meta-analysis. *PLoS ONE* 6(11): e27374. <https://doi.org/10.1371/journal.pone.0027374>

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¹²⁶ Saudamini Das, Storm Protection by Mangroves in Orissa: An Analysis of the 1999 Super Cyclone (SANDEE Working Papers, ISSN 1893-1891; 2007- WP 25)

¹²⁷ 2015, Government of India, India’s Intended Nationally Determined Contribution: Working Towards Climate Justice

- Seagrass – 506 g CO₂ m⁻² yr⁻¹ (or 138 g C m⁻² yr⁻¹); and
- Salt marshes – 884 g CO₂ m⁻² yr⁻¹ (or 245 g C m⁻² yr⁻¹).

172. Conservation, restoration and effective management of blue carbon ecosystems will maintain existing and provide additional carbon sinks along the Indian coast and will effectively contribute to the reduction of greenhouse gas emissions from the country. Using Odisha as an example: restoration of 20% of this state's existing mangroves and adding an extra 10% cover would increase the carbon sequestration capacity by ~320,000 tonnes CO₂ yr⁻¹. Similarly, restoration of 20% of the state's existing seagrass cover plus the creation of an additional 20% area as well as restoration of 10% of its salt marsh ecosystems would increase the carbon sequestration capacity by ~120,000 tonnes CO₂ yr⁻¹ and ~4,000 tonnes CO₂ yr⁻¹ respectively.

173. The expected long-term sequestration of blue carbon sequestration as a result of the project are thus estimated as shown in the table below. India's NDC shows that the country has been successful in improving carbon stocks in its forest by about 5%, from 6,621.5 million tons in 2005 to 6,941 million tonnes in 2013, and the additional benefits from blue carbon can enhance future sequestration as shown in the table below.

174. In addition, terrestrial reforestation activities to be conducted through the project will also contribute to the GCF Result of "Avoided emissions through forestry and other land use". This will be achieved in two ways: i) i) planting, enrichment planting and replanting of dune and other coastal vegetation as shelter belts and to reduce erosion, and for harvesting for livelihoods, and ii) reforestation of catchments to improve hydrological functioning e.g. Improving supply of freshwater to coastal lagoons and estuaries. Reforestation of catchments can be expected to sequester up to 8.8 tonnes CO₂ per ha per year¹²⁸, depending on the type of vegetation, with 3,550 hectares of watersheds that will be revegetated (8 tonnes used below).

175.

Ecosystem type	Extent (ha)	Annual sequestration rate (t CO ₂ per ha per annum)	Total annual sequestration (t CO ₂ per annum)	Total sequestered over 30 years (t CO ₂)
Mangrove	10,575	8.3	87,772.5	2,633,175
Seagrass	85	5.1	433.5	13,005
Saltmarsh	700	8.8	6,160	184,800
Watershed	3,550	8	28,400	852,000
Total			122,766	3,682,980

176. The expected impacts of the project are:

- 14,945 hectares of coastal ecosystems protected and restored to buffer against the current and future impacts of climate variability and climate change – including 10,575 hectares of mangroves, 700 hectares of saltmarshes, 85 hectares of seagrass beds, 35 hectares of coral reefs and 3,550 ha of coastal watersheds, (Output 1);
- 122,766 tonnes of carbon dioxide equivalent (t CO₂ eq) sequestered in restored ecosystems per year, with 3,682,980 t CO₂ eq sequestered over a 30-year period (Output 1);
- 1,744,970 people – of whom 50% are female – benefiting from the adoption of diversified, climate-resilient livelihood options, predominantly based on conservation and restoration of ecological infrastructure (Output 2); and
- improved capacity of coastal management institutions for planning and implementing climate change adaptation measures – including integrating climate resilience into livelihoods support and infrastructure planning, and protecting and restoring ecological infrastructure (Output 3).

E.1.2. Key impact potential indicator

GCF core indicators	Expected tonnes of carbon dioxide equivalent (t CO ₂ eq) to be reduced or avoided (Mitigation only)	Annual	122,766 tons CO ₂ eq
		Lifetime	3,682,980 tons CO ₂ eq

¹²⁸ Kishwan, J., Pandey, R. & Dadhwal, V.K. 2009. *India's Forest and Tree Cover: Contribution as a Carbon Sink*. Technical Paper, Indian Council of Forestry Research And Education.

	<ul style="list-style-type: none"> Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience); Number of beneficiaries relative to total population, disaggregated by gender (adaptation only) 	Total	<ul style="list-style-type: none"> 1,744,970 direct beneficiaries (50% female, and 12% from female-headed households) whose households are participating in new climate-adaptive livelihoods 10,000,000 indirect beneficiaries (50% female, and 12% from female-headed households) benefitting from integration of EbA into coastal governance
		Percent age (%)	5.8% (proportion of total population of coastal districts represented by the 10 million living in target landscapes, of whom 50% are female)

Other relevant indicators	<ul style="list-style-type: none"> Expected strengthening of adaptive capacity and reduced exposure to climate risks
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177. The number of indirect beneficiaries was calculated based on the population that will benefit from planning and implementing climate change adaptation measures in the coastal districts of the three target states of Andhra Pradesh, Maharashtra and Odisha States. These adaptation measures include protection and restoration of coastal ecosystems, with resultant benefits in reducing the risk of loss of life and damage to property through coastal flooding, storm damage, erosion and saline intrusion.

178. The number of direct beneficiaries is the number of people in the target landscapes whose households will be involved in livelihoods activities through the project. The target landscapes were identified through a country-driven process that combined participatory consultations with representatives of government institutions and local communities, along with information from national and global datasets. The locations of the 24 target landscapes are shown on the maps of Andhra Pradesh, Maharashtra and Odisha in Annex IX, and the landscapes are listed below:

Name of state	District	Target landscape
Andhra Pradesh	Nellore	1. Pulicat Lake, 2. Nelapattu Bird Sanctuary and surrounding communities
	Krishna	3. Krishna Wildlife Sanctuary, 4. Bantumilli Wetlands
	East Godavari	5. Coringa Wildlife Sanctuary and surrounding communities
	Srikakulam	6. Telineelapuram, 7. Sompeta
Maharashtra	Sindhudurg	8. Devgad, 9. Malvan, 10. Vengurla
	Ratnagiri	11. Dapoli, 12. Guhagar, 13. Rajapur,
	Raigad	14. Parnali, 15. Uran
	Palghar	16. Dahanu, 17. Palghar,
Odisha	Ganjam	18. Chilika-Ganjam, 19. Bahuda
	Puri	20. Chilika-Puri, 21. Mahanadi Mouth, 22. Devi Mouth
	Baleswar	23. Talasari

	Kendrapara	24. Bhitarkanika
<p>179. The target landscapes are shown in three state maps in Annex IX, and described in the information table in Annex 5 of Feasibility Study – 24 of these 34 landscapes were selected. The target landscapes were identified through a multi-criteria approach that assessed climate change vulnerability (CCV), climate change exposure (CCE) and the presence/extent of coastal ecosystems. Once the sites had been prioritised, census data were used to determine the number of people who would benefit from the ecosystem restoration interventions undertaken under Output 1 of the project. These interventions will reduce the vulnerability of coastal communities and their economic assets and livelihoods to climate change by buffering the impacts of storm surges and sea level rise.</p> <p>180. Furthermore, an assessment was made of the number of people within the 10 million indirect beneficiaries in the target landscapes who will be targeted for direct support on climate-resilient and diversified livelihood opportunities under Output 2. The three target states were divided into a total of eight sub-regions, based on their environmental and socio-economic conditions. Within each of these sub-regions, analyses were undertaken on the potential for the various climate-adaptive livelihood options to build adaptive capacities, within the local context of the specific sub-region. This resulted in a list of appropriate livelihoods to be supported in each sub-region. Once these had been identified, analyses of markets in each sub-region were undertaken to ensure that the market had capacity to absorb the produce of the livelihoods activities without being flooded. These market analyses, population figures and an understanding of the characteristics of each sub-region were used to calculate the number of households to benefit from each of the livelihood support activities within each of the sub-regions. This yielded a total of 1,744,970 direct beneficiaries of the livelihood support activities of the project – including participants in these activities and the members of their households (calculated as approximately 4 other individuals per household).</p> <p>181. Following further analysis, 16 of the 20 livelihoods included in the preliminary analysis were deemed to be climate-adaptive and were selected for support – 7 of these with GCF resources and co-finance and a further 9 with Government co-finance alone. The climate-adaptive livelihood options fall in two categories: <i>Category A</i> livelihoods based on coastal ecosystems restored to buffer climate impacts, aimed at vulnerable fishing households, and <i>Category B</i> livelihoods adapted to specific climate change impacts on agro-ecosystems, aimed at vulnerable farming households. The table in Section C.3 above shows these livelihoods in groups – climate-adaptive aquaculture ¹²⁹, ecotourism ¹³⁰ and non-timber forest products ¹³¹, as well as climate-smart intensification ¹³² and climate-adapted crops ¹³³, and processing of the products of climate-adaptive aquaculture¹³⁴. The rationale is provided in the table for how each group of livelihoods is climate-adaptive and how it links to the project’s overall EbA strategy.</p> <p>182. The project is expected to target approximately 348,994 participants in 16 core livelihood activities, with co-finance and GCF resources helping establish new livelihoods and adapt others, over a period of six years. The number of beneficiaries for livelihood activities was arrived at by factoring in the population of the intervention site, identifying the gap between demand and supply of services and taking a conservative estimate based on data sourced from government databases, reports, and previous projects. In cases where no direct data is available to determine the number of beneficiaries, estimates are taken based on discussions with the experts and teams at the field. A brief rationale for number of beneficiaries for each livelihood covered in the preliminary assessment (see Feasibility Study Section 7.5 for more detail) is mentioned below:</p> <ul style="list-style-type: none"> • For climate-smart SRI for paddy, the number of beneficiaries was arrived at by making a conservative assumption that 10% of the total paddy farmers in the region would be willing to switch to SRI techniques under 		

¹²⁹ Aquaculture: including crab farming, mussel farming, oyster farming, crab hatcheries, ornamental fisheries, integrated duck-fish farming, seaweed farming, integrated multitrophic aquaculture

¹³⁰ Coastal ecotourism: including scuba diving, tour guiding

¹³¹ Coastal NTFPs: including mangrove beekeeping for honey production

¹³² Climate-smart intensification: including System of Rice Intensification (SRI) for paddy farming

¹³³ Climate-adapted crops: including Cultivation of aromatic and medicinal plants, mushroom cultivation

¹³⁴ Processing of climate-adaptive aquaculture products: for example fish smoking, production of value-added mussel products

the project. Figures of total number of paddy farmers were calculated by using data on total rice cultivated in the region and average landholding size per farmer.

- For crab farming, the number of beneficiaries was arrived at through discussions with field teams and experts who estimate that a sustainable crab farming unit can service at least 1,500 beneficiaries per unit.
- For mussel farming, the number of beneficiaries was arrived at by making a conservative assumption that 0.8% of the potential beneficiaries would be willing to take up mussel farming. The potential beneficiaries number was derived from the number of active fishermen families in each region. The value is arrived at considering the percentage of mussel to fish production in 2008 was 0.2%.
- For oyster farming, the number of beneficiaries was arrived at by making a similarly conservative assumption that 0.8% of the potential beneficiaries would be willing to take up oyster farming, which follows similar production trends to mussel farming.
- For crab hatcheries, the number of beneficiaries to be involved in crab hatcheries was calculated based on the number of hatcheries needed to supply the crab farming units, and the number of people required to work in a hatchery, using the crab farming project in Maharashtra for reference.
- For ornamental fisheries, the number of beneficiaries was arrived at by making a conservative assumption that 1.35% of the potential beneficiaries would be willing to take up the ornamental fish farming. The potential beneficiaries number was derived from the number of active fishermen families in each region. The number was also based on input from the experts and resources available for the project, including limitations imposed by sustainable harvesting rates.
- For integrated duck-fish farming, the number of beneficiaries was arrived at by making a conservative assumption that approximately 30% of the total area to be covered can be successfully used for integrated duck fish farming. The potential area data was sourced from NABARD documents.
- For seaweed farming, the number of beneficiaries was arrived at by making a conservative assumption that 1.69% of the potential beneficiaries would be willing to take up the seaweed farming. The potential beneficiaries number was derived from the number of active fishermen families in each region, and based on input from the experts and resources available for the project.
- For honey production, the number of beneficiaries was calculated by identifying the gap in existing demand and production of honey, and using data on potential quantity of honey produced per unit. The information on quantity of honey produced per unit was sourced from existing projects.
- For scuba diving, the total number of beneficiaries was based on calculating the total number of tourists arriving for leisure and number of tourists serviced by a single instructor, and only areas with tourism infrastructure and potential dive sites were considered.
- For tour guiding, the total number of beneficiaries was based on calculating the total number of visitors arriving for tourism and assumptions on the number of tourists to be serviced on walking tours of the area by a single guide.
- For mushroom cultivation, the number of beneficiaries was calculated by identifying the gap in existing demand and production of mushrooms, and using data on possible quantity of mushrooms produced per unit, sourced from existing projects.
- For aromatic and medicinal plants, the number of beneficiaries was taken in proportion to the total area under cultivation in each region. The data on total area under cultivation in each region was sourced from NABARD documents.
- For fish value added MSMEs the number of beneficiaries were taken as number of persons employed in each unit. The total number of units were estimated in proportion to the monthly consumption of fish in rural regions. The data on total area under cultivation in each region was sourced from the Central Institute of Fishery Technology.
- For fishmeal plants, the total number of beneficiaries was calculated by assuming 30 persons requirement for a fishmeal plant. The number of fishmeal plants planned was one per region considering the almost equal number of people employed in fishing in the region.
- For fishmeal processing, the number of beneficiaries was calculated by identifying the gap in existing demand and production of fish, and using the assumption that 1% of the fish goes for processing. This gave the number

of possible units and further conservative estimate was made to arrive at the number of units that can be set up in the regions.

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

183. The proposed project supports the Government of India to enhance the resilience of vulnerable coastal communities to climate change. The project combines GCF grant finance with significant leveraged co-finance to shift the paradigm towards a new approach integrating ecosystem-centred and community-based approaches to adaptation into coastal management and planning by the public sector, the private sector and civil society.
184. India is making important investments in coastal development – in industry, agriculture, conservation, afforestation and rural livelihoods, but these are not yet systematically addressing climate risks. Without the project intervention, these investments are likely to have decreasing success in delivering expected development gains, because of underlying vulnerabilities compounded by current and future climate change impacts. The natural ecosystems of India’s coastal zone will continue to be undervalued and will be increasingly degraded and lost, sacrificing their significant contribution to reducing climate risk by buffering disasters and supporting livelihoods. Coastal communities will remain vulnerable to loss of life and damage to property through flooding, erosion and saline intrusion, expected to intensify as storm surges and sea level rise worsen. Poor coastal communities reliant on small-scale fishing and farming will remain vulnerable to impacts of temperature rise and increasingly erratic monsoons on their livelihoods. The infrastructural investments being made to promote development will also remain vulnerable to climate change impacts, loss and damage.
185. Through the GCF intervention, supported by co-finance from the public sector reflecting Government’s commitment to adaptation policy priorities (outlined in the NDC and NAPCC), investment in the coastal zone will become more climate-risk informed, using ecosystem- and community-based approaches to adapting to climate change impacts. The natural ecosystems of India’s coastal zone will be protected and restored, and their contribution to buffering climate shocks and stresses and supporting diversified livelihoods will be fully recognized and utilized. This will be achieved through interventions in target landscapes in the three states of Andhra Pradesh, Maharashtra and Odisha to i) protect and restore ecosystems such as mangroves and seagrass, and the services they provide, especially buffering storm surges, and ii) help communities adopt climate-adaptive livelihoods and value chains. Government co-finance will also be used to iii) mainstream EbA principles into coastal planning and governance, enabling intersectoral coordination for addressing climate risk across all of India’s coastal states.
186. The barriers to achieving this paradigm shift are shown in the diagram above at para 160, outlining the theory of change of the project.
187. Government co-finance will be used to create pathways for replication and scale as described below. Given that the combined length of the three target states’ coastlines (i.e. 2,374 km)¹³⁵ represents 31.5% of the total coastline length of India, there is potential to multiply the effects of the project by 200%, using the pathways to scale outlined below:
- The project enables scale-up through capacity development of key public and private sector role-players, developing sufficient institutional and technical capacity to jointly: i) assess the costs and benefits of large-scale interventions that enhance supplies of ecosystem goods/services and thereby promote a diverse array of coastal livelihoods; ii) facilitate detailed planning at the local level to demarcate precisely where specific ecosystem restoration and livelihood activities should be implemented to maximise adaptation benefits; iii) commit to allocating funds for large-scale implementation of such interventions within national and local government budget lines within all coastal districts of India; iv) oversee the effective implementation as well as long-term maintenance of the ecological infrastructure and rural livelihoods developed; and v) adapt the

¹³⁵ Length of Andhra Pradesh coastline - ~974 km, length of Andhra Pradesh coastline - ~840 km, length of Andhra Pradesh coastline - ~560 km

interventions over the course of several decades, as the precise effects of climate change at a landscape-scale become evident, and as methods for restoring ecosystems to maximise adaptation benefits become more refined.

- GCF resources and co-finance will be used to establish a long-term system for periodic detailed assessment of vulnerability and adaptive capacity along the entire coastline of India (Activity 1.1), supporting the identification of all areas where restoration of coastal ecosystems using an EbA approach can be implemented. For example, within the three targeted states, there is potential for restoration of a further ~7,000 ha of mangrove ecosystems¹³⁶. The vulnerability assessment will identify all such ecosystems across the entire coastline of India, and be repeated periodically to track progress. The implementation of restoration interventions in the three targeted states (Activity 1.2) will build technical capacities and facilitate the adoption of similar efforts across all other states of India. The EbA Decision-Support Tool will enable identification of specific sites for such implementation of EbA nation-wide, and will be applied by the relevant Coastal Zone Management Authorities in each of the 13 coastal states.
- Support for climate-adaptive livelihoods (Activities 2.1 and 2.2) will also be replicable across all coastal states of India. A total of 1,744,970 people will benefit from these activities within the targeted states. The development of market linkages, capacity building for diversification of livelihoods and facilitation of access to finance has the potential for upscaling into other coastal states. This will be achieved through the establishment of a Pan-Indian Coastal Resilience Network that will support knowledge exchange on lessons learned and best practices across the country, facilitating the adoption of project approaches across other coastal states. In addition, the dissemination of knowledge products on coastal adaptation and exposure/exchange visits for government officials will enhance understanding and technical capacity for promotion of climate-adaptive livelihoods across all coastal states.
- Replication is facilitated by the project through changes in the enabling environment within which district, state and national governments work. The new National Coastal Mission will provide a framework to integrate climate risk management and EbA principles into national policies and schemes, including the CAMPA afforestation fund and Smart Cities Mission. In the three states, climate change adaptation and EbA will be integrated more effectively into cross-sectoral spatial and development planning at the district and state levels. This approach will be replicated and scaled up in all the other coastal states, commencing during the project lifetime through the establishment of interdepartmental platforms in the 13 coastal states, and a Pan-Indian Coastal Resilience Network, and sustained long-term through the National Coastal Mission.

E.2.2. Potential for knowledge and learning

188. Capacity building of local communities, government officials, the private sector and other stakeholders will improve knowledge and awareness on the benefits of adopting EbA approaches to build climate resilience. Transfer of lessons learned and best practice on coastal resilience and EbA will also promote replication and upscaling of such interventions across the coastline of India. A knowledge exchange platform involving officials and communities from other South Asian coastal countries will enable dialogue, sharing, and learning on ecosystem-and community-based adaptation across the region. Using a range of knowledge products and channels for dissemination will ensure that the widest possible reach is achieved, i.e. promoting access to such knowledge for diverse stakeholders such as local communities, various levels of government, private sector agents and other development partners.

¹³⁶ Integrated Coastal and Marine Area Management Project Directorate & National Institute of Ocean Technology. 2016. An Integrated Approach to Assess the Biophysical Vulnerability of Coastal Areas (Andhra Pradesh, Odisha And Maharashtra) – A Feasibility Study.

189. The project will facilitate improved knowledge generation, creation and sharing for collective and adaptive learning on climate change adaptation in coastal areas for local communities, government officials and other stakeholders. In particular, it will generate substantive knowledge on the importance of ecological infrastructure in addressing climate-induced risks in coastal areas of India, as well as on undertaking collaborative, participatory and cross-sectoral planning for climate change. Government co-finance under the National Coastal Mission will be used to set up a system for collating data and information on global best practices, lessons learned, evidence from the field and scientific knowledge on coastal governance, climate change adaptation, EbA and livelihood diversification in the coastal zone of India. This will involve developing a number of knowledge products and knowledge management mechanisms, outlined below.

- Knowledge products translated into local languages for nation-wide use in community-level training for village self-help groups and CBOs, and women's capacity development programmes, supporting knowledge exchange visits between communities.
- A decision-support tool with associated online platform and app used to facilitate access to information and knowledge for decision-makers, communities and informed stakeholders.
- Detailed ecosystem- and site-specific protocols and guidelines – based on scientific best practices and regularly updated – used to inform restoration and adaptive management of various ecosystem types.
- A Coastal Calculator tool applied with relevant government and private sector actors to design shoreline protection and other climate-resilient infrastructure.
- A Pan-Indian Coastal Resilience Network of institutions to promote knowledge exchanges on integration of climate change adaptation into coastal development planning.
- Training courses or curricula on EbA, for delivery through administrative training and other relevant institutes at national and state levels.
- Academic partnerships for experimental learning on building climate resilience for publication in peer-reviewed scientific literature.
- Exposure and exchange visits for national-, state- and district-level government officials to promote knowledge sharing on cross-sectoral coastal governance, climate change adaptation and EbA.

190. These knowledge products and platforms will complement training and capacity building of local communities – including CBOs such as self-help and women's groups – as well as representatives of the public and private sectors to evaluate climate risks and design adaptation measures tailored to the local conditions. Knowledge generation and learning will focus on ecosystem- and community-based approaches to climate change, as well as institutional capacities for undertaking landscape-scale and cross-sectoral approaches to adaptation planning. The nodal point of the project's knowledge generation and learning activities will be the Pan-India Coastal Resilience Network (to be established under this project) to facilitate nation-wide learning on coastal adaptation. In addition, administrative training institutions at the national and state levels will integrate lessons from the project in training courses on EbA for civil servants and government officials.

191. Sharing of lessons learned and best practices will also be supported through the continuous monitoring and evaluation of the project. The M&E plan (Section H.2) will include provision for generation of lessons learned and best practices (reports, publications, and other communication and knowledge products for various media) to not only support adaptive project management but also to inform learning across national- and sub-national levels within India as well as regionally across other coastal South Asian states.

E.2.3. Contribution to the creation of an enabling environment

192. The project enables sustained participation of the public sector, private sector and civil society. Project interventions will mobilize ownership from all these sectors, and catalyze commitments to sustaining the projects' impacts in the long term. The project invests strongly in technical assistance and developing stakeholders' capacities for sustained impacts. The strategy for each sector is outlined below:

193. **Public sector:** Planning and implementation of coastal adaptation measures will be coordinated through a network of institutions that govern coastal management and planning, guided by the National Coastal Mission. Interdepartmental platforms will be established in the 13 coastal states, using existing platforms wherever possible – particularly State Action Plans for CC and CZM Authorities. These will facilitate integration of EbA

approaches into relevant policy, legislation and budgetary processes, and share lessons learned and best practices from target landscapes and states. Two examples of opportunities to mainstream climate change adaptation into national and state levels policy are: i) the Smart Cities Mission which addresses citizen-centric and sustainable development but not explicitly climate risk management, and ii) the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) which funds reforestation but does not yet have as a key goal the adaptation benefits of restoring ecosystems.

194. **Private sector:** Private sector role-players will be involved in the project in three distinct capacities, namely: i) as coastal developers and landholders who can build EbA principles into new developments or management of coastal lands; ii) as potential investors in businesses based on restored ecosystems (e.g. ecotourism, mari/aquaculture, agri-processing and value-added industries in the coastal zone); and iii) as potential financiers of livelihood and capacity development activities through their Corporate Social Investment programmes (the latter to be leveraged during project implementation). GOI co-finance will be used to facilitate a series of biennial intersectoral dialogues under the auspices of the National Coastal Mission – engaging both public and private sector role-players on coastal adaptation as a risk management strategy. This will involve sectors such as financial services, oil and gas, ports and shipping, power generation and energy, tourism, fishing and agriculture, as well as agri-processing industries. Through this platform for dialogue, the Coastal Mission will mainstream climate change adaptation principles into coastal zone development and management of coastal landholdings, leveraging private sector finance for restoration efforts where appropriate, and designing coastal infrastructure with an optimal mix of engineered and ecosystem-based solutions.
195. **Local level:** GCF resources and co-finance will be invested in improved technical and institutional capacity of Panchayati Raj institutions at district and sub-district level, as well as community organisations, on planning and implementing coastal adaptation measures, enhancing cross-sectoral coordination among relevant stakeholders. The project builds on existing experiences of community participation for ecological restoration and livelihood development in coastal areas of India, and will strengthen a range of CBOs (e.g. self-help and women's groups) on climate-adaptive livelihood and enterprise development. Ongoing participation of various stakeholders will be ensured through training and capacity building of community organisations and government officials on: i) planning and implementing EbA measures for maintaining ecological infrastructure; ii) supporting and expanding climate-adaptive livelihoods and enterprises; and iii) integrating climate change considerations into coastal planning and governance.
196. The paradigm shift facilitated by the project is predicated on adoption of an integrated and cross-sectoral approach to climate change adaptation with a specific focus on ecosystem- and community-based adaptation. This will strengthen the enabling environment for such an approach at the national and sub-national levels through both vertical and horizontal coordination of adaptation planning.
- *Horizontal coordination.* The platforms established in Output 3 under the National Coastal Mission will ensure cross-sectoral adaptation planning through inter-linked planning processes and project implementation arrangements to build long-term institutional capacities for climate change adaptation.
 - Coordination platforms in all coastal states will build capacities of state-level government institutions to integrate climate change adaptation – and specifically EbA approaches – into development planning and governance in coastal areas.
 - A Pan-Indian Coastal Resilience Network will promote knowledge management on design, planning and implementation of adaptation in coastal areas amongst key stakeholders.
 - Multi-stakeholder coordination structures will be established and strengthened in targeted landscapes to improve dialogue on and coordination of climate-resilient development planning.
 - *Vertical coordination:* The project promotes interlinkages between local-, district-, state- and national-level planning for adaptation that also supports implementation of national-level plans and strategies. Successful initiatives in the 24 target landscapes will be discussed in state-level project coordination structures, to assess how best to replicate such initiatives state-wide, through local and state government structures at various levels. In particular, the various interdepartmental platforms in the 13 coastal states of India, guided by National Coastal Mission, will be used to support the integration of ecosystem- and

community-based measures into specific policies and plans as well as into budgetary processes for comprehensive and integrated coastal adaptation planning and governance.

Innovation and Market Development

197. The project's adoption of integrated, cross-sectoral, ecosystem- and community-based approaches to climate change adaptation is innovative in the context of coastal governance in India. It has the potential to transform current approaches that are largely restricted to single sectors and focus on planning and implementation of hard infrastructure for coastal protection. In this way, the project is promoting a shift away from conventional, siloed planning processes within government agencies towards collaborative and cross-sectoral coordination between such agencies to develop integrated solutions that include ecological and community considerations at the landscape level. Critical aspects of the project's innovative approach are described below.

- The focus on **market development for value-added products** of aquaculture, agriculture and other climate-adaptive livelihoods, ensuring that livelihoods interventions are sustainable
- The **potential for ecological infrastructure** to buffer climate change impacts and support local livelihoods is recognized as central to provision of adaptation benefits.
- The focus on **community-based approaches to building climate resilience** through enhanced livelihoods and community-level planning for climate change adaptation will build adaptive capacities and reduce climate vulnerability.
- Adoption of a **landscape-scale approach to planning and implementing adaptation interventions** will achieve greater benefits than the current approach of undertaking planning within the scope of administrative sub-divisions.

198. This project will also support the development of the technical knowledge base on adopting ecosystem-based approaches to climate change adaptation at the landscape scale. This will include the application of innovative tools and methodologies such as:

- A decision-support tool to provide decision-makers and planners with enhanced information and knowledge for climate-resilient coastal management.
- A Coastal Calculator tool for design of shoreline protection and other climate-resilient infrastructure measures.

E.2.4. Contribution to regulatory framework and policies

199. The Government of India is strongly committed to the 2030 Agenda for Sustainable Development, in line with its India's national development goals and its "sab ka saath, sab ka vikas" or "development with all, and for all," policy initiatives for inclusive development. NITI Aayog, the Government of India's premier think tank, has been entrusted with the task of coordinating the SDGs, and has adopted a government-wide approach to sustainable development, emphasizing the interconnected nature of the SDGs across economic, social and environmental pillars, with the Ministry of Statistics and Programme Implementation leading discussions for developing national. State governments are key to India's progress on the SDG Agenda as they are best placed to 'put people first' and to ensure that 'no one is left behind'. Many of the Government's flagship programmes such as Swachh Bharat, Make in India, Skill India, and Digital India are at the core of the SDGs. State and local governments play a pivotal role in many of these programmes. The role of local governments is equally important; 15 of the 17 SDGs directly relate to activities undertaken by local governments in the country.

200. The project contributes towards the achievement of the SDGs as follows:

- *No Poverty (Goal 1)*. The project will promote the adoption of diversified, sustainable and climate-adaptive livelihood opportunities amongst local communities in India's coastal areas, with a particular focus on poor communities, and marginalised and disadvantaged groups.
- *Gender Equality (Goal 5)*. The project has a specific focus on the climate vulnerabilities of women. Many of the livelihood activities target women as primary beneficiaries of project support to address the disproportionate impact of climate change on them.

- *Sustainable Cities and Communities (Goal 11)*. The project supports improved planning of urban areas as well as local communities to address the impacts of climate change on their sustainability.
- *Climate Action (Goal 13)*. The primary, overarching focus of the project is on taking action on climate change adaptation at scale and amongst those most vulnerable to it.
- *Life below Water (Goal 14)*. The project will improve conservation and management of marine resources and biodiversity such as coral reefs and fish populations.
- *Life on Land (Goal 15)*. The project will support the restoration and management of ecosystems such as mangroves and forested watersheds that will provide adaptation benefits as well as additional environmental co-benefits such as biodiversity conservation.

The project is also aligned with various priorities of India's NDC, including:

- *1.3 Developing Climate Resilient Urban Centers*. The project includes activities on enhancing capacities for climate-resilient planning for towns and villages to reduce the impacts of climate-induced risks such as storm surges and sea-level rise.
- *1.6 Planned Afforestation*. The project has a strong focus on restoration of degraded ecosystems, including watershed afforestation and mangrove restoration.
- *2.1 Agriculture*. The project will support climate-resilient agricultural practices to sustain agricultural production under current and future climate change conditions and support community livelihoods and income generation.
- *2.4 Coastal Regions and Islands*. The primary focus of the project is on enhancing coastal governance for planning and implementing adaptation interventions that will build climate resilience at scale across the country's coastal areas.
- *2.5 Disaster Management*. The project will support EbA activities that will buffer against the impacts of climate-induced disasters such as storm surges and cyclones.
- *2.6 Protecting Biodiversity and Himalayan Ecosystem*. Project activities include large-scale restoration of degraded ecosystems, which will result in improved conservation of critical biodiversity.
- *2.7 Rural Livelihoods Security*. The project has a strong focus on enhancing the climate resilience of rural livelihoods in India's coastal areas.
- *2.8 Adaptation Actions under State Action Plans on Climate Change*. The project interventions are predicated upon the guidance and recommendations of the various state action plans on climate change.
- *2.9 Knowledge Management and Capacity Building*. The project includes a number of activities focused on building technical and institutional capacities at various levels for enhanced action on climate change. In addition, the project will support the development of a number of knowledge products and knowledge exchange mechanisms on climate change adaptation.

201. Finally, the GCF/GOI project will support the integration of ecosystem-centric approaches to climate change adaptation into public and private sector policies. Ecosystem-based and community-centric approaches to adaptation are currently not adequately mainstreamed into policy, planning and regulatory frameworks for coastal governance, nor are there sufficient sources of funding for scaling it up. The project will support mainstreaming and integration of climate change adaptation into existing policies and plans for local- and state-level planning as well as plans for key economic sectors such as oil and gas industries, port and shipping, power generation and energy, tourism, ecosystem management, fishing and agriculture. Integration of climate change concerns and the potential for EbA to promote climate resilience in coastal areas into policies, plans and strategies will increase institutional capacity for reducing climate change risks in vulnerable coastal areas.

202. Relevant policies, strategies and plans will be reviewed and revisions proposed to integrate climate change considerations in a more systematic approach. These relevant policies, strategies and plans at a national-level will include *inter alia*: i) National Conservation Strategy and Policy Statement on Environment and Development (1992); ii) National Forest Policy (1988); iii) Policy Statement on Abatement of Pollution (1992); iv) National Environmental Policy (2006); and iv) National Action Plan on Climate Change (2008). At a state-level, the relevant policies, strategies and plans will include *inter alia*: i) State Action Plan of Climate Changes for Andhra Pradesh (2012); ii) Maharashtra State Adaptation Action Plan on Climate Change (2014); and iii) Odisha Climate

Change Action Plan (2010). In particular, the importance of ecosystem restoration and climate-adaptive livelihoods as effective means of building adaptive capacity will be mainstreamed into coastal governance. Climate change adaptation and EbA will be integrated more effectively into spatial and development planning at the district and state levels. Furthermore, gaps and challenges related to climate change adaptation within existing plans for economic sectors in coastal areas will be identified and addressed. A landscape-based approach – with inclusion of multiple stakeholders – will be adopted to promote cross-sectoral planning for climate change adaptation.

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

Economic Co-benefits

203. The economic benefits from this project include: i) creation of short-term work opportunities in ecosystem restoration, and long-term job opportunities in maintenance of ecological infrastructure; ii) support for adaptation of activities like rice growing that are threatened by climate impacts, to enhance yields, nutritional status and incomes even in the face of such impacts; and iii) the creation of new livelihoods and small business opportunities that result in increased and diversified household incomes. Benefits will also accrue to the total population of 10 million people in 24 target landscapes in the coastal zone in the three states, where GCF and co-financed investments will be made in maintaining or restoring ecological infrastructure, and also in developing ecosystem-compatible climate-resilient built infrastructure. These investments will result in shoreline protection and avoidance of damage to property and land, allowing communities to avoid the concomitant costs of reconstruction, and loss of income from interruption of economic activities.
204. Socially and economically disadvantaged coastal communities in India are highly vulnerable to climate change impacts and currently have limited adaptive capacity. Increases in income and diversification of livelihood activities will contribute to strengthened climate resilience of these coastal communities. The project aims to provide sustainable livelihood and income generation opportunities to 1,744,970 household members in the 24 target landscapes in the 12 coastal districts in the three target states. These include livelihoods based on coastal ecosystems restored to buffer climate impacts, and livelihoods that adapt current farming practices to deal with climate impacts on agro-ecosystems, as well as value addition opportunities associated with both these categories of activities. These are detailed in Table 3 below. Skills training and opportunities to become involved in new livelihoods will be designed to include women, youth and marginalized groups. Livelihoods interventions will significantly improve the socio-economic status and empowerment of the coastal communities and pave the way for a better human development index in the highly vulnerable coastal districts of India.
205. An example of economic benefits through livelihoods work in one of the projects on which this proposal builds, comes from the Sindhudurg project. By adopting the system of rice intensification in coastal Sindhudurg, 2,500 farmers have reduced their cost of cultivation by 15-25%, while simultaneously leading to reduction of greenhouse gas emissions by 60% and water use by 40%. In the East Godavari project, it has been observed that effective enforcement of seasonal fishing ban for 60 days in a year has led to an increased fish catch and subsequently increases in income levels of 20%.

Social Co-benefits

206. Social benefits of project activities, especially livelihoods and restoration, will include nutrition, safety and security, empowerment, social cohesion, and a sense of ownership. Whole coastal communities will benefit from project activities, including farming communities on coastal plains who are vulnerable to climate change impacts on agriculture, and fishing families vulnerable to climate impacts on fisheries and aquaculture. As a result of their strong dependence on fishing and farming and a limited ability to access new livelihoods in order to deal with external stresses, coastal communities are vulnerable to climate change impacts exacerbated by ecosystem degradation. Within these communities, women, children and the elderly are amongst the most vulnerable to disaster impacts, including both slow onset disasters such as droughts, and extreme events like flooding from coastal storm surges. In addition, in India, there are a number of extremely vulnerable and marginalized social

groups such as dalits or irulas, classified as Scheduled Castes or Scheduled Tribes. By providing technical assistance for livelihoods opportunities that includes all of these groups, and enhancing access to finance and markets, social capital will be built. By establishing co-management structures for ongoing maintenance of ecosystems, and by training the next generation on monitoring and evaluation, where the evaluators themselves have a stake in the results of the interventions, the project will build adaptive capacity for the long-term. An example will be the work in Output 1.3 where youth from a range of social backgrounds will be trained to monitor coastal ecosystem health, including monitoring of carbon sequestration in maintained and restored coastal ecosystems.

Environmental Co-benefits

207. India's mangrove cover¹³⁷ is approximately 4,628 km², of which the area covered in the states under the project is as follows: i) Maharashtra – 222 km²; ii) Andhra Pradesh – 352 km²; and iii) Odisha – 213 km². The project will ensure protection and conservation of the existing mangrove cover, as well as an increase in the mangrove cover by 10,575 hectares over the project duration of six years. It will also ensure protection and conservation of other important ecosystems such as sea grass beds, salt marshes, coral reefs and coastal lagoons and estuaries. A ridge to reef approach will be taken to ensure that upstream impacts on coastal ecosystems are addressed, e.g. reforestation of catchments to avoid erosion and siltation of river mouths. The project will ensure conservation of several important coastal and marine biodiversity areas (ICMBAs) and highly sensitive areas (HSZ) as identified by the Wildlife Institute of India and National Centre for Sustainable Coastal Management (NCSCM). Through the ecosystems-based interventions of the project, important wildlife species will be protected including turtles, saltwater crocodiles, marine fishes, marine mammals and migratory birds, and those included in the IUCN Red List of threatened species.
208. The project will also provide considerable mitigation co-benefits through activities that sequester carbon. Restoration of degraded blue carbon ecosystems (e.g. mangroves, seagrass meadows) and creation of “new” ecosystems, through revegetation of degraded catchments and establishment of shelter belts, will provide additional carbon sinks along the Indian coast. The estimated total amount of CO₂ to be sequestered over a 30-year period as a result of these project activities exceeds 3.6 million tonnes (see Section E1.1). The project will thus contribute to India's emission reduction efforts in terms of its Nationally Determined Contribution (NDC) targets.

Gender-Sensitive Development Impact

209. Women involved in agriculture and fishing are largely confined to basic production and selling of these goods, but have considerable potential for skills enhancement to participate in value addition as well as diversification to other income-generating activities (e.g. in the tourism sector). This diversification of livelihoods will increase their resilience to change. The interventions of this project have been designed to address these issues by: i) supporting participation of women in climate-resilient planning and decision-making; and ii) providing specific opportunities for women to build the climate resilience of their livelihood practices and their empowerment.
210. Specific opportunities have been created for women to improve and diversify their livelihoods in a manner that will promote their resilience to climate change. Diversified and climate-adaptive livelihood activities have been selected that will specifically target women, with the aim of increasing their potential for generating income despite current and future climate change impacts (see Activities 2.1 and 2.2). For example, livelihoods such as mussel and oyster aquaculture, mangrove crab farming, cultivation of mushrooms and medicinal plants, and fish value-addition activities all have the potential to selectively benefit women. Such activities are culturally acceptable for women to participate in, while at the same time offering considerable potential for generation of significant increases in income. Empowering women by providing them with economic opportunities will have other co-benefits such as improvement in their social status, as well as potentially improved access to health and education services for their families. This in turn could enhance resilience to extreme weather events and natural disasters. The East Godavari project has demonstrated that the income of approximately 500 women beneficiaries has increased during the project period. In Sindhudurg, mussel and oyster culture has resulted in returns of six to eight times the initial investment by 10 women's self-help groups, significantly increasing the women's percentage contribution to household income. This activity has tremendous potential for replication

¹³⁷ MOEFCC. 2013. Forest Survey of India.

amongst women self-help groups in other coastal areas. A full Gender Analysis and Action plan has been developed and is attached as Annex XIII(c) to this Funding Proposal.

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

211. The coastline of India is vulnerable to the expected impacts of climate change including extreme temperatures, changes in precipitation patterns, increased incidence of extreme weather events and sea-level rise. In particular, climate change poses considerable risks to the lives and livelihoods of rural communities living in coastal districts. Calculations based on 20 years (1993–2012) of tide gauge measurements along the Indian coastline show that sea level has risen at an average rate of approximately 1.3 mm per year¹³⁸. Extreme weather events – such as cyclones, floods and drought – are also predicted to increase in frequency and intensity under future climate change scenarios (see Sections 2.7 and 2.8 of the Feasibility Study – Annex II).
212. Communities living in the coastal zone will be vulnerable to these impacts of climate change. Climate change threatens the well-being and livelihoods of people in the coastal zone of India by negatively impacting fisheries, agriculture, forestry, infrastructure, water availability and health (see Section C.1 of this Full Proposal and Section 2.8 of the Feasibility Study). For example, coastal flooding will cause loss of life and damage to economic assets and infrastructure. Such flooding will be exacerbated by sea-level rise and accelerated coastal erosion. Coastal farming and aquaculture operations, as well as freshwater aquifers, are also vulnerable to saline intrusion, which is occurring rapidly in some cases as a result of such extreme events, or more gradually as a result of sea level rise. Fisher communities' livelihoods are vulnerable in cases where fish stocks are expected to decline because of the impact of ocean warming on species and habitats that serve as fish nurseries. Farmers are also experiencing a decrease in income as changes in rainfall patterns pose challenges to agriculture, with dry periods reducing the yields of crops such as rice.
213. The proposed project will address these expected vulnerabilities in coastal communities through targeting climate-adaptive livelihoods support to poor communities whose current livelihoods are vulnerable to climate change, for example, fishermen whose fish stocks are declining, and need to supplement their income through adding value to fish before selling it (e.g. drying or pickling), or through aquaculture operations in coastal creeks (e.g. mussels or crabs). There will also be a focus on farming communities dependent on a limited number of crops for subsistence and sale on local markets, where lower yields and increased crop failures are anticipated as a result of longer dry spells and unpredictable monsoon rains. These communities' vulnerability will be reduced through using GCF funds and GOI co-finance to introduce agriculture methods that require less water (e.g. the System for Rice Intensification), and using GOI co-finance to introduce new crops (e.g. aromatic plants) to deal with temperature increases and rainfall changes. Project interventions will focus particularly on groups within communities that are particularly vulnerable to the impacts of climate change. For example, women fishers will be targeted as they tend to be involved in near-shore fishing activities which are more sensitive to climate change impacts than deep-water fishing (which is largely male-dominated). Similarly, women are estimated to contribute to more than 79% of agriculture and food production. As climate change is expected to greatly reduce agricultural productivity in India¹³⁹, women will thus be disproportionately more affected by its impacts. Extreme rainfall events – that are likely to increase in frequency because of climate change – have, for example, been shown to have catastrophic effects on fish-drying operations in Maharashtra and Andhra Pradesh, destroying the business investments of large numbers of local women¹⁴⁰. Social and cultural norms also have various implications for the climate vulnerability of marginalised groups in India, with “lower caste”, poorer populations being forced by financial conditions to live in marginal areas along the coast that are particularly exposed to climate change impacts. Project interventions have been designed to take the various needs and priorities of such vulnerable and marginalised groups into consideration during the design of project interventions for climate change adaptation.

¹³⁸ INCCA 2010.

¹³⁹ EPTRI 2012. State Action Plan on Climate Change for Andhra Pradesh. Survey No. 91/4, Gachibowli, Hyderabad

¹⁴⁰ Salagrama, V. 2012. Climate Change and Fisheries: Perspectives from Small-Scale Fishing Communities in India on Measures to Protect Life and Livelihood. International Collective in Support of Fishworkers (ICSF).

E.4.2. Financial, economic, social and institutional needs

214. India is a lower middle-income country¹⁴¹ with deep disparities in wealth and wellbeing and high levels of income inequality. Approximately 29% of Indians – i.e. more than 300 million people – live below the national poverty line of US\$ 1.90 per person per day at purchasing parity power. Given this large number of people, Gol is constrained in its ability to fund investments into climate resilience through domestic financing, as much of government expenditure is focused on socio-economic development activities to address the widespread poverty. In particular, Gol has limited financial capacity for the investments required to enhance the adaptive capacity of vulnerable, rural communities living in the coastal areas of India. For example, while the government is investing in development across India's coastline, much of this finance is directed toward ports, roads, railways and associated economic infrastructure, rather than on building the climate resilience of the poorest communities along the coast. India's economic development is expected to be severely impacted by climate change, which is expected to push an additional 45 million people into poverty¹⁴².
215. Poverty, gender inequality and social exclusion – especially as a result of the caste system – are most prevalent in rural areas of India, including in coastal areas of the three target states. The districts where the project interventions will be undertaken contain significant numbers of members of scheduled castes and tribes who suffer disproportionately from poverty because of, *inter alia*, social discrimination, landlessness and limited access to resources and economic assets. Within these communities, women, children and the elderly are amongst the most vulnerable to disaster impacts, such as flood and droughts. Lack of access to paid employment affects youth and women disproportionately. Many households have limited access to markets and inadequate provision of basic infrastructure and services. Given the factors described above, there is an urgent need to undertake climate-resilient development within the coastal areas of India to protect communities, their economic assets and their lives and livelihoods from the impacts of climate change.
216. There are also technical and institutional capacity needs to enable integrated approaches to climate change adaptation to be adopted in an integrated, cross-sectoral manner. Limited awareness of linkages between sectors related to coastal development currently results in little collaboration between relevant institutions and stakeholders. The GCF project will strengthen institutional capacities of government institutions, local communities and other stakeholders for planning, coordinating and implementing adaptation interventions to build climate resilience along the coast. In particular, this capacity building will focus on the importance of ecological infrastructure and EbA as cost-effective and complementary means of adapting to climate change when integrated with “hard” adaptation measures. GCF resources and co-finance will be used to train local communities and government officials on planning for climate-resilient coastal development to address climate-induced risks in the long-term.
217. The Gol and the private sector are not currently investing significantly in ecosystem-based adaptation measures in coastal areas of India. This is as a result of limited technical capacity and undervaluation of the adaptation benefits of coastal ecosystems (see Section C.2 of this Full Proposal and Section 5.1.4 of the Feasibility Study). Moreover, adaptation interventions – such as those to be implemented under this project – largely result in the generation of public goods. There is thus little incentive for the private sector to invest in such measures, while communities have inadequate resources and expertise to do so. For example, communities themselves cannot afford to invest in costly activities such as restoration or establishing new infrastructure for aquaculture or agri-processing operations as they do not have the financial or technical means to undertake large-scale restoration, and there are few incentives in place for effective co-management of ecosystems. Without grant financing, largely impoverished coastal communities would not have the technical or financial capacity to make the investments required for maintaining and restoring coastal ecosystems to buffer disasters and as the basis for sustainable livelihoods.
218. The proposed interventions do not lend themselves to financial reflows back to private sector investors, the Gol or the GCF, as there will not be large-scale generation of revenue or recovery of costs. Instead, the expected small-scale financial returns that will be generated from investments into livelihood diversification, in the form of

¹⁴¹ World Bank. 2016. *List of economies*.

¹⁴² Hallegatte et al. 2016. *Shock Waves: Managing the Impacts of Climate Change on Poverty*. World Bank

income from enhanced yields and new activities, will accrue at the local (household and community) level; savings from avoided expenditure on repairing disaster-induced damages will also be made at household level. The Government of India seeks maximum concessionality for the proposed urgent adaptation actions that will benefit vulnerable communities in the coastal zones of Andhra Pradesh, Maharashtra and Odisha. A grant financing mechanism is thus sought to support the prioritised interventions of this project.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

219. The proposed GCF project is in line with, and supports the implementation of the National Action Plan on Climate Change (NAPCC, 2008) and the target states' State Action Plans on Climate Change, as well as the Government of India's Nationally Determined Contribution (NDC) in terms of the Paris Agreement within the UNFCCC, with its adaptation and mitigation targets.

220. The NAPCC focuses on strategies and priority interventions for mitigating and adapting to climate change. The mitigation strategies include Planned Afforestation, while relevant Adaptation strategies are Coastal Regions and Islands, Disaster Management, Protecting Biodiversity (and Himalayan Ecosystem), and Rural Livelihoods Security. The Plan is being implemented through eight National Missions, outlining the main priorities for dealing with the challenge of climate change in India. The eight missions are the National Solar Mission, the National Mission for Enhanced Energy Efficiency, the National Mission on Sustainable Habitat, the National Water Mission, and the National Mission for Sustaining the Himalayan Ecosystem. Three missions of central importance for the project are:

1. **Green India Mission:** Through this Mission the NAPCC aims to restore/reforest 6 million hectares of degraded forest lands, thus expanding India's forest cover from 23 to 33%.
2. **National Mission for Sustainable Agriculture:** In implementing the NAPCC this Mission will support climate adaptation in agriculture through: i) the development of climate-resilient crops; ii) the expansion of weather insurance mechanisms; and iii) improved agricultural practices.
3. **National Mission on Strategic Knowledge for Climate Change:** Government will use this Mission to gain a better understanding of the impacts, effects and challenges of climate change. It also encourages private sector initiatives to develop adaptation and mitigation technologies through venture capital funds.

The NAPCC identifies several priority areas for India's coastal zones, including:

- Developing an air-ocean circulation modelling system especially for the Bay of Bengal and the Arabian Sea, to simulate regional climate change and, in particular, monsoon behaviour
- Carrying out high-resolution ocean-atmosphere variability studies in tropical oceans, in particular, the Indian Ocean
- Engineering a high-resolution storm surge model for coastal regions
- Developing salinity-tolerant crop cultivars
- Raising community awareness on coastal disasters and necessary action
- Establishing timely forecasting and cyclone and flood warning systems
- Increased planting and regeneration of mangroves and coastal forests.

221. The proposed project is aligned with the all of the abovementioned priorities – in particular the last four – as well as the objectives of the Green India Mission, the National Mission for Sustainable Agriculture and the National Mission on Strategic Knowledge for Climate Change. In addition, the project addresses priority areas related to agriculture, coastal disasters, cyclone and flood warning systems, and restoration of coastal ecosystems.

222. The project is also fully aligned with the three target states' State Action Plan for Climate Change (see Section C.2 of this Funding Proposal and Section 3.2 of the Feasibility Study in Annex II for further details on each state's

Plan). In particular, the project helps to implement the following priorities for climate change adaptation, contained in all three Plans:

- addressing the impacts of climate change agricultural practices and livelihoods;
- protecting and conserving natural ecosystems and biodiversity to buffer against climate change impacts; and
- protecting low-lying and vulnerable populations against climate-induced disasters.

223. India's Nationally Determined Contributions (NDC) outlines the country's commitment towards a low carbon emission pathway. It identifies priorities for: i) clean energy; ii) energy efficiency in various sectors of industries; iii) a major thrust to non-fossil based electricity generation; and iv) a building sector based on energy conservation. The INDC's adaptation strategies include:

1. **Adaptation component.** Aims to better adapt to climate change by enhancing investments in development programmes in sectors that are vulnerable to climate change, particularly agriculture, water resources, the Himalayan and coastal regions, health and disaster management.
2. **Mobilising finance.** Aims to mobilize domestic and additional funds from developed countries to implement the above mitigation and adaptation actions.
3. **Technology development and transfer.** Aims to build capacities, and create a domestic and international framework for sharing of climate technology in India.

224. The proposed project is closely aligned with these adaptation goals. The NDC also includes a target for 2030 to reduce the emissions intensity of India's GDP by 33-35% from 2005 levels and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030. This ties in with a related commitment mentioned in the NDC to increase forest and tree cover "eventually" from 24 to 33% of the country's terrestrial area. The GCF project will contribute to mitigation by maintaining and restoring both terrestrial and blue carbon sinks (see Output 1.3 in Section C.2) in the three target states.

E.5.2. Capacity of accredited entities and executing entities to deliver

225. UNDP is a long-term partner of the Government of India and UNDP has built strong relationships with decision-makers, and proven its strengths as an impartial provider of technical advice and support. UNDP has worked in India since 1951 in almost all areas of human development, from democratic governance to poverty eradication, to sustainable energy and environmental management. UNDP's programmes are aligned with national priorities and are reviewed and adjusted annually. In addition to managing a large portfolio of environmental projects in India, UNDP has for the past 8 years supported the Ministry of Environment, Forest and Climate Change on preparation of a series of State Action Plans on Climate Change (SAPCCs). UNDP has also been a key partner in disaster response efforts following the 1999 Odisha cyclone, the 2004 tsunami, and the 2008 Kosi River flood in Bihar, leading recovery work and mobilizing funds to ensure future disaster risk reduction.

226. The proposed project is aligned with UNDP's comparative advantage in the areas of capacity building, providing technical and policy support, reducing barriers and creating enabling conditions for adaptation planning and investments. It also builds on UNDP's current portfolio of 56 Ecosystem-based Adaptation projects globally, undertaking work in protecting, restoring and managing natural ecosystems to help vulnerable communities adapt to climate change¹⁴³ funded through The Adaptation Fund, Global Environment Facility Trust Fund, Least Developed Countries Fund, Special Climate Change Fund, International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, Australian Agency for International Development and the Department of Foreign Affairs and Trade, Canadian International Development Agency, and Japan International Cooperation Agency.

227. Since 1985, UNDP has been supporting the Ministry of Environment, Forest and Climate Change (MoEFCC), in meeting its national and international environmental priorities and commitments. This includes support to almost 40 projects in the area of climate change, sustainable natural resource management and chemicals management. The technical and policy support provided by UNDP through these projects focuses on institutional

¹⁴³ UNDP (2015) Ecosystem Based Adaptation Analysis Report, http://adaptation-undp.org/sites/default/files/resources/undp_eba_mapping_analysis_report_jan_2016_final_online.pdf

strengthening and building capacities to utilize natural resources in a sustainable way, while increasing resilience to climate variability and associated risks and impacts.

228. The lead implementing partner (executing entity) for the project is the Ministry of Environment, Forest and Climate Change (MoEFCC), which has been responsible since 2015 for all climate change matters including implementation of the NAPCC (2008). In most states, the forest and environment departments are responsible for coordination and implementation of the State Action Plans on Climate Change and also host the state coastal zone management authority (CZMA), which is present in all the coastal states. The National Centre for Sustainable Coastal Management, a national technical institute under the MoEFCC, promotes sustainable coastal development through partnerships, conservation and scientific research on India's coast, and has formed a consortium with 14 coastal research institutions¹⁴⁴.
229. In the three target states, the MoEFCC will sign a Letter of Agreement with each of the forest departments, who are best placed to coordinate activities at state level and on the ground in the 24 target landscapes, based on extensive experience with implementing donor-funded projects as well as national and state schemes and missions. These are: the Environment, Forests, Science and Technology Department in the State of Andhra Pradesh; the Revenue and Forest Department in the state of Maharashtra; and the Forest and Environment Department in the state of Odisha.
230. The MoEFCC, together with the three State Governments, will implement the project in close cooperation with the other coastal states, and also with a range of other ministries, departments and agencies responsible for coastal area management and governance. National ministries and state-level departments that will collaborate on cross-sectoral planning and governance will include those relating to environment and forests, climate change, rural development, agriculture and farmers' welfare, road transport, micro, small and medium enterprises, and shipping. At district and landscape level, officials responsible for agriculture, fisheries, irrigation, disaster management, tourism, enterprise development, housing and waste will be involved in the project, as will a wide range of private sector, non-governmental and community structures.

E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

231. Discussions in the Ministry of Environment, Forest and Climate Change (MoEFCC) related to priorities around EBA and coastal adaptation have been ongoing over the last two years through various related government initiatives, two major UNDP-GEF projects, as well as other multilateral partner efforts supported by ADB, GIZ and the World Bank. These evolved into project-specific consultations, as the national government and three states of Andhra Pradesh, Maharashtra and Odisha built on the ongoing discussions and state actions plans to invest in these priorities, including with funds to be sought through GCF. As various priorities and needs have been emerging, the proposed GCF project has evolved as a potential investment channel that enables the incremental costs of addressing climate change adaptation to be more effectively addressed.
232. Over the course of 2016, building on national policy priorities outlined in the NDC and NAPCC, the National Designated Authority (NDA) for the GCF in the Ministry of Environment, Forest and Climate Change (MoEFCC) led a focused process of consultations on priorities for climate change adaptation in the coastal zone of the three states, seeking to understand vulnerable coastal communities' adaptation needs and how GCF funding could help the country meet the incremental costs of addressing these needs and establishing pathways to scale across India's coastal zone.
233. The proposed project will involve a wide range of stakeholders including communities, community-based organizations, non-governmental organizations, monitoring and research institutions, small and large-scale private sector operators, in addition to public sector role-players from various spheres of government. During 2016, the MoEFCC led the process of consultations with key stakeholders at a national level. In the three target states, consultations have been led by the Environment, Forests, Science and Technology Department in the State of Andhra Pradesh, the Revenue and Forest Department in the state of Maharashtra, and the Forest

¹⁴⁴ University of Calcutta, Andhra University, Anna University, M S Swaminathan Research Foundation, National Centre for Earth Science Studies Trivandrum, Pondicherry University, College of Fisheries Mangalore, National Institute of Technology Surathkal, University of Mumbai, Goa University, Bhavnagar University, Gujarat Vidyapith, Madras School of Economics, KIIT University and Centre for Environment Education.

and Environment Department in the state of Odisha. In Odisha, discussions were facilitated by the Integrated Coastal Zone Management Programme of the Forest and Environment Department.

234. A full list of NGOs already engaged through state-level consultation meetings is included in Annex XIII(d). The NGO sector, together with small-scale community-based organizations such as Eco Development Committees, Van Samrakshan Samitis, self-help groups, producer organizations and fisher associations, will be important role-players on the ground in the target states and landscapes. A wide range of smaller NGOs and community-based organizations in the three target states and the 24 target landscapes (see maps in Annex IX) will also be involved in ongoing stakeholder engagement processes. Private sector role-players will also be engaged during the project – from the financial services sector, and in key economic sectors such as oil and gas, ports and shipping, power generation and energy, tourism, fishing and agriculture. These sectors will be engaged on investing in upstream activities generated by the livelihoods activities (e.g. processing aquaculture products) and on applying EbA principles in managing their own coastal landholdings, including planning of new infrastructure development.
235. In addition, a series of site-level engagements was conducted with communities in selected target landscapes in each of the three states, to understand better their vulnerabilities to climate change, their adaptive capacity. These engagements sought input on the ways in which previous project activities had enhanced participants' livelihoods and incomes, and the quality of the natural resource base on which these livelihoods depend. During these discussions, local communities expressed the need for adaptation projects that will reduce threats to their ecosystems-dependent livelihoods and strengthen their resilience to increasing climate change impacts. Particular questions were posed in these discussions about the current and potential involvement of women in economic and project activities, as well as the role of young people and socially marginalized groups. One example is the point made in consultations in Sindudurgh District in Maharashtra that livelihoods opportunities in ecotourism, scuba diving and tour guiding should be made available to women through the project, despite social norms which see these activities as a traditionally male preserve. Useful lessons were learnt from these engagements and built into the project design, particularly of Activity 1.2, which takes a co-management approach to ecosystem restoration and maintenance, and Activities 2.1 and 2.2 which support climate-adaptive livelihoods and enterprises through technical assistance, and strengthened access to finance and markets. A full list of national, state and site-level consultations is included in Section 9.4 of the Feasibility Study (Annex II).
236. The consultations included a series of workshops during which the proposed project concept was discussed in detail with a range of related government sectors. An initial meeting of a MoEFCC-coordinated technical working group was held in Delhi in August 2016, including national and state-level role-players. At this meeting, an emphasis was placed on drawing out the lessons learnt and building on the gains made in previous projects. In particular, lessons were drawn from three projects in the target states – the UNDP-managed GEF-financed projects on “Mainstreaming Coastal and Marine Biodiversity into Production Sectors” in the East Godavari district of Andhra Pradesh (East Coast) and in Sindhudurg Coast of Maharashtra (West Coast), and Phase I of the World Bank-supported Integrated Coastal Zone Management project implemented in several states including Odisha (with Phase II planned to take place in several states including Andhra Pradesh). The funding proposal was validated by this technical working group in March 2017 with parallel civil society consultations happening simultaneously in the three states and results recorded in the minutes of the appraisal meeting (see Annex VII).
237. The process of engagement with community members and beneficiaries in the 24 target landscapes (project sites), listed below (see maps in Annex IX), will be continued during the first year of implementation if the project is approved. This engagement in the sites will include two key elements: i) undertaking participatory, community-based land-use planning, based on an analysis of vulnerability to climate change impacts and adaptive capacity, to identify and locate site-specific measures for ecosystem conservation and restoration, and explore the community's ongoing role in co-managing these sites; and ii) undertaking participatory livelihoods planning in target landscapes and villages – evaluating livelihood options in aquaculture, agriculture and MSMEs through development of community-centric, value-chain development strategies, and identifying appropriate sites for harvesting, growing, fishing, culturing, storage and processing. This is outlined in the Stakeholder Engagement Plan in Annex XIII(e).

E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

Economic and financial soundness

238. The overall economic and financial soundness of this project have been determined through conducting a full economic analysis during proposal development, in accordance with the 'Financial and Economic Analysis of Projects' guidelines of UNDP. The project yields sustainable development benefits across coastal districts of the three target states, with more than 1,744,970 direct beneficiaries in the target landscapes whose households are involved in livelihoods activities through the project, and 10 million indirect beneficiaries living in these landscapes, who will benefit from the mitigation of economic damages and losses associated with extreme weather events, especially storm surges that can cause coastal flooding, erosion and saline intrusion. The proposed investment demonstrates a high degree of economic efficiency, with an economic rate of return in excess of 16% for livelihood activities, of approximately 26% for paddy rice activities, and well above 25% in most coastal protection activities. The project also leverages domestic co-finance (\$86.85 million) and builds capacities for sustained impact.
239. Detailed financial analyses have been conducted for Output 2 (separate analyses for SRI for paddy farming and all other climate-adaptive livelihood activities). Activities under Output 1 involve mapping vulnerability, restoring coastal ecosystems and monitoring progress in achieving adaptation and mitigation benefits. As such, the output promotes the protection and restoration of ecosystems that are public goods, and does not generate revenue or financial return. Output 3 involves knowledge management and interventions to influence public and private sector policies, plans and investment decisions, but again does not involve actual investment of GCF funds or co-finance in revenue-generating activities. Hence, financial analysis is not considered pertinent for Outputs 1 and 3, given the public good nature of these activities, and the fact that they are not designed to generate financial benefits to any of the project stakeholders. Financial analysis for the climate-resilient livelihoods support over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) higher than the weighted average cost of capital (WACC)/hurdle rate for all three states, for both SRI for paddy farming and for other climate-resilient livelihoods enhancement activities proposed under this project. Hence, the livelihoods investments to be made under Output 2 are computed to be financially viable and sustainable in the long-term.
240. For Output 2, GCF funding is proposed to cover 52% of costs of implementing SRI for paddy farming training/capacity building activities and an average of 45% of costs for all other proposed livelihood enhancement activities that can increase the adaptive capacity of farming households, with government co-financing covering the remaining costs. GCF funding is proposed to be used judiciously to finance primarily training/capacity building/technical assistance/social mobilization costs, with government co-financing being used to fund installation of livelihood generation assets etc., indicating that this project's proposed funding structure is planned to include, and not crowd out, public investments.

Cost-effectiveness

241. Cost-effectiveness of the project and its interventions is promoted at a number of different levels, through: i) adapting protocols for ecological restoration and livelihood development that have been used successfully in India's coastal zone and other coastal environments; ii) engaging local communities in establishing appropriate co-management structures for the planning, implementation and long-term maintenance of all interventions; and iii) intensive cross-sectoral collaboration between national ministries and state-level departments to ensure that all operation and maintenance plans for investments in ecological infrastructure and coastal livelihoods are rigorously followed in the long-term. Particular means through which cost-effectiveness is enhanced include the following:
242. **Project design with tested EbA solutions to challenges:** The bio-geographical and socio-economic suitability of the project activities have been successfully tested in the field, as reflected in Section 2.5 of the Feasibility Study (Annex II). The cost-effectiveness of proposed ecosystem- and community-based adaptation solutions has been tested in a number of projects at varying scales. This includes three recent/current UNDP-managed GEF-financed projects (Sindhudurg, EGREE, Gulf of Mannar) involving restoration of coastal ecosystems and generation of ecosystem-based livelihoods. It also includes experience and lessons learnt from the Asian

Development Bank-managed Special Climate Change Fund project on “India: Climate Resilient Coastal Protection and Management” working in Karnataka and Maharashtra, and the GIZ-funded AdaptCap Project in coastal Tamil Nadu and Andhra Pradesh. The project builds on all these initiatives’ lessons of cost- effectiveness and efficiency of delivery. The project will also build synergies with other projects and national and state-level schemes and missions working in the same target states and landscapes, to maximize effectiveness and cost-effectiveness.

243. **Building on evidence from cost benefit analysis:** Evidence from around the world shows that ecosystem-based approaches can be cost-effective in helping communities adapt to unavoidable climate change impacts, whilst simultaneously delivering multiple social, economic and environmental benefits¹⁴⁵. UNDP has conducted a series of cost-benefit analyses of EBA interventions in Africa, Asia and Latin America^{146,147}, demonstrating that potential EBA interventions compare favourably with business as usual scenarios or other adaptation options. A cost-benefit analysis of ecosystem and engineering options for coastal protection was recently undertaken by GIZ in Vietnam¹⁴⁸, assessing the costs and benefits of coastal reforestation and forest conservation – including mangrove rehabilitation – versus hard infrastructure, namely a concrete dyke upgrade. The results showed that the cost of mangrove restoration would amount to an estimated 1.7 million Vietnam dong per capita, whilst a sea dyke system would cost approximately 38.8 million dong per capita¹⁴⁹. The mangroves provided the same protection to the coastline as a concrete dyke upgrade, with reduced vulnerability to extreme weather events and flooding from spring tides, and was therefore deemed more cost-effective. The project builds on this body of work in designing specific EbA interventions fort effectiveness and cost-effectiveness.

244. **Ongoing learning and adaptive management:** An efficient knowledge management system will be critical in providing the necessary conditions for effective coastal development and planning. This system will collate information and lessons learned on coastal planning and climate change from external and local sources while also encouraging the generation of new knowledge. Knowledge transfer will occur through exchange platforms at the level of communities, states, national and international role-players. An iterative adaptive management framework will be applied to the long-term operations and maintenance of all adaptation investments, whereby success of interventions is continually assessed and adapted as challenges arise during implementation, based on frequent and long-term monitoring and evaluation of all adaptation interventions, with evaluations to quantify the benefits and cost-effectiveness of investments and feed back into the adaptive management framework.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

245. *Not applicable*

E.6.3. Financial viability

246. Financial analysis of the proposed SRI for paddy farming activity (under Output 2) over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) about ~23.9% for all 3 states, which is higher than the WACC/hurdle rate of 6.9%. Hence, investments to be made under SRI for paddy activity are computed to be financially viable and sustainable in the long-term. FIRR and Financial Net Present Value (FNPV) for the three states are as shown in the table below.

State	FNPV (15-year)	FIRR (15-year)	WACC
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¹⁴⁵ UNDP. 2015. *Making the Case for Ecosystem-based Adaptation: The Global Mountain EbA Programme in Nepal, Peru and Uganda*. UNDP, New York.

¹⁴⁶ Rossing, T, Chhenjum Sherpa, N & Egan, A (2015). *Challenging gender roles and crossing castes: Promoting women’s livelihoods through broom grass cultivation in the Nepal Himalaya*. UNDP.

¹⁴⁷ UNDP. 2015. *Natural Resource Economic Analyses for the Ecosystem Based Adaptation (EbA) Project in Mount Elgon Ecosystem*. Uganda, Ministry of Water and Environment.

¹⁴⁸ GIZ. 2013. *Saved health, saved wealth: An approach to quantifying the benefits of climate change adaptation: Practical application in coastal protection projects in Viet Nam*. Available at:

http://www.perspectives.cc/typo3home/groups/Publications/giz_2013_Saved_health_saved_wealth_-_an_approach_to_quantifying_the_benefits_of_climate_change_adaptation.pdf.

¹⁴⁹ Asian Development Bank. 2015. *Ecosystem-based approaches to climate change challenges in the Greater Mekong Subregion*.

Andhra Pradesh	US\$ 975.3 Million	23.89%	6.9%
Odisha	US\$ 569.2 Million	23.87%	6.9%
Maharashtra	US\$ 23.0 Million	23.86%	6.9%

247. Financial analysis of the proposed 6 livelihood activities (non-SRI) to be funded by GCF and GOI co-finance over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) of 21.5% for Andhra Pradesh, 24.4% for Odisha, and 27.6% for Maharashtra, which are all higher than WACC of 6.9%. Hence, investments to be made for the 6 livelihood enhancement activities (non-SRI) are computed to be financially viable and sustainable in the long-term. FIRR and Financial Net Present Value (FNPV) for the 3 states for livelihoods enhancement activities (other than SRI) are as shown in the table below.

State	FNPV (15-year)	FIRR (15-year)	WACC
Andhra Pradesh	US\$ 71.9 Million	21.5%	6.9%
Odisha	US\$ 28.9 Million	24.4%	6.9%
Maharashtra	US\$ 24.0 Million	27.6%	6.9%

248. Financial analysis of the proposed 9 livelihood activities to be funded by GOI funding only over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) of 34.8% for Andhra Pradesh, 15.2% for Odisha, and 15.6% for Maharashtra, which are all higher than WACC of 6.9%. Hence, investments to be made for the 9 livelihood enhancement activities funded only by GOI are computed to be financially viable and sustainable in the long-term. FIRR and Financial Net Present Value (FNPV) for the 3 states for the 9 livelihoods enhancement activities funded by GOI are as shown in the table below.

State	FNPV (15-year)	FIRR (15-year)	WACC
Andhra Pradesh	US\$ 546.8 Million	34.8%	6.9%
Odisha	US\$ 91 Million	15.2%	6.9%
Maharashtra	US\$ 151.6 Million	15.6%	6.9%

249. Sensitivity analysis of financial returns computed above was performed primarily to assess the impact of lower than assumed revenues or higher than estimated costs. The financial returns are still positive if revenues decrease by 10% or costs increase by 10%. While theoretically, SRI for paddy farming activity and all other livelihoods enhancement activities as described above are still financially viable without GCF grants, in practice, the training and capacity building part of these activities may not be conducted at all or be conducted at a slow pace in the absence of GCF grants, given the budgetary constraints in these states. Hence, GCF grants are proposed to act as catalysts in the implementation of these activities in these states, thereby enhancing the climate resilience of these coastal communities sooner.

E.6.4. Application of best practices

250. The design of the proposed GCF project incorporates best practices from international literature on ecosystem- and community-based adaptation. The Feasibility Study (Annex II) contains detail on methodologies and techniques for the restoration component of the project, identifying best practices based on experience in South Asia and internationally for restoration of mangroves, coral reefs, seagrass beds, saltmarshes, and catchments

including coastal and dune vegetation. In relation to the implementation of the project through a community-based approach, important lessons have been applied from key related initiatives, in particular these four:

- The **Integrated Coastal Zone Management Project** (World Bank, GoI, 2010–2017, US\$ 286 million)
- The project **Conservation and Management of Coastal Resources as a Potential Adaptation Strategy for Sea Level Rise** (Adaptation Fund, NABARD, 2015–2019, US\$ 689,264)
- The project **Mainstreaming Coastal and Marine Biodiversity Conservation into Production Sectors in Sindhudurg Coast in Maharashtra** (GEF, UNDP, MoEFCC, 2011–2016, US\$ 3,4 million)
- The project **Mainstreaming Coastal and Marine Biodiversity Conservation into Production Sectors in the East Godavari River Estuarine Ecosystem (EGREE)**, Andhra Pradesh (GEF, UNDP, MoEFCC, 2011–2018, US\$ 6 million).

Areas in which best practices have been applied in the project design are as follows:

Community involvement in managing and restoring ecosystems

251. A major factor for the success of both conservation and restoration projects is invariably strong community involvement and cooperation in planning and carrying out activities on the ground. Sometimes community members provide labour for works and monitoring as an in-kind contribution, in cases where there are obvious benefits that accrue to all immediately. Where benefits may accrue over a longer time period, it is often appropriate to involve paid labour. In the abovementioned projects this has been achieved effectively through the Forest Department in coastal states recruiting and remunerating local villagers for works conducted in their districts. Several projects in various ecosystems and regions of India found that including local villagers – especially women – into planning and restoration activities had both financial and ecological benefits. This was usually attributed to local knowledge and expertise being incorporated into project implementation from the start. To ensure ecological sustainability, it was found that the distinction between resource harvesting and conservation needed to be clearly explained to local communities from the outset of the project. This distinction contributed to reducing conflicts that arose between restoration objectives and community livelihood activities. These lessons have been applied in the project design through creating opportunities for participatory, community-based land use planning in target landscapes.

Effective maintenance after restoration to sustain gains

252. A recurring theme in successful projects was that careful management of resource extraction enabled ecosystems to manage or recover from climate change impacts, and in some cases to maintain their roles as effective buffers against extreme events. Where ecosystems had been restored, it was found that skills development and dialogue with all stakeholders leading to effective management of the restoration sites was critical. Fostering relationships based on constructive cooperation between conservation authorities and local communities was another requirement for successful restoration. With regards to averting human-wildlife conflicts at certain project restoration sites, educating local communities on the ecological, social and financial benefits of restoration was also found to be helpful. Community management of restored ecosystems was often found to add both social and financial benefits to the project. Working with local communities to manage local natural resources and materials in a sustainable manner results in a sense of ownership of the resources, more productive work and greater economic development in the long-term. This type of engagement results in greater flexibility in terms of adaptive management during project implementation. These lessons have been applied in the project design through including the establishment of co-management structures to continue community involvement in ongoing maintenance.

Communities understanding the science

253. In terms of monitoring the biophysical results of project interventions on the ground, providing an enabling environment for universities and youth to become actively involved in the monitoring of restoration sites has been proven to be a cost-effective way of conducting monitoring activities in India that also advances knowledge generation. The use of sustainable and innovative technologies can, in particular, assist in the long-term monitoring process. This has been applied in the project design through training communities in the target

landscapes to participate in monitoring coastal ecology and ecosystem health, and also in undertaking carbon assessments and measuring carbon sequestration. This will involve local youth from all social backgrounds, as well as NGOs/CBOs – including using a mobile phone app to facilitate access to a Decision-Support Tool to be developed for adaptation planning. Experience has also shown that awareness of climate change and the associated risks is often limited or non-existent in Indian coastal communities and among local authorities. Initiatives that create awareness of alternate livelihood options and ways for coastal communities to adapt current livelihoods to increase resilience to climate change through training and demonstrations are most successful. Past projects on ecosystem restoration and conservation have shown that efficacy of interventions and a sense of empowerment within the community increases when the local people are aware of how the health of surrounding ecosystems is strongly linked to their everyday livelihood activities. The GCF project will advance knowledge in the wider community through training courses for CBOs on anticipated climate change impacts on livelihoods and adaptation options, as well as public education and awareness programmes.

Working through community-based organizations

254. Initiatives that are implemented through community-based organisations (CBOs) were found to be most effective in fostering change at a societal level in India, and maximising participation. This has been done through involving organizations such as village self-help groups, producer and fisher organizations in a lead role on activities, working together with Panchayat Raj institutions. Community-based tools and intensive community participation were invariably necessary for uptake of new livelihoods by communities, and helped facilitate linking ecosystem restoration activities with income generation activities. CBOs were found to often promote local custodianship through community participation, and to promote mutual sharing of knowledge among the individuals of coastal communities. These initiatives also served as a platform for education and training to community members. In addition, CBOs often acted as social inclusion catalysts, bringing people of all castes together to discuss the development of livelihoods in a constructive manner. Lastly, CBOs promoting new livelihoods were often able to create women-inclusive environments. These lessons have been applied in the project design in placing CBOs at the centre of livelihoods activities, and involving youth from all social backgrounds in new livelihood opportunities such as training to be tour-guides or scuba-dive leaders.

Skills development interventions

255. Skills development interventions enable coastal communities to build on their existing livelihood skills and also manage coastal ecosystems in a sustainable manner. Such interventions have helped communities to adopt alternative livelihoods or take up existing work in a more climate-resilient and productive way. Farmers, fisher folk and other marginalized groups in Indian coastal communities have in particular been found to increase income streams and reduce seasonal unemployment as a result of such interventions. To maximize the benefits of the skills development, links to industries are required in order to promote employment of newly trained people. In the case of livelihood skills involving self-employment, developing access to consumer markets was found to be critical for providing technical support and skills development for community members on climate-resilient and diversified livelihoods, including agri/aquacultural extension services, Farmer Field Schools and demonstration farms. The project will include targeted skills development programmes for climate-adaptive aquaculture, ecotourism and non-timber forest products, as well as for climate-smart intensification and climate-adapted crops, through relevant community-based organizations (e.g. self-help groups) and local self-governance institutions (e.g. Gram Panchayats).

Access to enabling finance

256. Past projects have shown that access to microfinance and insurance greatly increases the financial security – and hence climate resilience – of coastal communities, particularly women. Links to banks and microfinance institutions are frequently successfully established through self-help groups. Such links enable loans to be used to develop specific livelihood projects that benefit the community as a whole. Access to finance has consequently enabled many communities to undertake alternate livelihoods or expand upon their existing livelihoods (e.g. fishing, crab farming, agriculture and micro-enterprises). These lessons have been applied in the project design through providing support to self-help groups, producer and fisher organizations, and local entrepreneurs to access greater loans from local cooperative banks and regional rural banks (under licence of government-owned

commercial banks or state governments), by working to enhance their capacity for business planning, their credit record and collateral opportunities. The project may also have spin-offs in matching entrepreneurs, banks, buyers and opportunities to establish medium-sized processing facilities for the agricultural and aquacultural products supplied by the livelihoods activities. All this work will build on decades of experience and best practice from India's well established micro-finance sector.

Ensuring sustainability of aquaculture

257. Past projects involving the establishment and expansion of aquaculture, including mussels, oysters, crabs, and multitrophic ponds have learnt important lessons on sustainability. These include the importance of managing water quality to avoid eutrophication or pollution, as well as keeping stocks within the carrying capacity of the ecosystem. Inappropriate waste disposal practices have been shown in past projects to lead to pollution of groundwater which negatively affects marine ecosystems as well agricultural production of coastal communities in India. Past initiatives have shown that an integrated aquaculture systems approach can also prevent damage to surrounding ecosystems^{150,151}. Improved waste management techniques will be used in the GCF project to mitigate these effects and where appropriate, integrated duck and fish farms, and multi-trophic ponds will be established. Stocking of coastal creeks, for example with hatchling crabs, will be carefully planned and monitored so as not to exceed ecological carrying capacity, building on local knowledge as well as international best practice.

E.6.5. Key efficiency and effectiveness indicators

<i>GCF core indicators</i>	Estimated cost per t CO ₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)
	\$9.82 ¹⁵² (contribution of conserved and restored blue carbon and terrestrial ecosystems to climate change mitigation through avoided GHG emissions)
	Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)
	n/a
Other relevant indicator	

¹⁵⁰ Troell M, Kautsky N & Folke C. 1999. Applicability of integrated coastal aquaculture systems. *Ocean and Coastal Management* 42:63–70.

¹⁵¹ Kumar K & Ayyappan S. 1998. Integrated aquaculture in eastern India, DFID NRSP High Potential Systems. Institute of Aquaculture, working paper number 5. Current practices in integrated aquaculture from India. Central Institute of Freshwater Aquaculture, Indian Council of Agricultural Research, Odisha, India.

¹⁵² This was calculated by taking into account the total investment in coastal ecosystem restoration (GCF and GOI) through Activity 1.2 of \$36,163,615 (\$23,376,593 + \$10,238,022 + \$2,549,000), and dividing this by the number of t CO₂ eq sequestered over a 15-year period, i.e. 3,682,980 tonnes.

F.1. Economic and Financial Analysis

Economic Analysis

Approach and Methodology

258. The economic analysis of the proposed project was carried out in accordance with the *Guidelines for the Economic Analysis of Projects of United Nations Development Program*.¹⁵³ The economic efficiency of the investment was determined by computing the economic net present value (NPV) with an assumed 10% discount rate, and the economic internal rate of return (EIRR). For consistency purposes, all proposals developed with the support of UNDP have opted to use a 10% discount rate, in line with the existing practice of multilateral development banks.
259. Economic values (costs and benefits) are all measured in real terms of 2017. Economic costs of the project are net of taxes, duties, and price contingencies. Furthermore, the analysis assumes a shadow wage rate of 1.00 for unskilled and semi-skilled labor in India. Provided that the economic cost of labor in India is expected to be lower than the market wage rate (financial cost), we expect this assumption leads to significantly over-estimating the economic cost of the project, and under-estimating the true net economic value of the project. For example, in a recent (2016) cost-benefit analysis of an energy efficiency project in India, the Asian Development Bank used a shadow wage rate factor of 0.75 for unskilled labor, reflecting a judgment that the labor component of the project had a lower opportunity cost than is implied by the financial labor cost (as a result of the existence of surplus unskilled and semi-skilled labor in India).¹⁵⁴ The above assumption allows the use of financial cost as a measure of the economic cost of the project (once again noting that in doing so, the economic cost of the project is over-estimated, and the net present value of the investment is then under-estimated).
260. As is common when undertaking the economic analysis of investment projects, numerous assumptions were used to delineate the “with project scenario” from the “without project scenario”. These assumptions are presented and discussed below. Assumptions were made so as to under-estimate the true net economic value of the proposed investment project. The analysis period is 25 years. In all cases where assumptions had to be made, we have adopted conservative assumptions so as to avoid over-estimating the expected benefits of the project. We thus believe that the analysis under-estimated the true economic benefits of the project.
261. For purpose of the economic analysis of the proposed investment project, the project’s components and sub-components have been grouped into two activities: (1) livelihoods; and (2) coastal protection.
262. The coastal protection activities constitute Output 1 while livelihoods activity constitute Output 2. Output 3 as well as “project management cost” are not amenable to the conduct of an economic analysis on their own. However, the cost of these two project components, amounting to \$33,614,423 cannot be ignored. For purpose of the economic analysis, it is assumed that this cost is distributed across Output 1 and Output 2 in proportion of the contribution of the cost of Output 1 and Output 2 to total cost.¹⁵⁵

Outcome of the Economic Analysis

263. The net present value (NPV) of Output 1 and Output 2 are presented below. The benefits of Output 1 are measured as the increased livelihoods generated by the activities of Output 1. The benefits of Output 2 are generated by the reduction in lost statistical lives and damages from the project. It is conservatively assumed that those would be

¹⁵³ UNDP. 2015. *Guidance on the conduct and reporting of the Economic and Financial Analysis of Climate Change Adaptation and Mitigation Projects and Programmes*. UNDP.

¹⁵⁴ The economic analysis is available at <https://www.adb.org/sites/default/files/linked-documents/48224-002-ea.pdf>. The shadow wage rate is presented in paragraph 10 of the document.

¹⁵⁵ It may be remembered that the cost (or a share of the cost) of Output 3 and of the management cost was not included in the cost of Output 2 in the financial analysis. The assumption made here in the economic analysis is not inconsistent with the assumption made in the conduct of the financial analysis where the purpose was strictly to evaluate the direct incremental net revenues of the various livelihood activities.

reduced by 5% to 20%. Note that the results in Maharashtra are slightly less favorable as a result of a much lower incidence of damaging extreme weather events in Maharashtra than in Andhra Pradesh and Odisha.

NPV and IRR of Output 2

Sub-output	State	NPV	IRR
Livelihood Activities	Andhra Pradesh	66,363,881	20.0
	Maharashtra	22,270,227	24.3
	Odisha	27,160,522	22.4
Paddy Rice	Andhra Pradesh	1,118,903,068	26.4
	Maharashtra	25,541,680	24.9
	Odisha	654,496,869	26.4

NPV and IRR of Output 1

State	Scenario	NPV (\$)	IRR (%)
Andhra Pradesh	If 10% reduction	55,970,363	28.1
	If 20% reduction	131,962,731	40.8
	If 30% reduction	207,955,099	49.3
Maharashtra	If 10% reduction	(14,458,290)	1.8
	If 20% reduction	(3,791,224)	8.3
	If 30% reduction	6,875,842	12.7
Odisha	If 10% reduction	55,274,922	27.1
	If 20% reduction	129,969,681	38.5
	If 30% reduction	204,664,441	46.1

264. Sensitivity analyses showed the economic efficiency of the project to be robust to increase in costs or decrease in benefits.

Financial analysis

265. Financial analysis of the proposed project was carried out in accordance with the 'Financial and Economic Analysis of Projects' guidelines of UNDP. Detailed financial analyses have been conducted for Output 2 (separate analyses for SRI for paddy farming and all other climate-adaptive livelihood activities). Activities under Output 1 involve mapping vulnerability, restoring coastal ecosystems and monitoring progress. As such, the output promotes the protection and restoration of ecosystems that are public goods, and does not generate revenue or financial return. Output 3 involves knowledge management and interventions to influence public and private sector policies, plans and investment decisions, but again does not involve actual investment of GCF funds or co-finance in revenue-generating activities. Hence, financial analysis is not considered pertinent for Outputs 1 and 3, given the public good nature of these activities, and the fact that they are not designed to generate financial benefits to any of the project stakeholders.
266. Output 2 proposes to implement livelihood enhancement activities in 24 target landscapes in 12 coastal districts in the three target states– Andhra Pradesh, Odisha and Maharashtra. The various climate-resilient livelihood activities planned include the System of Rice Intensification (SRI) for paddy farming, crab farming, mussel farming, oyster farming, crab hatcheries, ornamental fisheries, integrated duck-fish farming, seaweed farming, honey production, mushroom cultivation, cultivation of aromatic and medicinal plants, MSMEs for value-added fish products (e.g. fish cutlets, fish pickle, canned mussels), fishmeal plants, fish processing units, scuba diving, and tour guiding. Financial analysis is conducted for these livelihoods enhancement activities.

267. Financial analysis of livelihoods enhancement activities is conducted in three parts – financial analysis of SRI for paddy in one part, and financial analysis of the other 6 climate-resilient livelihood enhancement activities proposed to be funded by GCF and GOI co-finance together in another part, and financial analysis of the 9 livelihood enhancement activities proposed to be funded by GOI funding only in another part, as described below. This is because SRI for paddy activity is primarily a technical assistance/capacity building activity without any capital costs involved; whereas all the other livelihood enhancement activities involve capital investments into livelihood- enhancing physical assets, such as cages for crab hatcheries, as well as capacity building/social mobilization costs.
268. **Financial Analysis of SRI for Paddy Activity:** The System of Rice Intensification (SRI) for paddy farming is a methodology of paddy farming that can increase the yield of rice produced per acre of farm, despite increased temperatures and more erratic monsoons, through more efficient use of inputs and new growing techniques. Implementation of SRI for paddy farming essentially involves training and capacity building of farmers in SRI techniques. Details on input data, estimation and assumptions that have been used for financial analysis of SRI for paddy farming activity are available in the Financial Analysis Annex XII (b).
269. Financial analysis of the proposed SRI for paddy farming activity (under Output 2) over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) about ~23.9% for all 3 states, which is higher than the WACC/hurdle rate of 6.9%. Hence, investments to be made under SRI for paddy activity are computed to be financially viable and sustainable in the long-term. FIRR and Financial Net Present Value (FNPV) for the three states are as shown in the table below.

State	FNPV (15-year)	FIRR (15-year)	WACC
Andhra Pradesh	US\$ 975.3 Million	23.89%	6.9%
Odisha	US\$ 569.2 Million	23.87%	6.9%
Maharashtra	US\$ 23.0 Million	23.86%	6.9%

Financial Analysis of Other Six non-SRI Livelihood Enhancement Activities proposed to be funded by a combination of GCF and GOI funding: Apart from SRI for paddy farming, 6 other climate-resilient livelihood enhancement activities are planned to be implemented as part of this proposed project. These activities fall into two categories:

- A. *Livelihoods that are based on coastal ecosystems restored to buffer climate impacts, including those that:*
- take place in creeks and ponds in the intertidal zone (e.g. crab farming) and benefit from EbA measures to conserve, restore and manage ecosystems for their disaster buffering benefits
 - provide for value addition to fishing and aquaculture products (e.g. fish processing) that benefit from EbA measures to conserve, restore and manage ecosystems, helping to sustain these livelihoods over time, alongside evolving climate risks.
 - take place close to the intertidal zone (e.g. ecotourism) and benefit from the scenic beauty derived from EbA measures to conserve, restore and manage ecosystems, especially coral reefs in the case of scuba diving.
 - take place in and near mangroves (e.g. mangrove beekeeping), which benefit from EbA measures to conserve, restore and manage ecosystems.
- B. *Livelihoods that are adapted to specific climate change impacts on agro-ecosystems, including those that:*
- form part of a strategy to promote climate-resilient agro-ecosystems (e.g the System of Rice Intensification), that manage soil and water resources better to withstand erratic monsoons with longer dry spells

- form part of a strategy to promote climate-resilient agro-ecosystems through changing cropping patterns cultivating new crops that use less water and/or can tolerate increased temperatures (e.g. aromatic plants).

270. These activities all involve making some investments into developing/building physical assets, as well training and capacity building, and hence, a single financial analysis is conducted for all these activities together. It is important to note that GCF grants are proposed to be used mainly for training/technical assistance/capacity building/social mobilization costs of these activities, which amount to an average of 45% of the total costs, and the remaining costs, which include costs of developing/building physical assets that can enhance livelihoods and income generation, are proposed to be financed by co-financing through a range of budgets, schemes and missions at State level, as outlined in the co-finance letters from the Governments of Andhra Pradesh, Odisha and Maharashtra. Details on input data, estimation and assumptions that have been used for financial analysis of these other livelihood enhancement activities are available in the Financial Analysis Annex XII (b).

271. Financial analysis of the proposed 6 livelihood activities (non-SRI) to be funded by GCF and GOI co-finance over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) of 21.5% for Andhra Pradesh, 24.4% for Odisha, and 27.6% for Maharashtra, which are all higher than WACC of 6.9%. Hence, investments to be made for the 6 livelihood enhancement activities (non-SRI) are computed to be financially viable and sustainable in the long-term. FIRR and Financial Net Present Value (FNPV) for the 3 states for livelihoods enhancement activities (other than SRI) are as shown in the table below.

State	FNPV (15-year)	FIRR (15-year)	WACC
Andhra Pradesh	US\$ 71.9 Million	21.5%	6.9%
Odisha	US\$ 28.9 Million	24.4%	6.9%
Maharashtra	US\$ 24.0 Million	27.6%	6.9%

272. Sensitivity analysis of financial returns computed above was performed primarily to assess the impact of lower than assumed revenues or higher than estimated costs. The financial returns are still positive if revenues decrease by 10% or costs increase by 10%. While theoretically, SRI for paddy farming activity and all other climate-resilient livelihoods enhancement activities as described above are still financially viable without GCF grants, in practice, the training and capacity building part of these activities might not be conducted at all or might be conducted at a slow pace in the absence of GCF grants, given the budgetary constraints in these states. Hence, GCF grants are proposed to act as catalysts in the implementation of these activities in these states, thereby enhancing the climate resilience of these coastal communities sooner.

273. **Financial Analysis of the Nine Livelihood Enhancement Activities proposed to be funded only by a GOI funding:** In addition to the 7 livelihood enhancement activities described in the previous sections, nine other livelihood enhancement activities are planned to be implemented under this program with GOI funding only, and these are: integrated duck-fish farming, honey production, mushroom cultivation, cultivation of aromatic and medicinal plants, fish value added products MSME, fish smoking processing unit, fishmeal plants, scuba diving, and tourist guide. These activities involve making investments into developing/building physical assets, as well training and capacity building, and hence, a single financial analysis is conducted for all these activities together. It is important to note that GOI financing is proposed to be used for both training/technical assistance/capacity building/social mobilization costs of these activities, and the costs of developing/building physical assets that can enhance livelihoods and income generation.

274. Financial analysis of the proposed 9 livelihood activities to be funded by GOI funding only over a 15-year period results in a positive Financial Internal Rate of Return (FIRR) of 34.8% for Andhra Pradesh, 15.2% for Odisha, and 15.6% for Maharashtra, which are all higher than WACC of 6.9%. Hence, investments to be made for the 9 livelihood enhancement activities funded only by GOI are computed to be financially viable and sustainable in

the long-term. FIRR and Financial Net Present Value (FNPV) for the 3 states for the 9 livelihoods enhancement activities funded by GOI are as shown in the table below.

State	FNPV (15-year)	FIRR (15-year)	WACC
Andhra Pradesh	US\$ 546.8 Million	34.8%	6.9%
Odisha	US\$ 91 Million	15.2%	6.9%
Maharashtra	US\$ 151.6 Million	15.6%	6.9%

F.2. Technical Evaluation

275. This project will support implementation of ecosystem- and community-based adaptation interventions to enhance climate resilience and protect lives and livelihoods from the impacts of current and future climate changes in coastal areas of India. The approaches that will be followed have been tailored to the local environmental and socio-economic contexts of the target states, after careful consideration of the climate vulnerabilities and adaptation priorities of the targeted beneficiaries. In doing this, the project draws from national and global best practices on EbA, climate-adaptive livelihoods and capacity building for planning adaptation interventions.

276. The EbA approaches to be implemented have been identified based on their potential for addressing current and predicted climate change threats for coastal India, as demonstrated through lessons learned on coastal EbA from around the world. Restoration of all ecosystems will be underpinned by a thorough understanding of the ecology of each site as well as the climate and non-climate drivers that are undermining their capacity for provision of climate-resilient ecosystem goods and services. The specific restoration interventions are described below (with further details in Section 7 of the Feasibility Study in Annex II).

- **Mangrove restoration.** Restoration and conservation of 10,575 ha of mangroves will be undertaken in all three target states (4,750 ha in Andhra Pradesh; 3,350 ha in Maharashtra; 2,475 ha in Odisha). This restoration will use a number of complementary techniques, including: i) restoration of hydrological functioning from upper catchment areas as well as tidal inflow; ii) construction of fishbone and feeder channels; iii) planting of mangrove propagules in degraded areas; iv) enforcement of restrictions on resource extraction; v) protecting vulnerable mangrove areas to allow recovery; vi) regulating outputs from aquaculture and agriculture to improve water quality and ensure ecosystem health; and vii) construction of permeable dams.
- **Coral reef restoration.** Restoration of 35 ha of coral reefs will be undertaken in Maharashtra. This restoration will use two techniques, viz. coral gardening and artificial reef creation through structure placement. These are simple, low-technology approaches that have been shown to be extremely cost-effective for growing large colonies of corals within a short period of time.
- **Seagrass restoration.** Restoration of 85 ha of seagrasses will be undertaken in Odisha. On-site seed planting will be used for this restoration, as it has been demonstrated internationally as being the most effective technique with low environmental impacts and medium to low costs. This involves i) seeding; and ii) transplanting seedlings or mature plants from donor sites. In India, seagrass (impacted by bottom trawling) has been successfully rehabilitated along the Tuticorin coast (State of Tamil Nadu) and showed a survival rate of between 85–90%, and this specific experience will be built upon.
- **Saltmarsh restoration.** A total of 700 ha of saltmarshes will be restored across the three target states (200 ha in Andhra Pradesh; 500 ha in Odisha). The approaches used will follow global best practices for saltmarsh restoration, such as: i) restoration of tidal flushing regimes; ii) removal of sediment from the saltmarsh area; iii) planting of saltmarsh species such as *Salicornia* spp. and *Spartina* spp.; and iv) removal of invasive species.
- **Watershed restoration.** Watershed restoration and conservation will be undertaken in a total of 3,550 ha across all three target states (2650 ha in Andhra Pradesh; 400 ha in Maharashtra; 500 ha in Odisha). A number of complementary approaches will be used, based on the localized environmental and socio-economic context of each site. These techniques will include: i) soil conservation through control of gullies and other badly eroded areas; ii) reforestation through planting of tree and shrub species; iii) restoration of hydrological functioning, including breaching of silted estuaries and enhancing natural recharge of soil water and aquifers, iv)

rehabilitation of wetlands, ponds and wet meadows; v) improved cultivation and agricultural techniques; vi) planting of shelterbelts and coastal dune vegetation; and vii) improved planning, management and conservation of degraded areas. Restoration will aim to retain water in the catchment, stabilise soils, reduce sedimentation, maximise infiltration, recharge aquifers, reduce surges and reduce amplitude of river hydrographs¹⁵⁶.

277. Undertaking restoration interventions as described above, through Activity 1.2 of the project, will result in numerous adaptation benefits. Examples of such benefits include: i) attenuation of wave energy during storm surges, reducing both the risk and the impact of coastal flooding; ii) reducing rates of coastline erosion; iii) creating habitat for natural resource-based livelihoods¹⁵⁷; iv) provision of timber, non-timber forest products¹⁵⁸ and other ecosystem goods that underpin rural livelihoods; v) improved hydrological functioning such as increased rainwater infiltration, greater aquifer recharge and reduced flooding; and vi) water purification and enhanced water supply. Specific indicators for the achievement of these benefits will be developed for each target landscape through coordination structures involving all stakeholders, and community members will be trained to work with scientists in regular monitoring of these indicators, in order to track progress towards the achievement of the project's adaptation outcomes. The reduction in losses and damages from climate-induced hazards as well as the increased provision of ecosystem goods that support local livelihoods will result in enhanced climate resilience of coastal communities. The approaches proposed here have been derived from global best practices, as well as lessons learned from similar initiatives in India.
278. The livelihoods to be supported by the project were identified based on their potential for enhancing the climate resilience of coastal communities – both through harnessing the income-generation potential of restored coastal ecosystems and through adapting practices to climate change impacts. During preparation of this proposal, a livelihoods assessment was undertaken in the targeted states to ascertain which options are most suitable to the local social, economic and environmental conditions and have viable market opportunities. Moreover, livelihoods were selected that: i) add value to existing livelihood strategies (e.g. fish value-added products); ii) have low technology requirements and can be sourced from local materials (e.g. oyster farming); iii) are based around habitats restored under Output 1 and incentivise conservation thereof (e.g. mangrove crab farming); iv) offer opportunities for intensification of current livelihoods (e.g. integrated duck-fish farming); and v) comprise adapting existing livelihood strategies to climate change impacts (e.g. SRI for paddy). Detailed descriptions of these livelihoods are provided in the Feasibility Study (Annex II).
279. GCF resources and co-finance will be used to establish an online Decision-Support Tool for monitoring coastal adaptation, with an associated app and web portal. This tool will be dynamic, with data from relevant assessments (e.g. forest and ecosystem surveys, analyses of restoration progress and associated carbon benefits) being uploaded and available immediately for access to “live” information. Uploads will be able to be made through the online platform, as well as through the smartphone app to be developed through the project. The data and information to be uploaded will include parameters such as: i) location (latitude and longitude/GPS coordinates); ii) ecosystem type; iii) plant species; iv) size of individual plants (e.g. diameter at breast height); v) extent of ecosystem coverage; and vi) observed threats and degradation. The online platform and app will allow a broad range of stakeholders – including technical government officers, community members, NGOs/CBOs, academic institutions, scientists, etc. – to participate in monitoring of ecosystems. In addition, these and other stakeholders – e.g. government policy- and decision-makers, private sector agents – will have access to detailed, up-to-date information on the health of coastal ecosystems to inform decision-making and planning for climate-resilient development at all levels and within both the public and private sectors.
280. An additional example of innovative technology to be used in the project is the application of the Coastal Calculator tool for each of the three target states to guide design of climate-resilient infrastructure. The use of such a tool was demonstrated in the Cook Islands, where the outputs were used to design a climate-resilient harbour for the island of Mangaia. This tool takes into account aspects such as beach profile, intensity and frequency of storms, presence of coral reefs and their characteristics, and the local bathymetry to identify

¹⁵⁶ Powell, M.P and Jones, L. Catchment Restoration and Sustainable Urban Water Management: A New Paradigm

¹⁵⁷ E.g. crab farming, oyster and mussel aquaculture.

¹⁵⁸ E.g. honey, medicinal plants.

appropriate placing and design of coastal infrastructure to ensure its resilience to the localised impacts of climate change. Use of the Coastal Calculator will enable engineers and planners within the public and private sectors to develop appropriate designs for shoreline protection and other coastal infrastructure that include considerations of climate change and resilience. Such a design process would enable an optimal combination - for each particular situation - of “hard” engineered solutions such as building seawalls, “soft” engineered solutions such as installing geotubes; semi-natural solutions such as planting of shelter belts, and natural solutions such as maintaining mangroves.

F.3. Environmental, Social Assessment, including Gender Considerations

281. A Social and Environmental Screening assessment was undertaken to identify and address any potential social and environmental risks that could arise from project activities. Based on the findings of this assessment, an Environmental and Social Management Framework was developed for the project (see Annex VI).

Environment

282. The project is likely to have some short-term, small-scale environmental impacts during implementation, but will ultimately have considerable, long-term environmental benefits (See Section E.3.1). Under Output 1, project activities include restoration and conservation of coastal ecosystems using an EbA approach. This will lead to improved ecosystem functioning that will yield environmental and social benefits in the short, medium and long term. Examples of such benefits include improved hydrology, biodiversity conservation and enhanced provision of ecosystem goods and services, including disaster buffering. This will in turn lead to enhanced climate resilience in coastal areas through maintaining such ecosystem goods and services in the face of climate change in coastal areas.

283. Project activities will involve preparation of sites for ecosystem restoration, including: i) digging of channels in mangrove areas; ii) collection of planting materials such as propagules; iii) reforestation; iv) construction of small-scale rural infrastructure such as check dams and contour bunds; and v) transplanting of corals. All efforts will be undertaken to reduce the environmental impacts of such work, e.g. work will be undertaken during the dry season and in such a way as to reduce erosion. In addition, site-specific planning will be undertaken prior to implementation to ensure that any potential negative environmental consequences are identified and appropriate measures undertaken to prevent such impacts as far as possible.

284. The promotion of diversified and climate-adaptive livelihoods may also potentially lead to negative environmental impacts. However, these have been designed to limit such impacts to a minimum. Specific design issues taken into consideration include the following:

- **SRI for Paddy.** This system requires less water and fewer potentially harmful inputs (e.g. pesticides and fertilisers) while still providing increased production capacity. There will therefore be lower environmental damage than existing rice cultivation practices, including downstream impacts on water quality in creeks where aquaculture is practiced. Moreover, existing paddies will be used as opposed to clearing of new areas for additional cultivation. This activity is thus likely to produce little or no negative environmental impacts.
- **Mud Crab Farming.** Mud crabs are farmed in existing mangrove areas. While environmental disruption may occur at a very small small-scale (smaller than 1 hectare) for each farm, this disruption is minimal and limited to construction of fencing around the specific area. This fencing is fully permeable, allowing flow of water and sediments as well as movement of micro-fauna. This activity is thus likely to produce minimal environmental impacts.
- **Oyster and Mussel Farming.** Oysters and mussels are farmed on small structures constructed within estuaries along the coast. These structures are built from locally sourced materials such as wooden poles, and do not interfere with water flow. Moreover, there are no additional inputs. Increase of farming will take ecological carrying capacity into account. Consequently, this activity will have no significant environmental impacts.
- **Integrated Duck-Fish Farming.** This involves integrated duck farming into extant aquaculture. This is unlikely to have any environmental impacts, as there will not be construction of new ponds. In addition, integrated duck-fish

farming results in negligible waste production, while at the same time increasing biological diversity and productivity of aquaculture ponds.

- **Seaweed Farming.** Cultivation of seaweed requires no input of fertilisers, and no physical alterations of the environment, and reduces eutrophication and pollution. Seaweed is cultivated on bamboo rafts, with no negative environmental impact, and the potential for a positive impact as described.
- **Mushroom Cultivation.** Mushrooms are cultivated on compost that is created from agricultural residue. Such residues are generally burnt, and mushroom cultivation thus provides an opportunity to reduce burning and the resultant carbon emissions and particulate pollution. No negative environmental impacts are anticipated from this activity.
- **Cultivation of Medicinal and Aromatic Plants.** The cultivation of medicinal and aromatic plants largely involves diversification of existing agriculture such as cereals and pulses. These plants can also be grown in marginal or degraded lands, as they are tolerant to drought, brackish and waterlogged areas. Moreover, they have little requirement for fertilisers, pesticides or conventional tillage practices. Therefore, cultivation of medicinal and aromatic plants have negligible environmental impacts, and is often less detrimental than conventional agriculture.
- **Fish Value Added Products.** Value addition for fish involves processes such as pickling, mincing, battering and breeding. This process is energy-efficient, and can be powered by renewable energy. Also, there is no major pollution effluent, as water is only used for washing and can thus be diverted into normal treatment facilities. Therefore, there are limited environmental impacts expected from this activity.

285. Furthermore, the project makes provision for a complaint's register along with a two-tiered Grievance Redress Mechanism consistent with the UNDP's Stakeholder Response Mechanism: Overview and Guidance (2014) and World Bank Group Safeguards Policies. The Grievance Redress Mechanism has further been designed in consideration of the specific local context and draws on existing processes and procedures for the resolution of complaints and grievances in India. The Grievance Redress Mechanism established goals and objectives along with eligibility requirements to make a complaint and/or grievance. It has been designed that all parties will act in good faith throughout the process and more importantly, that it will be arbitrary in nature in trying to achieve mutually acceptable resolutions for all parties. The Grievance Redress Mechanism also provides for the covering of costs for legitimate complaints or grievances so as individuals and/or groups are not disadvantaged by bringing complaints to the attention of MOEFCC and UNDP. Finally, the Grievance Redress Mechanism allows individuals and/or groups to also file a complaint with the Social and Environmental Compliance Unit within the Office of Anticorruption and Integrity within the UNDP should they have any concerns as to corruption, unethical behaviour or where they believe their complaint or grievance has not been adequately addressed.

286. An independent specialist study conducted in response to iTAP review, attached as *Annex XIII o*, reviewed the potential environmental risks associated with the planned climate-adaptive aquaculture activities, and concluded the following:

- Out of the four small-scale coastal aquaculture activities, ornamental fish culture is an activity which is carried out in confined aquaculture system and using hatchery reared seeds. Hence, the aquaculture system has no negative impact on the external environment.
- Pen-culture of crabs being a mangrove conservation programme; a low impact sustainable aquaculture system (LISA) and not dependent on wild seed for stocking, is truly sustainable. The proposed hatchery development programme in all the three states would help expansion of the activity, resulting in reduction of pressure on wild stock for harvest.
- The oyster farming activity is least demanding in terms of natural resource use for their sustenance and seed requirement, since seeds are plentiful in nature and utilizing the resource which otherwise would have perished in the absence of surface to settle and grow. The oysters being filter feeders survive on the planktonic organisms and organic matter in the water and are hence least polluting.
- The Mussel culture is also a LISA system, like oysters, the only difference being the need to supply mussel seeds for stocking in areas where seeds do not occur naturally. To make it sustainable, the activity is being planned initially within the limits of natural seed resource, in areas where seed occurs, and later through hatchery-produced seeds in other areas. New bivalve hatcheries are being planned to meet the seed requirements of oysters and mussels.

- The development in respect of the three aquaculture activities viz. crab farming, oyster farming and mussel farming need to be carried out following the principles of carrying capacity assessment and waste mitigation. As such the coastal aquaculture at present in the country is carried out following the guidelines of the Coastal Aquaculture Authority, which regulates setting up of shrimp/fish farms in the supra-tidal areas, beyond 200 meters from the high tide level (HTL), based on the carrying capacity assessment and their operations through a set of norms limiting production, input use, waste mitigation, post-harvest management and disease control etc. Similar guidelines in respect of the intertidal areas need to be formulated for regulating the proposed aquaculture activities. The State of Maharashtra has already taken initiative in this direction and formulated a Guideline for Carrying Capacity Assessment of Sustainable, Small-scale Aquaculture Activities. Such regulations, once in place in the other target states, will render such small scale coastal aquaculture practices truly sustainable.
- Recognising the growing need of the sector across India, the National Policy on Marine Fisheries, 2017, has made suitable provisions for the mariculture sector, including, *inter alia*, the setting up of hatcheries for supply of seed for development of the sector, capacity building of fisher communities, and procedures to monitor environmental and social impacts. This national policy also governs wild harvesting of marine resources, applying Government's commitment to the FAO Code of Conduct for responsible fishing, as well as the principle of community co-management for fisheries management, as proposed in the project.

Social

287. Project interventions will be undertaken in coastal areas of India where communities are particularly vulnerable to the impacts of climate change. These communities are largely rural and often have constrained or marginal livelihood opportunities. The project will provide two main benefits that will improve the climate resilience of these communities. Firstly, project activities will restore and conserve coastal ecosystems using an EbA approach to provide an enhanced supply of ecosystem goods and services. These ecosystems will provide adaptation benefits to local communities such as buffering against the impacts of climate change including storm surges and sea-level rise. This will lead to social benefits such as reduced loss of lives and reduced damages to infrastructure and productive assets during extreme weather events. Secondly, the project will promote diversified and climate-adaptive livelihood options for coastal communities. These activities will have considerable social benefits for local communities, primarily enhanced climate resilience through increased adaptive capacity of livelihoods as well as increased household income. This improved household-level income will in turn promote savings and catalyse households investing into activities that result in improved resilience to climate change impacts in the short-, medium- and long-term. For example, households involved in value-addition activities will receive a greater share of the profits on those products. Increased income will allow households to invest earnings into productive assets. Greater income will allow households to adapt to and recover from climate-induced hazards, as well as invest in improved healthcare, education, nutrition and other development outcomes.

Gender

288. The project was designed in consultation with women's organizations – particularly women's self-help groups (SHGs) – in community-level consultations. The resultant design has considerable focus on ensuring that women are integrally involved in project implementation and are beneficiaries of on-the-ground activities, including specific opportunities for women's SHGs. Project interventions are thus gender-sensitive and will target women, in order to address their disproportionately large vulnerability to the impacts of climate change. In particular, rural women will receive support for livelihood diversification activities for enhanced adaptive capacity to climate change, and will form at least 60% of the beneficiaries of livelihoods interventions. Particular livelihood interventions will be discussed within community structures, being sensitive to societal norms around men's and women's labour, whilst encouraging women's involvement in the full range of activities, building on India's commitments to gender justice and equality. At least 1,300,000 women in the target states will benefit from enhanced and climate-adaptive livelihood opportunities.
289. Women in rural areas of India are at considerable risk to poverty owing to low incomes and limited participation in the labour force. The project will enhance the adaptive capacities of such women through increased income security and as well as diversified livelihoods opportunities. Under Output 2, the project will support women in agricultural production as well as value-addition to primary production. The interventions have been designed to be culturally and socially acceptable to women, and the project will target women-headed households to increase their incomes and reduce their vulnerability to climate change. Women and women's groups will be actively engaged by project facilitators – both to take advantage of livelihood opportunities and to strengthen their capacity to participate confidently in community and project structures. A key benefit of the project for women is increased income, which will in turn lead to improved health, education and well-being, as women will be more able to address household needs. Women will also be more involved in community planning and decision-making. A detailed Gender Assessment and Gender Action Plan is provided in Annex XII(c).

F.4. Financial Management and Procurement

290. The financial management and procurement of this project will be guided by UNDP financial rules and regulations available [here](#). Further guidance is outlined in the financial resources management section of the UNDP POPP available [here](#). UNDP has comprehensive procurement policies in place as outlined in the 'Contracts and Procurement' section of UNDP's POPP. The policies outline formal procurement standards and guidelines across each phase of the procurement process, and they apply to all procurements in UNDP. See here: <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=211&Menu=BusinessUnit>
291. The project will be implemented following the National Implementation Modality (NIM) following these guidelines [here](#). UNDP will ascertain the national capacities of the implementing partner by undertaking an evaluation of capacity following the Framework for Cash Transfers to Implementing Partners (part of the Harmonized Approach to Cash Transfers - [HACT](#)). All projects will be audited following the UNDP financial rules and regulations noted above and applicable audit guidelines and policies.
292. The NIM guidelines are a formal part of UNDP's policies and procedures, as set out in the UNDP Programme and Operations Policies and Procedures (POPP). The NIM guidelines were corporately developed and adopted by UNDP, and are fully compliant with UNDP's procurement and financial management rules and regulations.
293. The national executing entity MoEFCC (also referred to as the national 'Implementing Partner' in UNDP terminology), is required to implement the project in compliance with UNDP rules and regulations, policies and procedures (including the NIM guidelines). In legal terms, this is ensured through the national government's signature of the Agreement concerning Technical Assistance between UN organizations and the Government of India (signed by both Parties on 14 February 1952) and the Agreement between UN Special Fund and the GOI concerning Assistance from the Special Fund (signed on 20 October 1959), together with a UNDP project document which will be signed by the Implementing Partner to govern the use of the funds. Both of these documents require compliance. Prior to signature of the project document, MoEFCC as the national Implementing Partner, needs to have undergone a Harmonized Approach to Cash Transfer (HACT) assessment by UNDP to assess capacities to implement the project. During implementation, UNDP will provide oversight and quality assurance in accordance with its policies and procedures, and any specific requirements in the Accreditation Master Agreement (AMA) and project confirmation to be agreed with the GCF. This may include, but is not limited to, monitoring missions, spot checks, facilitation and participation in project steering committee meetings, quarterly progress and annual implementation reviews, and audits at project level or at implementing partner level on the resources received from UNDP.
294. The Harmonized Approach to Cash Transfer (HACT) framework consists of four processes, namely: i) macro assessments; ii) micro assessments; iii) cash transfers and disbursements; and iv) assurance activities. Assurance activities include planning, periodic on-site reviews (spot checks), programmatic monitoring, scheduled audits and special audits. During micro-assessment, there can weaknesses identified for which actions are required to addresses the gaps. When a spot check finds that the gaps are not addressed it will mean that the level of assurance activities will have to remain higher and modalities of engaging with that implementing partner will have to be reviewed if necessary. All details are available here: <https://popp.undp.org/SitePages/POPPSubject.aspx?SBJID=167&Menu=BusinessUnit>.
295. The project will be audited in accordance with UNDP policies and procedures on audits, informed by and together with any specific requirements agreed in the AMA. According to the current audit policies, UNDP will be appointing the auditors. In UNDP scheduled audits are performed during the programme cycle as per UNDP assurance/audit plans, on the basis of the implementing partner's risk rating and UNDP's guidelines. A scheduled audit is used to determine whether the funds transferred to the implementing partner were used for the appropriate purpose and in accordance with the work plan. A scheduled audit can consist of a financial audit or an internal control audit.
296. All GCF resources will be provided to the executing entity, less any agreed cost recovery amount. Under UNDP's national implementation modality, UNDP advances cash funds on a quarterly basis to the executing entity for the implementation of agreed and approved programme activities, in accordance with UNDP standard policies and

the NIM Guidelines. The executing entity reports back expenditure via a financial report on quarterly basis to UNDP. Any additional requirements will be as in accordance with the AMA.

297. A draft procurement plan (which will be further discussed and revised prior to UNDP Project Document signature) is provided in Annex XIII(a).

G.1. Risk Assessment Summary

298. This proposal builds on the successes of existing initiatives along India's coast that promote climate change adaptation and/or ecosystem protection and restoration (particularly the UNDP Sindhudurg and EGREE projects) and draws strongly from the lessons learned through such initiatives. The project has been designed to address as many potential risks as possible upfront through the project structure itself, building on the lessons learned. Potential risks associated with project implementation are also mitigated through the executing agency's well established relationship with the executing entity, and the due diligence already carried out, ensuring sound financial and programme monitoring systems as well as strong technical oversight. The overall risks for the project are consequently considered to be low to moderate. The remaining risks and associated mitigation measures are detailed in Section G.2.
299. The main risks to project implementation are technical, operational, institutional, social and environmental. Risks related to technical and operational aspects of the project may affect the success of the ecosystem restoration and livelihood support activities. Technical risks could also result in poor design or application of tools and methodologies such as the vulnerability assessment methodology, Decision-Support Tool, and Coastal Calculator. Institutional risks such as limited coordination among project stakeholders and weak political support for the project may result in inefficient delivery of project outputs and thus reduced impact of project interventions. Social risks include poor sensitization – and involvement – of participating communities, leading to weak buy-in and limited engagement of the communities. This would in turn affect the long-term sustainability and viability of project interventions. Environmental risks such as extreme climate events could result in losses and damages caused to project interventions, reducing their efficacy and success.
300. Several mitigation measures have been designed to address these risks. The project will invest in community mobilization as well as capacity building for communities and officials to promote engagement and appropriate refinement of project interventions during the implementation phase. Project activities will be undertaken in close collaboration with local communities through co-management structures that include clear roles and responsibilities for government, communities and other partners. Site-specific protocols will be developed for EbA interventions that take into account local socio-economic and environmental conditions, with due consideration of social, environmental and other site-specific risks. Coordination between various stakeholders will be facilitated through the project management structure (see Section C.7) as well as through the coordination mechanisms established under Output 3.
301. Inclusive and participatory planning processes – initiated during the development of this project proposal – will continue throughout the implementation phase to promote ownership and buy-in from communities and government officials. An Environmental and Social Management Framework (see Annex VI(b)) has been developed to specifically address environmental and social risks that may arise during project implementation.

G.2. Risk Factors and Mitigation Measures

Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.

Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
Limited capacity of government officers and community members (including self-help groups,	Technical and operational	High (>20% of project value)	Medium

CBOs, etc.) to plan and implement restoration and livelihood support interventions.			
Mitigation Measure(s)			
The project will ensure strong engagement and mobilization of local-level government and community members to ensure their participation in project activities. Awareness raising and technical capacity building for both officials and communities will be undertaken to ensure that design and implementation of project interventions are based on sound understanding of climate risks and adaptation measures. All planning will be fully participatory, involving members of various vulnerable segments of the target communities (e.g. women, youth, socially marginalized) in prioritization of project interventions given their particular vulnerabilities to climate change. This mitigation measure is expected to adjust the risk level to “Low”.			
Selected Risk Factor 2			
Description	Risk category	Level of impact	Probability of risk occurring
Limited coordination between government ministries, UNDP, communities, NGOs/CBOs, private sector and other stakeholders reduces the efficiency and effectiveness of implementation of project interventions.	Technical and operational	Low (<5% of project value)	Medium
Mitigation Measure(s)			
Strong institutional and implementation arrangements for the project's management framework will ensure effective coordination and collaboration between project partners. Project management units at the national level as well as in each target state will facilitate constant dialogue between project partners and stakeholders. This will be complemented by UNDP's role as executing agency responsible for project oversight. In addition, co-management structures will promote coordination and collaboration between government officials and local communities for on-the-ground activities. The project will also build institutional capacities for coordination between various stakeholders. In particular, this will be achieved through cross-sectoral coordination structures to be established under Output 3. Moreover, project activities focus specifically on building capacities in various institutions for adoption of integrated and cross-sectoral approaches to adaptation planning at the national and sub-national levels. This mitigation measure is expected to adjust the risk level to “Low”.			
Selected Risk Factor 3			
Description	Risk category	Level of impact	Probability of risk occurring
Extreme weather events impact restoration and livelihoods activities, either preventing their implementation or reducing their efficacy.	Social and environmental	High (>20% of project value)	Medium
Mitigation Measure(s)			
Restoration interventions will be planned and implemented based on site-specific implementation protocols to be developed under the project. These protocols will take into account the local environmental conditions – including frequency, severity and type of climate-induced hazards – and explicitly outline lowest risk options for implementation. Identification of localized sites for restoration (which was initiated during the development of this project proposal) will be further refined during implementation, taking into account factors such as exposure and sensitivity to climate-induced hazards (see Activity 1.1). Protocols will be regularly updated to enable adaptive management of sites. By identifying risks posed by climate-induced hazards, planners and implementers will be able to make provision for site-specific mitigation measures.			

The design of livelihoods interventions – to be supported in each locality – will also take into account the potential for disruption by extreme weather events. Local knowledge on the impacts of climate-induced hazards will be used to inform the types of interventions at the localized level. In addition, implementation of these activities will be undertaken based on information from weather advisories to ensure that due consideration is given to impending climate risks.

This mitigation measure is expected adjust the risk level to “Low”.

Selected Risk Factor 4

Description	Risk category	Level of impact	Probability of risk occurring
Limited awareness and sensitization of local communities reduces rates of adoption of livelihood practices and involvement in EbA interventions.	Social and environmental	High (>20% of project value)	Low

Mitigation Measure(s)

The fully participatory nature of engagement with local communities for Activities 1.2 and 2.1 will be complemented by sensitisation and awareness-raising of local communities concerning climate risks, adaptation options and the benefits of project activities. This engagement will be inclusive of all segments of the population, including men, women, the youth, the elderly, people with disabilities and marginalised groups. Inclusive and participatory engagement of local communities through such a multi-stakeholder approach is expected to promote community buy-in and adoption of project activities, which will contribute towards adoption as well as longevity and sustainability of project interventions. Extension officers and community facilitators will be selected from target landscapes wherever possible, and will be provided with training on techniques for effective community engagement.

Selected Risk Factor 5

Description	Risk category	Level of impact	Probability of risk occurring
Project activities result in collateral environmental degradation	Social and environmental	High (>20% of project value)	Low

Mitigation Measure(s)

The proposed ecosystem and livelihood activities are based on experiences and lessons learned from past ongoing initiatives in India, particularly the UNDP-supported Sindhudurg and EGREE projects. These initiatives have demonstrated proven approaches towards ecosystem restoration and livelihoods support interventions that have minimal negative impacts on the natural environment. This proposed project will replicate the methods and approaches employed in such activities from these successful activities to ensure the least possible impact on the natural environment. This includes careful design and monitoring of aquaculture in creeks and brackish ponds to avoid exceeding carrying capacity; or causing pollution or eutrophication of water, or saline intrusion into neighbouring paddies. The Forest Department will retain responsibility in each target state for working with community organizations and facilitators to monitor any specific risks identified at local level and check that mitigation measures are in place throughout project implementation.

Community participation is also essential also as the “eyes and ears” of enforcement by the Forestry Department, ensuring that there are no incursions into sensitive areas undergoing restoration or newly under protection – either by outsiders, or by community members seeking to undertake illegal activities. The process of developing restoration protocols for each site will involve discussions between the Forestry Department and community structures on arrangements for co-management and sustainable harvesting in each site. This process will be coordinated and monitored across the project by the Natural Resource Management Officer in the national PMU and by the Ecological and Adaptation Specialists in the State PMUs. In the target landscapes the development, implementation and monitoring of site restoration protocols will be undertaken by the NGOs contracted by the Forestry Department,

working with community co-management structures and the Ecological and Adaptation Specialists. Such arrangements will determine communities' access to the specific resource (e.g. forests, mangroves) where appropriate, and within predetermined parameters (e.g. off-take rates, times of the week etc.). In some cases, the initial phases of restoration work will necessitate the exclusion of community members from areas where they previously had access, for example to harvesting resources. Such restrictions will be explained and awareness raised on the medium and long-term benefits, and where possible, alternative sites will be provided for compensatory access to resources.

Furthermore, the project will engage with all stakeholders to develop landscape-level plans that identify optimal land use and management within a given project sites. This process will include – wherever necessary – obtaining the necessary planning permission for any infrastructural developments associated with restoration and livelihoods work. This approach to planning at a landscape scale will help ensure that planning permission is not granted in isolation, but as part of a wider plan for the specific coastal zone that includes protection of intact and restored coastal habitats.

Regarding climate-resilient infrastructural and urban planning (Activity 3.2), the emphasis of the project is on planning for rather than carrying out any major housing, water or sanitation infrastructure development. Any such development occurring in parallel with the project, however, will be governed by the Environment Protection Act, and will conduct an Environmental Impact Assessment if so obliged in terms of the Schedule of EIA notification (2006) ensuring that any potential environmental degradation is minimised, and that appropriate mitigation measures will be undertaken.

Selected Risk Factor 6

Description	Risk category	Level of impact	Probability of risk occurring
Livelihood support may not add significantly to income generation of local people.	Social and environmental	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

The choices from the suite of selected climate-adaptive livelihood options to be supported in each locality will be determined and finalized after intensive and inclusive consultations with relevant stakeholders, particularly the local communities who are expected to be primary beneficiaries. This will allow for communities to be involved in selecting those livelihood options that they perceive to be most likely to augment their income. In addition, only those climate-adaptive livelihood options that have substantial potential for income generation and have viable markets in specific localities will be considered. As part of this process, livelihoods facilitators will be trained to conduct more detailed market analyses in the context of specific target landscapes. Facilitators will provide support on appropriate siting and permitting, business planning, access to finance, and developing value chains, including facilitating deals with buyers of products. All of these measures will mitigate against the risk of livelihoods options not fulfilling their potential for income generation.

Selected Risk Factor 7

Description	Risk category	Level of impact	Probability of risk occurring
Conflict between potential beneficiaries of livelihood interventions in target communities.	Social and environmental	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

The project will follow a fully participatory and inclusive process for identification of eventual beneficiaries in the target landscapes, focusing on farming and fishing households whose current livelihoods are vulnerable to climate impacts. Local communities and CBOs will be intensely involved in this process to ensure that consensus is achieved on which community members are most vulnerable to the effects of climate change and are thus most deserving of being

selected as beneficiaries. Project interventions will focus on providing tangible benefits for women, female-headed households, the youth and the elderly, and members of Scheduled Castes and Tribes. These groups are particularly vulnerable to the impacts of climate change, as they have limited access to economic assets and resources (e.g. land, fishing equipment), experience high rates unemployment, have limited education, and have limited market access (see Annex XIII(c) for gender analysis). The exact beneficiaries will be identified during the first phase of the project (undertaking the fine-scale vulnerability assessment and participatory livelihoods mapping – see Activities 1.1 and 2.1) to ensure that project interventions address climate vulnerabilities within the local socio-economic and environmental context. Furthermore, the ESMF creates a framework for a Grievance Redress Mechanism that will allow for potential conflict to be resolved to ensure an equitable distribution of project benefits (see Annex VI(b)).

Selected Risk Factor 8

Description	Risk category	Level of impact	Probability of risk occurring
Limited involvement and participation of women and other marginalized groups in project implementation	Social and environmental	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

The project has a strong focus on inclusion of women and socially marginalized groups within the planning and implementation of project activities. This inclusion began during the design of this project proposal, with numerous consultations targeting women's self-help groups and members of marginalized groups, especially Scheduled Tribes. During project implementation, this consultation process will continue to guide implementation of project activities, with certain activities targeting women and other vulnerable groups as the primary beneficiaries, and youth training opportunities being open to youth from all social backgrounds. Women's participation in both co-management structures and livelihood opportunities will be actively promoted through engagement by community facilitators.

Selected Risk Factor 9

Description	Risk category	Level of impact	Probability of risk occurring
Project support to climate-adaptive aquaculture unintentionally leads to increase in wild harvesting of breeding stock or mature organisms	Social and environmental	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

The project will improve access to markets for crabs for beneficiaries, but there is already much unmet demand regionally. By promoting sustainable farming of crabs from hatchery-produced seed, the project will help meet this demand and take pressure off the wild resource. Oyster spat is plentiful and attaches naturally to the substrate provided (see independent study in response to iTAP review, attached as *Annex XIII o*). Mussel seeds are not plentiful and will be supplied to project beneficiaries through hatcheries. No harvesting will be allowed to supply ornamental fish, breeding stock for which will be supplied through the Marine Products Export Development Agency. The project will strengthen community co-management of marine resources, and enforcement of protected areas along the coast in the target landscapes. Beyond these areas, all harvesting of marine resources will be governed by India's Comprehensive Marine Fisheries Policy of 2004.

Selected Risk Factor 10

Description	Risk category	Level of impact	Probability of risk occurring
Project support to climate-adaptive aquaculture leads to excessive pollution of creeks and degraded environment	Social and environmental	Medium (5.1-20% of project value)	Low

Mitigation Measure(s)

Aquaculture of oysters and mussels has a limited impact on water quality, as shown in the independent specialists study conducted in response to the iTAP review (see *Annex XIII o*), and crab culture is strictly regulated by the Guideline for Carrying Capacity Assessment of Sustainable, Small-scale Aquaculture Activities, already in place for Maharashtra, following international guidelines from FAO and local carrying capacity assessments, and including waste management through estimation of nutrient loading and its dilution through tidal exchange. Similar Guidelines will be developed in 2018 in the other two target states, in line with their existing procedures for applying for aquaculture permits which also address waste management and require ongoing monitoring of water quality (the Fisheries Policy of Andhra Pradesh 2015-2020 and the government of Odisha in its GE/(GL)-S-29/2015/16538 dt. 3/6/2015¹⁵⁹). Ornamental fish will be raised in tanks, and risk of pollution will be mitigated through treatment of wastewater for reuse (see Annex XIII o).

Other Potential Risks in the Horizon

n/a

¹⁵⁹Govt. of Odisha.2015, Principles for lease of brackish water areas in the state, Fisheries and ARD Department, Odisha Gazette.

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's [Performance Measurement Framework](#) under the [Results Management Framework](#).

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level						
Paradigm shift objectives						
<i>Increased climate-resilient sustainable development</i>	<p>The proposed project will transform coastal governance in India by integrating climate change adaptation – particularly ecosystem restoration and climate-adaptive livelihoods – into coastal management and planning. Overall, the project will contribute to the Fund-level impacts of <i>Increased resilience and enhanced livelihoods of the most vulnerable people, communities, and regions</i> and <i>Improved resilience of ecosystems and ecosystem services</i>.</p> <p>The GCF investment will be combined with government co-financing spent in three target states on restoring ecosystems through EbA approaches, and promoting climate-adaptive livelihood options, as well as strengthening coastal governance for climate change adaptation in all coastal states. This will facilitate climate-resilient sustainable development in India by harnessing ecological infrastructure for buffering of extreme events, and underpinning sustainable livelihoods based on those ecosystems.</p> <p>In total, an estimated 10 million people in the 24 target landscapes (maps in Annex IX) within 12 coastal districts of Andhra Pradesh, Maharashtra and Odisha will indirectly benefit from improved coastal planning and governance for adaptation. Support for climate-adaptive livelihood development will directly benefit 1,744,970 household members through increased income and enhanced adaptive capacity (see Section E.1.2 for explanation of how this direct beneficiaries figure was arrived at).</p>					
Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
Fund-level impacts						
<i>GCF core indicator</i>	<p><i>Total number of direct and indirect beneficiaries (% of whom is female)</i></p> <p><i>Expected tonnes of carbon dioxide equivalent (t CO₂ eq) to be reduced or avoided</i></p>	<p>Direct beneficiaries: <i>Household Survey: Adaptive Capacity and Climate Vulnerability</i> administered three times in target landscapes</p> <p>Indirect beneficiaries: Census data District government data</p> <p>Avoided emissions: Data from coastal adaptation Decision-Support</p>	<p>0 direct and indirect beneficiaries</p> <p>0 tonnes CO₂ eq sequestered per year</p>	<p>Direct beneficiaries: 500,000 people (50% female, and 12% from female-headed households) whose households are participating in new climate-adaptive livelihoods</p> <p>Indirect beneficiaries – number of residents (including gender breakdown</p>	<p>Direct beneficiaries: 1,744,970 people (50% female, and 12% from female-headed households) whose households are participating in new climate-adaptive livelihoods</p> <p>(0.9% of the total population of coastal districts¹⁶⁰)</p> <p>Indirect beneficiaries (including direct)</p>	<p>Successful uptake of livelihoods that are demonstrably climate-adaptive</p> <p>Integration of EbA into coastal governance is successful and leads to effective planning for ecosystem restoration, climate-adaptive livelihoods, and climate-resilient infrastructure and livelihoods in 24 target landscapes</p> <p>Restoration efforts succeed in re-establishing</p>

¹⁶⁰ According to Government of India (2015) *India's Intended Nationally Determined Contribution: Working Towards Climate Justice*, p.23, 14.2% of India's population lives in coastal districts – a total of 171,847,466 people

		Tool used to track the extent of restored ecosystems in target landscapes		and number of female-headed households) confirmed by mid-term through household survey 28,751 tons CO ₂ eq sequestered per year as a result of 3,500 ha of coastal ecosystems having been restored	10,000,000 (50% female, and 12% from female-headed households) benefitting from Integration of EbA into coastal governance (5.8% of total population of coastal districts) 122,766 tons CO ₂ eq sequestered per year as a result of 14,945 ha of coastal ecosystems having been restored	vegetation, and estimates of carbon captured and stored by restored ecosystems are accurate
<i>A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions</i>	<i>1.2 Number of males and females benefiting from the adoption of diversified, climate-adaptive livelihood options (including fisheries, agriculture, tourism, etc.)</i>	<i>Household Survey: Adaptive Capacity and Climate Vulnerability</i> administered three times in target landscapes Market surveys Census data	No new climate-adaptive livelihoods opportunities yet provided	500,000 people (60% female) whose households are participating in new climate-adaptive livelihoods	(1,744,970 people ¹⁶¹ (60% female) whose households are participating in new climate-adaptive livelihoods	Successful uptake of climate-adaptive livelihoods Market access ensured for sale of goods and services not intended for household consumption Establishment and strengthening of value chains to support ecosystem-based commodities
<i>A4.0 Improved resilience of ecosystems and ecosystem services</i>	<i>4.1 Coverage/scale of ecosystems protected and strengthened in response to climate</i>	Target landscapes: Data from coastal adaptation Decision-Support Tool used to track the extent of restored ecosystems in target landscapes	No new protection or restoration efforts with climate risks incorporated	3,500 ha of coastal ecosystems restored through project interventions	14,945 ha ¹⁶² of coastal ecosystems restored through project interventions (Includes 10,575 ha of mangroves, 85 ha of	Favourable climatic conditions support restoration, impact of extreme events is not severe Restoration techniques chosen are successful, with

¹⁶¹ The number of beneficiaries was calculated based on in-country data and expert opinion on: i) number of households with the potential to adopt a specific livelihood activity; ii) production potential of each livelihood activity; iii) realistic assumptions of number of households willing to adopt new practices; iv) realistic assumptions on number of production units (e.g. crab hatcheries) that could be established.

¹⁶² The number of hectares that will be restored was calculated based on: i) available budget for EbA; ii) extent of degraded ecosystems per state that have the potential to be restored; and iii) potential for restored ecosystems to provide adaptation benefits to vulnerable communities. See Indicator 1 under H.1.2. below for a detailed breakdown per ecosystem type.

	<p><i>variability and change</i></p>	<p>Site-specific restoration protocols including a) methodology, b) monitoring and evaluation plan, and c) operations and maintenance manual</p> <p>Data from <i>Household Survey: Adaptive Capacity and Climate Vulnerability</i> quantifying community participation in paid work opportunities on restoration, as well as monthly hours of in-kind contributions on maintenance and enforcement activities</p> <p>All coastal states:</p> <p>Data from coastal adaptation Decision-Support Tool used to track the restoration and conservation of coastal ecosystems in all 13 coastal states</p>	<p>for ecosystems in the target landscapes</p>		<p>seagrasses, 35 ha of coral reefs, 700 ha of saltmarshes and 3,550 ha coastal watersheds)</p>	<p>good follow-through and maintenance</p> <p>Alternative livelihood practices reduce resource extraction from ecosystems</p>
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H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term	Final	
Project Outcomes	Outcomes that contribute to Fund-Level Impacts					
<i>A5.0 Strengthened government institutional and regulatory systems for climate-responsive development planning</i>	<i>5.1 Degree of integration/ of climate change including EbA in 13 coastal states' Coastal Zone Management Plans</i>	Scorecard for assessment of CZM Plans' consideration of 1. climate impacts, 2. adaptation measures, 3. use of ecosystems approach, and 4. use of community-centred approach	Score-card to be administered to determine baseline	All least 5 of 13 coastal CZM plans score at least 75% in all 4 categories	All 13 coastal state CZM Plans score at least 75% in all 4 categories	Integration of EBA and community-centred approaches to climate change adaptation is CZM Plans leads to a stronger institutional and regulatory system
A7.0 Strengthened adaptive capacity and reduced exposure to climate risks	<i>7.1: Use by participating households of support on climate-adaptive livelihoods and value chains, and benefit by at-risk households from reduced disaster exposure</i>	Questionnaire administered annually in target landscapes, using Randomized Control Trial approaches - <i>Household Survey: Adaptive Capacity and Climate Vulnerability</i> Includes scale to provide a rating for: 1. Impact of livelihood support on adaptive capacity 2. Impact of restoration on risk exposure	0 people benefitting (Initial survey results define households participating in livelihoods and those directly at risk from coastal flooding and damage)	500,000 people (50% female) whose households are using support on climate-adaptive livelihoods and value chains Restoration interventions have reduced exposure for at least 20% of households directly at risk	(1,744,970 people (50% female) whose households are using support on climate-adaptive livelihoods and value chains Restoration interventions have reduced exposure for at least 70% of households directly at risk	Support on climate-adaptive livelihoods and value chains leads to enhanced adaptive capacity Ecosystem restoration efforts strengthen shoreline protection, reducing risk to lives and property
Project/programme outputs	Outputs that contribute to outcomes					
1. Enhanced resilience of coastal and marine ecosystems and their services	<i>Numbers of hectares of coastal ecosystems – disaggregated by type – that are</i>	Restoration protocols for each target landscape and implementation reports	0	Mangroves: 3,100 ha Saltmarsh: 210 ha Coral: 10 ha	Mangroves: 10,575 ha Saltmarsh: 700 ha Coral: 35 ha	Favourable climatic conditions support restoration, impact of extreme events is not severe Appropriate restoration techniques chosen,

	<i>successfully restored to reduce the impact of climate-induced disasters and other climate change impacts</i>	Remote sensing Field visits		Seagrass: 25 ha Watersheds 1,000 ha	Seagrass: 85 ha Watersheds 3,550 ha	successful follow-through and maintenance Alternative livelihood practices reduce resource extraction from ecosystems
2. Climate-adaptive livelihoods for enhanced resilience of vulnerable coastal communities	<i>Number of males and females adopting diversified, climate resilient adaptive practices</i>	<i>Household Survey: Adaptive Capacity and Climate Vulnerability</i>	0	100,000 people (60% women and 15% the heads of households) receiving training and technical support for climate-adaptive livelihoods and value addition	348,994 people ¹⁶³ (60% women and 15% the heads of households) receiving training and technical support for climate-adaptive livelihoods and value addition	Successful uptake of climate-adaptive livelihoods Market access ensured for sale of all goods and services Establishment and strengthening of value chains to support ecosystem-based commodities Improved access to micro-, hybrid and other forms of finance to support MSMEs for value addition.
3. Strengthened governance and institutional framework for climate-resilient management of coastal areas	<i>National Coastal Mission in existence and operational</i> <i>Pan-Indian Coastal Resilience Network operational and functional</i> <i>Number and level of effective coordination mechanisms in 24 target landscapes / 12 districts</i>	Capacity development scorecard - survey of staff in MoEFCC and institutions involved in work of National Coastal Mission Review of outputs and activities of Pan-India Coastal Resilience Network (i.e. workshop proceedings, bulletins, newsletters, briefing notes)	0 Coastal Mission in existence 0 network in existence	Coastal Mission established Pan-Indian Coastal Resilience Network established and operational Coordination mechanisms established in 24 target landscapes / 12 districts	Coastal Mission fully operational Pan-Indian Coastal Resilience Network functional and involving all 13 coastal states Coordination mechanisms operating effectively in 24 target landscapes / 12 districts	Network of institutions is established and remains active Training and knowledge-sharing results in improved capacity for planning and implementation
Activities	Description	Inputs			Description	

¹⁶³ This is the number of adults receiving training and technical support. The number of direct beneficiaries (1,744,970) is this number multiplied by 5, based on the assumption of an average household size of 5 people.

<p>1.1. Conducting vulnerability assessment of the coast to inform planning of ecosystem- and community-based adaptation interventions – in 13 coastal states</p>	<p>This activity will see the improvement and application of current methodologies for assessing climate change vulnerabilities in coastal areas to include ecosystem-related parameters for undertaking scientifically robust, context-specific vulnerability assessments. These assessments will feed into a dynamic decision-support tool to improve access to up-to-date, “live” knowledge on climate vulnerability in all of India’s coastal districts. The decision-support tool will enable national and state governments as well as NGOs and local communities to design and implement site-specific adaptation measures.</p>	<p>1.1.1 Supporting coastal research and management institutions to add ecosystem-related parameters to methodologies for guiding vulnerability assessment and national- and state-level planning and decision-making on adaptation and management measures to address climate change</p> <p>1.1.2 Applying the enhanced/revised methodology to establish a gender-sensitive system for periodic detailed assessment of vulnerability and adaptive capacity along the entire coastline of India, using the analysis to inform planning of restoration and livelihoods activities for climate change adaptation.</p> <p>1.1.3 Developing a gender-sensitive Decision-Support Tool for adaptation planning at state and national levels that integrates district-level data with site-/district-level assessments to provide decision-makers with dynamic information that is regularly updated using data from census, ecological surveys and other sources.</p> <p>1.1.4 Creating an online platform and associated mobile phone application to facilitate access to information in the Decision-Support Tool for decision-makers, communities, NGOs/CBOs and other relevant stakeholders, as well as to allow them to upload data for tracking changes in ecological and socio-economic vulnerability to climate change in coastal areas.</p> <p>1.1.5 Producing a national series of restoration guidelines based on the information used for the Decision Support Tool – one booklet /pdf per ecosystem type, drawing on site-level experience</p>	<p>Inputs will provide an updated methodology for collecting and analysing data to prepare comprehensive climate vulnerability assessments for India’s entire coastline. Assessments will combine bio-physical and socio-economic data – particularly ecosystem-related parameters as well as community vulnerabilities – to identify risks posed by climate change impacts and prioritise intervention sites for EbA.</p> <p>The information from the assessments will feed into a decision-support tool for climate change adaptation that will be used to give access to decision-makers and planners at all levels on climate risks and vulnerabilities for adaptation planning.</p> <p>Access to the decision-support tool will be through an online platform and smart-phone app. This will provide dynamic, “live” information to decision-makers and planners, allowing them to use the most up-to-date data available to inform adaptation planning.</p> <p>O&M for the Decision-Support Tool, online platform and app will be supported by MOEFCC funding during and beyond project implementation.</p>
<p>1.2. Conservation and restoration of coastal ecosystems for increasing</p>	<p>Participatory land-use planning will be undertaken to enhance management of coastal ecosystems in the project’s target states – mainly mangroves, coral</p>	<p>1.2.1 Supporting participatory planning in 24 target landscapes of site-specific EbA measures for conservation and restoration of six ecosystem types, based</p>	<p>Participatory land-use planning, monitoring and co-management will ensure strong community engagement and buy-in for project activities, enhancing the</p>

<p>ecosystem resilience – in 3 target states</p>	<p>reefs, saltmarshes, seagrass ecosystems and coastal watersheds. Site-specific protocols will be developed in the target landscapes to guide implementation of restoration and conservation activities, using an EbA approach to enhancing the provision of critical ecosystem goods and services. Participatory approaches to monitoring and co-management of restored sites will be established and strengthened.</p>	<p>on the vulnerability assessment undertaken through Activity 1.1, to produce Target Landscape Integrated Management Plans</p> <p>1.2.2 Developing Restoration Protocols for sites in 24 landscapes – based on global and national best practices – for restoration of coastal ecosystems</p> <p>1.2.3 Establishing 24 co-management structures in target landscapes to foster community support for and participation in conservation and restoration activities, including pollution management to minimise impact on ecosystems.</p> <p>1.2.4 Undertaking ecosystem conservation, restoration and management (including pollution control) activities – based on the EbA protocols and through the co-management structures – in the project sites in the three states.</p> <p>1.2.5 Developing and implementing 24 community-based/participatory monitoring and maintenance programmes through the co-management structures to maintain restored ecosystems and capture lessons learned and best practices from the project sites; including preparing a post-implementation monitoring plan and budget in the final year of the project and updating the O&M Plan accordingly</p> <p>1.2.6 Training and supporting communities in 24 target landscapes – with a focus on local youth as well as NGOs/CBOs – to use the coastal adaptation Decision-Support Tool to track the restoration and conservation of coastal ecosystems in 3 target states, including extent of restored ecosystems and carbon sequestered.</p> <p>1.2.7 Producing a video in each of the three target States on the restoration and conservation work of the multi-stakeholder partnerships in the target landscapes</p>	<p>long-term sustainability and maintenance of restoration and conservation efforts.</p> <p>Development of context-specific protocols for EbA activities will increase the success rate of ecosystem restoration activities.</p> <p>Conservation and restoration of 16,325 ha of mangroves, 85 ha of seagrasses, 65 ha of coral reefs, 1,200 ha of saltmarshes and 4,350 ha coastal watersheds – will be undertaken in collaboration with local communities to enhance climate resilience through buffering against climate risks.</p> <p>O&M for ecosystem restoration and management will be supported by state-level governments during and beyond project implementation.</p> <p>Training will be provided to local communities (particularly the youth) and NGOs/CBOs to work with scientists on monitoring ecosystem functioning and uploading this information into the decision-support tool as a means to track both ecosystem restoration as well as carbon sequestration.</p> <p>O&M for the Decision-Support Tool and ongoing monitoring will be supported by MOEFCC and State Forest Department funding during and beyond project implementation</p>
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<p>2.1. Building climate resilient livelihoods and enterprises through value chains and strengthened access to markets – in 24 target landscapes</p>	<p>This activity will support participatory mapping and planning for promotion of diversified and climate-adaptive livelihoods. Extension officers and community mobilizers will receive training to climate-proof investments. Communities will get technical support for small enterprises, access to finance and value addition associated with climate-adaptive livelihoods. Bankable business plans will be developed for resilient and diversified livelihood options. Value chains – including both supply and market linkages – will be strengthened.</p>	<p>2.1.1 Undertaking participatory, user-centric planning in 24 target landscapes for climate-adaptive livelihood and value chain support based on vulnerability assessment and value-chain development strategies, monitoring progress through household survey</p> <p>2.1.2 Providing technical support to community groups in 24 target landscapes to set up the adaptive livelihoods and add value to the products of climate-adaptive aquaculture¹⁶⁴</p> <p>2.1.3 Providing training for extension officers and community mobilizers in 24 target landscapes on ensuring that planned livelihoods and value addition activities are climate-risk informed</p> <p>2.1.4 Supporting the development of value chains for climate-adaptive livelihoods in 24 target landscapes, facilitating backward linkages for input supply, and forward linkages for processing, packaging, storage, refrigeration, transport and market access</p> <p>2.1.5 Providing technical assistance to community groups in 24 target landscapes to set up certification schemes for “eco” products, and to develop bankable business plans to access loan finance for expansion, during or post-project, as well as insurance on assets.</p>	<p>Promotion of diversified and climate-adaptive livelihoods as well as strengthening of value chains will lead to increased income of local communities under current and future climate scenarios. This will increase their capacity to adapt to climate change impacts. At the same time this will produce environmental and socio-economic co-benefits.</p> <p>O&M for the livelihood activities will be undertaken by beneficiaries and participating CBOs/NGOs during and beyond project implementation.</p>
<p>2.2. Improving capacities of local communities for community-based adaptation and climate-adaptive livelihoods – in 24 target landscapes</p>	<p>Livelihood support and skills training will be undertaken in targeted communities with fishing and farming households whose current livelihoods are threatened by climate change. Capacity development activities and knowledge exchanges will be carried out, with a particular focus on women, youth and marginalised population groups</p>	<p>2.2.1 Conducting multimedia public education and awareness campaigns across the three states on climate change and its impacts, and the need to conserve and restore ecosystems to underpin livelihoods and buffer extreme events</p> <p>2.2.2 Undertaking village-level capacity building on climate change and EbA in 24 target</p>	<p>Promotion of diversified and climate-adaptive livelihoods as well as strengthening of value chains will lead to increased income of local communities under current and future climate scenarios. The synergy established between ecosystem conservation and livelihoods will serve to prevent conversion of natural habitats to agriculture/aquaculture which has</p>

¹⁶⁴ Processing of climate-adaptive aquaculture products: for example fish drying, production of value-added prawn products

		<p>landscapes in light of evolving climate risks - involving women's groups, self-help groups, producer and fisher organizations, CBOs, NGOs and Panchayat Raj institutions, with focus on women, youth, and marginalized groups</p> <p>2.2.3 Delivering training courses in 24 target landscapes for climate-adaptive aquaculture, ecotourism and non-timber forest products, as well as climate-smart intensification and climate-adapted crops through relevant community-based organizations (e.g. self help groups) and local self-governance institutions (e.g. Gram Panchayats)</p> <p>2.2.4 Facilitating sharing of lessons in 12 districts between target landscapes on effective techniques for climate-adaptive livelihoods, including through exchange visits between communities, with focus on women, youth, and marginalized groups.</p>	<p>been one the major drivers of ecological degradation on the Indian coastline that is compounded by climate change.</p>
<p>3.1. Network of institutions for enhanced climate resilience and integrated planning and governance in all 13 coastal states</p>	<p>Planning and implementation of coastal adaptation measures will be coordinated through a network of institutions that govern coastal management and planning. This will enhance coordination of adaptation planning at the landscape level, while also promoting cross-sectoral planning that involves a wide range of stakeholders. This follows the successful model demonstrated by structures such as the Chilika Development Authority and the East Godavari River Estuarine Ecosystem Foundation.</p> <p>The mainstreaming of EbA approaches to coastal adaptation – as a complementary measure to “hard” approaches – will be facilitated through the various State Action Plans on Climate Change for all coastal states of India. This will enable lessons learned on coastal adaptation and EbA – particularly through this project – to be upscaled in the other 13 coastal states. Similarly, the integration of EbA into the</p>	<p>3.1.1. Establishing multi-stakeholder coordination structures in 24 target landscapes / 12 districts in the three states to provide a platform for dialogue on and coordination of climate-resilient development planning and co-management of coastal ecosystems.</p> <p>3.1.2. Using existing interdepartmental platforms in 13 coastal states – particularly State Action Plans for CC and CZM Authorities – to facilitate integration of EbA approaches into relevant policy and legislation, including state CZM Plans, and to share lessons learned and best practices from target landscapes and states.</p> <p>3.1.3. Establishing a Pan-Indian Coastal Resilience Network of organizations, tertiary institutions, coordination platforms and coastal districts – to promote knowledge exchanges on integration of climate change adaptation into</p>	<p>Co-finance for the activities of Output 3 in the 13 coastal States and at national level will be forthcoming from national Government under the umbrella of the National Coastal Mission. The Mission will be successful in supporting integration of climate change adaptation into coastal management will be supported. This will increase institutional capacities to integrate climate change considerations into planning and decision-making within local communities, state- and district-level government and economic sectors.</p> <p>In selected institutions, the project will build capacity in identified areas and strengthen institutional arrangements for dialogue and collaboration on climate resilience in coastal planning and management. These institutions will promote engagement of a wide range of stakeholders including from government, development partners, local communities,</p>

	<p>National Coastal Mission's programme of work will be supported, making a broader range of policy options available to decision-makers.</p> <p>Further upscaling of project results will be achieved through a Pan-Indian Coastal Resilience Network. This will include stakeholders such as the landscape-level coordination structures (see Activity 3.1.1), government departments for coastal governance (e.g. CZM authorities), universities, the National Coastal Mission and other relevant national missions, and NGOs/CBOs.</p>	<p>coastal development planning, with a focus on EbA.</p> <p>3.1.4. Supporting the proposed National Coastal Mission in integrating climate change adaptation – and particularly EbA – into Government in various sectors</p>	<p>donor agencies, and private sector institutions.</p> <p>O&M for the landscape-level institutions and Pan-India Coastal Resilience Network will be supported by MOEFCC funding during and beyond project implementation.</p>
<p>3.2. Integrating ecosystem-centric approaches to climate change adaptation into public and private sector policies, plans and budgets, and scaling up finance for EbA – in 13 coastal states</p>	<p>Integration of climate change concerns and the potential for EbA to promote climate resilience in coastal areas into policies, plans and strategies will increase institutional capacity for reducing climate change risks in vulnerable coastal areas. Government co-finance through the new National Coastal Mission will develop government's capacity to mainstream EbA into relevant policies, plans and finance mechanisms, using interdepartmental platforms in all coastal states, and facilitating public and private sector dialogues.</p> <p>This activity will also enhance capacities for undertaking climate-resilient planning in urban areas along the coast, using a Coastal Calculator Tool to support climate-resilient design of coastal infrastructure.</p>	<p>3.2.1 Supporting the new National Coastal Mission to integrate climate risk management and EbA principles into national policies and schemes, including CAMPA afforestation fund and Smart Cities Mission</p> <p>3.2.2 Facilitating 3 biennial intersectoral dialogue events under the auspices of the National Coastal Mission - engaging public and private sector role-players on coastal adaptation as a risk management strategy, incl. fisheries, agriculture, tourism, ports and shipping, oil and gas</p> <p>3.2.3 Equipping the interdepartmental CZM platforms in 13 coastal states to use scenario planning for business as usual vs ecosystem-based adaptation in the coastal zone</p> <p>3.2.4 Developing gender-sensitive EbA plans for four coastal Smart Cities (Kalyan in Maharashtra; Kakinada and Visakhapatnam in Andhra Pradesh; and Bhubaneswar in Odisha)</p> <p>3.2.5 Working through state-level interdepartmental platforms in 3 target states to provide coastal town planners and engineers with training on the Coastal Calculator tool, using EbA for shoreline</p>	<p>Relevant policies, strategies and plans – including state action plans on climate change – will be reviewed and revisions proposed to integrate climate change considerations in a more systematic approach. In particular, the importance of EbA and climate-adaptive livelihoods as effective means of building adaptive capacity will be mainstreamed into coastal governance.</p> <p>Climate change adaptation and EbA will be integrated more effectively into spatial and development planning at the district and state levels. Furthermore, gaps and challenges related to climate change adaptation within existing plans for economic sectors within coastal areas will be identified and addressed. A landscape-based approach – with inclusion of multiple stakeholders – will be adopted to promote cross-sectoral planning for climate change adaptation.</p> <p>The Coastal Calculator will take into account parameters such as the beach/coast profile, local bathymetry, presence and types of coastal ecosystems, coastal erosion, longshore drift, frequency and intensity of extreme weather events, and sea-level rise. The outputs of the Coastal Calculator will be</p>

		<p>protection and climate-resilient infrastructure</p>	<p>information on climate-resilient design options for coastal infrastructure planning, particularly with the inclusion of EbA options.</p> <p>Application of the Coastal Calculator will be complemented by training to town and village planners to understand the potential of “soft” measures for coastal protection, in order to better undertake climate-resilient urban planning.</p>
<p>3.3. Knowledge management for coastal resilience</p>	<p>Capacity building of local communities, government officials, the private sector and other stakeholders will improve knowledge and awareness on the benefits of adopting EbA approaches to build climate resilience. This will be based on partnerships with academic institutions to ensure that experimental learning is captured to determine quantitative benefits provided by adaptation measures such as EbA. This will be informed by a data collection system on coastal adaptation to collate information from project activities as well as other national and global initiatives for analysis.</p> <p>Training on climate change adaptation for public servants and government officials will be developed. This will ensure at least a basic understanding of climate change impacts and the importance of adaptation – and particularly EbA – across a range of government sectors.</p> <p>Knowledge on EbA and coastal adaptation will be disseminated within the target states, across all coastal states of India, and across all coastal countries in South Asia. Knowledge products will be developed and (where appropriate) translated into local languages for community-level knowledge exchange. This will be complemented by exposure visits to field sites for government officials, as well as regional knowledge sharing opportunities.</p>	<p>3.3.1 Supporting the establishment of a system under the National Coastal Mission for collating data and information on global best practices, lessons learned, evidence from the field and scientific knowledge on ecosystem- and community-based approaches to adaptation in the coastal zone of India.</p> <p>3.3.2 Establishing a series of annual workshops (5 in project period) under the auspices of the pan-Indian Coastal Resilience Network, involving tertiary institutions, research organizations and relevant NGOs to share research findings related to coastal EbA</p> <p>3.3.3 Developing and piloting a training course or curricula on EbA, for delivery through administrative training and other relevant institutes at national and state levels, incorporating project experience and lessons especially on community-based adaptation – at least one in each of 3 target states</p> <p>3.3.4 Working through the Pan-India Coastal Resilience Network to develop and disseminate knowledge products at national, regional and international levels and to share experience and learning.</p> <p>3.3.5 Developing 12 district-specific, gender-sensitive knowledge products translated into local languages for use in the community-level training courses for village self-help groups and CBOs, and women’s</p>	<p>Transfer of lessons learned and best practice on coastal resilience and EbA will promote replication and upscaling of such interventions across the coastline of India.</p> <p>Using a range of knowledge products and channels for dissemination will ensure that the widest possible reach is achieved, i.e. promoting access to such knowledge for diverse stakeholders such as local communities, various levels of government, private sector agents and other development partners.</p> <p>O&M for the knowledge management and dissemination will be supported by MOEFCC and state-level government institutions during and beyond project implementation.</p>

		<p>capacity development programmes.</p> <p>3.3.6 Undertaking at least 9 exposure and exchange visits (involving 3 target states) for national-, state- and district-level government officials and community leaders to promote knowledge sharing on cross-sectoral coastal governance, climate change adaptation and EbA.</p> <p>3.3.7 Creating a knowledge exchange platform involving South Asia's five coastal countries with 3 international events for dialogue and sharing learning on ecosystem-and community-based adaptation to climate change in the coastal zone, building on existing forums.</p>	
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H.2. Arrangements for Monitoring, Reporting and Evaluation

302. GCF funding will be used to ensure that monitoring and evaluation systems are put in place to track progress over the 6 years of project implementation towards the planned project outcomes and fund level impacts. This will be achieved through the means of verification outlined in Table H.1.2 above, where progress on each indicator from the baseline to the mid-point and end-point targets for those indicators will be tracked. For example, a detailed survey instrument, the Household Survey: Adaptive Capacity and Climate Vulnerability, will be used in the target landscapes, using Randomized Control Trial approaches to monitor communities' adaptive capacity and exposure to climate risks, tracking their involvement in both ecosystem restoration and climate-adaptive livelihoods activities. The questionnaire section on community participation in climate-adaptive livelihoods will include gathering baseline data on household economic activities, production yields (fishing, farming, aquaculture), monetary income and harvesting of natural resources. The questionnaire will also include analysis of additional variables contributing to vulnerability to climate change and adaptive capacity, including understanding of climate change impacts on livelihoods, gender roles, market linkages, access to credit, physical location of household assets, and state of neighbouring shoreline protection infrastructure (natural and built).
303. Table H.1.2 also outlines an area of monitoring that forms part of the project design for Output 1 on ecosystem restoration – involving tracking of coastal adaptation and mitigation benefits, to be led by the Climate Change section in the MoEFCC under the National Coastal Mission that is charged with implementing the NAPCC in the coastal zone. Output 1.3 involves establishing a long-term monitoring framework in the target landscapes, supporting long-term sustainability of the project interventions. Communities will be trained – with a focus on local youth as well as NGOs/CBOs – in monitoring coastal ecology and ecosystem health, using the coastal adaptation Decision-Support Tool to track the restoration and conservation of coastal ecosystems in all 13 coastal states, including the extent of restored ecosystems and carbon sequestered. The state-level coordination platforms in Output 3 will be used to upscale this approach to other coastal states.
304. Secondly, Output 1.2 involves the development of specific indicators for the achievement of EbA benefits – to be developed for each of the 24 target landscapes through coordination structures involving all stakeholders. Community members will be involved in defining these indicators, and trained to work with scientists in regular monitoring of them. Examples include indicators for benefits include: i) attenuation of wave energy during storm surges, reducing both the risk and the impact of coastal flooding; ii) reducing rates of coastline erosion; iii) creating habitat for natural resource-based livelihoods; iv) provision of timber, non-timber forest products and other

- ecosystem goods that underpin rural livelihoods; v) improved hydrological functioning such as increased rainwater infiltration, greater aquifer recharge and reduced flooding; and vi) water purification and enhanced water supply.
305. Site-specific restoration protocols will be developed, detailing the methodology being used. The protocols will be revisited frequently and adjusted based on the data collected from the restored ecosystems, enabling an adaptive management approach. Site-specific restoration protocols will each include a detailed M&E plan that describes how rigorous, frequent, long-term monitoring of the following variables will take place: plant survivorship, of all species planted, plant vigour of all species planted, rate of growth, soil/sediment chemistry (where applicable) and water chemistry. Where feasible, monitoring of the following will be included in the restoration protocol: stream flow, sedimentation, erosion, groundwater volume, wave energy, size of storm surges, supply of non-timber forest products and supply of timber. Rigorous archiving of the long-term monitoring datasets of all project EbA investments will take place within an appropriate Indian research institution. Formal plans will be signed off by government and an appropriate Indian research institution in each of the three target states (e.g. Andhra University, University of Mumbai, KIIT University), covering continued long-term monitoring over at least three decades of the project's EbA investments. The protocols will be revisited frequently and adjusted, based on the data collected from the restored ecosystems, enabling an adaptive management approach.
306. As part of the Household Survey: Adaptive Capacity and Climate Vulnerability a section will be included to monitor community involvement in the target landscapes in ecosystem restoration – tracking participation in paid work opportunities, as well as ongoing involvement in co-management through in-kind commitment of time to maintenance and enforcement activities. This will include respondents' estimation of approximate number of hours per month spent on co-management of restored sites, as part of implementing the Operations and Maintenance Plan (see Annex XIII(b)). Detailed Operations and Maintenance Manuals that are site-specific will be developed during the planning phase of each intervention, taking into account the biophysical factors associated with EbA (as well as the equipment/facilities associated with livelihood interventions), and will collectively form an overarching O&M Implementation Plan.
307. The project is designed to engage the communities in continuous monitoring of the project activities as indicated in the ecosystems restoration efforts. The project monitoring will engage beneficiaries and mechanisms will be put in place to collect data through participation of local communities. To capture the impacts of the proposed interventions, the project includes the use of Randomized Control Trial approaches as part of its annual surveys (Household Survey: Adaptive Capacity and Climate Vulnerability) to assess the (i) Impact of livelihood support on adaptive capacity and (ii) impact of restoration on risk exposure.
308. Project-level monitoring and evaluation will be undertaken in compliance with the [UNDP POPP](#) and the [UNDP Evaluation Policy](#). The primary responsibility for day-to-day project monitoring and implementation rests with the National Project Coordinator and the State Project Managers. The National Project Coordinator and State Project Managers will develop annual work plans to ensure the efficient implementation of the project. The National Project Coordinator and the State Project Managers will inform the National Project Steering Committee and the UNDP Country Office of any delays or difficulties during implementation, including the implementation of the Monitoring & Evaluation (M&E) plan, so that the appropriate support and corrective measures can be adopted. The National Project Coordinator and the State Project Managers will also ensure that all project staff maintain a high level of transparency, responsibility and accountability in monitoring and reporting project results.
309. The UNDP Country Office will support the National Project Coordinator and the State Project Managers as needed, including through annual supervision missions. The UNDP Country Office is responsible for complying with UNDP project-level M&E requirements as outlined in the [UNDP POPP](#). Additional M&E, implementation quality assurance, and troubleshooting support will be provided by the UNDP Regional Technical Advisor as needed. The project target groups and stakeholders including the NDA Focal Point will be involved as much as possible in project-level M&E.
310. A project inception workshop will be held at the beginning of the implementation phase to: i) re-orient project stakeholders to the project strategy and discuss any changes in the overall context that influence project

implementation; ii) discuss the roles and responsibilities of the project team, including reporting and communication lines and conflict resolution mechanisms; iii) review the results framework, re-assess baselines as needed, and discuss reporting, monitoring and evaluation roles and responsibilities and finalize the M&E plan; iv) review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; and v) plan and schedule Project Steering Committee meetings and finalize the first year annual work plan. The National Project Coordinator will prepare the inception report no later than one month after the inception workshop. The final inception report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the National Project Steering Committee .

311. A project implementation report (PIR) will be prepared for each year of project implementation. The National Project Coordinator, the UNDP Country Office, and the UNDP Regional Technical Adviser will provide objective input to the annual PIR. The National Project Coordinator will ensure that the indicators included in the project results framework are monitored annually well in advance of the PIR submission deadline and will objectively report progress in the Development Objective tab of the PIR. The annual PIR will be shared with the National Project Steering Committee and other stakeholders. The UNDP Country Office will coordinate the input of the NDA Focal Point and other stakeholders to the PIR. The quality rating of the previous year's PIR will be used to inform the preparation of the next PIR. The final project PIR, along with the terminal evaluation report and corresponding management response, will serve as the final project report package. Semi-annual reporting will be undertaken in accordance with UNDP guidelines for quarterly reports that are produced by the National Project Coordinator.
312. An independent mid-term review (MTR) process will be undertaken and the findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the final half of the project's duration. The terms of reference, the review process and the final MTR report will follow the standard templates and guidance available on the [UNDP Evaluation Resource Centre](#). The final MTR report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the National Project Steering Committee. The final MTR report will be available in English. An independent terminal evaluation (TE) will take place no later than three months prior to operational closure of the project. The terms of reference, the review process and the final TE report will follow the standard templates and guidance available on the [UNDP Evaluation Resource Centre](#). The final TE report will be cleared by the UNDP Country Office and the UNDP Regional Technical Adviser, and will be approved by the National Project Steering Committee. The TE report will be available in English. The UNDP Country Office will include the planned project terminal evaluation in the UNDP Country Office evaluation plan, and will upload the final terminal evaluation report in English and the management response to the public UNDP Evaluation Resource Centre (ERC) (www.erc.undp.org). The MTR and TE will be carried out by an independent evaluator. The evaluation report prepared by the independent evaluator is then quality assessed and rated by the UNDP Independent Evaluation Office.
313. The UNDP Country Office will retain all M&E records for this project for up to six years after project financial closure in order to support ex-post evaluations.
314. While the UNDP Country Office, through its ongoing presence in the country, will continue to engage with the Gol, there is no provision for human and financial resources to undertake formal reporting post-completion of the project. Information, where available, will be communicated to the GCF Secretariat as feasible.

I. Supporting Documents for Funding Proposal

- NDA No-objection Letter **Annex I**
- Feasibility Study **Annex II**
- Integrated Financial Model for Output 2 on Livelihoods (Summary) **Annex III (a)**
- Letters of commitment for co-financing commitment **Annex IV**
- Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) **Annex V**
- Social and Environmental Screening Procedure **Annex VI (a)**
- Environmental and Social Management Framework **Annex VI (b)**
- Environmental and Social Report Disclosure **Annex VI (c)**
- Appraisal Report and Due Diligence Reports with recommendations **Annex VII**
- Evaluation Report of the baseline project **Annex VIII – not applicable**
- Maps indicating the location of target landscapes in the 3 target states **Annex IX**
- Timetable of Project Implementation **Annex X**
- Project confirmation **Annex XI**

Additional information

- Economic Analysis **Annex XII (a)**
- Economic Analysis (excel) **Annex XII (b)**
- Procurement Plan **Annex XIII (a)**
- Operations & Maintenance Plan **Annex XIII (b)**
- Gender Assessment and Action Plan **Annex XIII (c)**
- Stakeholder Consultations **Annex XIII (d)**
- Stakeholder Engagement Plan **Annex XIII (e)**
- Evidence of internal approval **Annex XIII (f)**
- Detailed budget and work plan **Annex XIII (g)**
- Project activities and responsibilities **Annex XIII (h)**
- Restoration and livelihoods and activities per landscape **Annex XIII (i)**
- Unit Costs for Climate-Adaptive Livelihoods **Annex XIII (k)**
- HACT Assessments **Annex XIII (l)**
- DPC Calculations **Annex XIII (m)**
- Technical Study 1a: Cost-Benefit Analysis of the Seagrass and Coral Reef Restoration Components **Annex XIII (n-1)**
- Technical Study 1b: Cost-Benefit Analysis of the Seagrass and Coral Reef Restoration Components (excel) **Annex XIII (n-2)**
- Addendum to Technical Study 1: Cost-Benefit Analysis of the Seagrass and Coral Reef Restoration Component **Annex XIII (n-3)**

- Technical Study 2: Promoting Sustainable Livelihood in Maharashtra, Andhra Pradesh, and Odisha **Annex XIII (o)**
- Responses to GCF comments on funding proposal **Annex XIV**
- Letter of Endorsement from UNDP Senior Management **Annex XV (a)**
- Letter of Agreement between UNDP and Government of India on UNDP support services **Annex XV (b)**
- Responses to iTAP comments