

Concept Note

Building Climate Resilient Safer Islands in Maldives

Republic of Maldives | Japan International Cooperation Agency (JICA)

5 September 2018



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Concept Note

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

The Accredited Entity is encouraged to submit a concept note, in consultation with the National Designated Authority, to present a project or programme idea and receive early feedback and recommendation.

Project/Programme Title: Building Climate Resilient Safer Islands in Maldives

Country(ies): Republic of Maldives

National Designated
Authority(ies) (NDA): Ministry of Environment and Energy (MEE)

Accredited Entity(ies) (AE): Japan International Cooperation Agency (JICA)

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Notes

- The maximum number of pages should **not exceed 12 pages**, excluding annexes. Proposals exceeding the prescribed length will not be assessed within the indicative service standard time of 30 days.
- As per the Information Disclosure Policy, the concept note, and additional documents provided to the Secretariat can be disclosed unless marked by the Accredited Entity(ies) (or NDAs) as confidential.
- The relevant National Designated Authority(ies) will be informed by the Secretariat of the concept note upon receipt.
- NDA can also submit the concept note directly with or without an identified accredited entity at this stage. In this case, they can leave blank the section related to the accredited entity. The Secretariat will inform the accredited entity(ies) nominated by the NDA, if any.
- Accredited Entities and/or NDAs are encouraged to submit a Concept Note before making a request for project preparation support from the Project Preparation Facility (PPF).
- Further information on GCF concept note preparation can be found on GCF website [Funding Projects Fine Print](#).

A. Project / Programme Information (max. 1 page)			
A.1. Project or programme	<input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	A.2. Public or private sector	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector
A.3. Is the CN submitted in response to an RFP?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, specify the RFP: _____	A.4. Confidentiality¹	<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Not confidential
A.5. Indicate the result areas for the project/programme	<p>Mitigation: Reduced emissions from:</p> <input checked="" type="checkbox"/> Energy access and power generation <input type="checkbox"/> Low emission transport <input checked="" type="checkbox"/> Buildings, cities and industries and appliances <input type="checkbox"/> Forestry and land use <p>Adaptation: Increased resilience of:</p> <input checked="" type="checkbox"/> Most vulnerable people and communities <input type="checkbox"/> Health and well-being, and food and water security <input checked="" type="checkbox"/> Infrastructure and built environment <input checked="" type="checkbox"/> Ecosystem and ecosystem services		
A.6. Estimated mitigation impact (tCO₂eq over lifespan)	To be calculated after the specification of solar PV is confirmed.	A.7. Estimated adaptation impact (number of direct beneficiaries and % of population)	Total number of beneficiaries: 36,631 (10 % of the population) (Direct beneficiaries; 36,631, Indirect beneficiaries; 357,566)
A.8. Indicative total project cost (GCF + co-finance)	Amount: USD <u>84,400,000</u>	A.9. Indicative GCF funding requested	Amount: USD <u>46,000,000</u>
A.10. Mark the type of financial instrument requested for the GCF funding	<input checked="" type="checkbox"/> Grant <input type="checkbox"/> Reimbursable grant <input type="checkbox"/> Guarantees <input type="checkbox"/> Equity <input type="checkbox"/> Subordinated loan <input type="checkbox"/> Senior Loan <input type="checkbox"/> Other: specify _____		
A.11. Estimated duration of project/ programme:	5 years	A.12. Estimated project/ Programme lifespan	5 years
A.13. Is funding from the Project Preparation Facility requested?²	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Other support received <input type="checkbox"/> If so, by who: _____	A.14. ESS category³	<input type="checkbox"/> A or I-1 <input checked="" type="checkbox"/> B or I-2 <input type="checkbox"/> C or I-3
A.15. Is the CN aligned with your accreditation standard?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	A.16. Has the CN been shared with the NDA?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
A.17. AMA signed (if submitted by AE)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	A.18. Is the CN included in the Entity Work Programme?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
A.19. Project/Programme rationale, objectives and approach of programme/project (max 100 words)	The Republic of Maldives is one of the most vulnerable countries to climate change among small island developing states (SIDs). This project will focus on vulnerable outer islands as a pilot site to realize "Safer Islands" by strengthening the Maldives's adaptive capacity to climate change resilience. Specifically, introducing innovative technologies to the Maldives - coastal protection technologies in harmony with its rich ecosystem, and strengthening the disaster risk reduction system and safeguarding the critical		

¹ Concept notes (or sections of) not marked as confidential may be published in accordance with the Information Disclosure Policy ([Decision B.12/35](#)) and the Review of the Initial Proposal Approval Process ([Decision B.17/18](#)).

² See [here](#) for access to project preparation support request template and guidelines

³ Refer to the Fund's environmental and social safeguards ([Decision B.07/02](#))

infrastructure will be conducted by the Ministry of Environment and Energy as Executing Entity, supported by GCF and JICA.

B. Project / Programme details (max. 8 pages)

B.1. Context and Baseline (max. 2 pages)

Context and Baseline Summary

The Republic of Maldives is an archipelagic small island developing state (SIDS) with a population of 357,566 scattered in 188 small islands out of total 1,192 islands, spread over 90,000 km²; of that, less than 298 km² is land. The main industries are tourism and fisheries, with GDP per capita of 9,554 USD (2016, IMF). Tourism is the main industry and the main source of foreign incomes accounting 25.3% of the total GDP and 39.8% of the government revenues. Fisheries account for a small percent (1.3%) of the country's GDP; however, this sector employs half of the country's workforceⁱ and 98% of export products.

Climate change has been an existential threat to the low lying islands of Maldives, as its average height is 1.5 m above mean sea level (MSL), and over 80% of the land area is less than 1m above MSL, which could louse the most of the land area with even a 1m sea level rise. Additionally, its inherent land scarcity is forcing the nation to be vulnerable, as most of the settlements and critical infrastructures are concentrated along the coastal areas. Maldives economy is also highly vulnerable to climate change, as main industry's high dependency on the coastal resources –tourism and fishery.

Climate change impacts of coastal erosion from sea level rise, and storm surges, sea swells and storm generated waves have increased over the last decades. Over 80% of the island face erosion issues, specifically in 2014, 116 (61.7%) inhabited islands reported erosion, out of which 38% reported severe erosion status (MEE,2017). Currently, about 30 islands are identified as critically eroded islands, with impacts ranging from loss of beaches, vegetation, damages to human settlements, loss of critical infrastructure and flooding and inundation due to storm surges. Recognizing the threat, the Maldives government have increased the budget on coastal protection to 10 million USD per year. Although, with 188 inhabited islands spread over the entire archipelago, with many populations less than 1,000, the limited government resources are insufficient to provide a lasting solution of coastal protection.

Recognizing the threat, the Maldives government developed the concept of 'Safer Islands', for climate resilient island development as one of the backbones of long term development after the 2004 tsunami. The concept aims to strengthen coastal protection, provide disaster emergency/ management services to vulnerable islands, develop reliable communication system, appropriate harbours / transport infrastructure etc, to which this project is aimed to contribute. The government have also developed its NDC (2016) and NAPA (2006), and prioritized 10 adaptive contributions to address the current and future impacts of climate change in its NDC. Among them, this project is expected to contribute to '**Coastal Protection**', '**Early Warning and Systematic Observation**', and '**Infrastructure Resilience**'.

Climate Change context

● Climate Hazards and future predictions

- **Sea Level Rise** – Sea level records for the past 20 years showed a rise of 3.753mm and 2.933 mm per year in Male and Gan island, respectively. The maximum sea surface height changes for central and south is projected to vary between 0.40m to 0.48m from 2001 to 2100 with possible range of 0.36m to 0.5m.(MEE, 2015 "Development of high-resolution regional climate model for the Maldives")
- **Storm surge**; According to the historical data, maximum storm surge height is reported to be 0.84m with a return period of 100 years. If coupled with high tide, this historical trend could generate a storm tide of 1.82m in height. Future predictions indicates storm surges can create up to 2.78m waves under medium prediction, enough to completely inundate a medium to small sized islands in the Maldives.

● Climate Vulnerability : Main root causes

- **Scarce, low-lying land, and geographically dispersed islands** –Over 80 % of the total land area is less than 1m above MSL, of average 1.5m, making the country extremely vulnerable to climate change. The islands spread over 90,000 km², with 298 km² area of land. The highest point in the Maldives is around 2.4 m above MSL, making it the lowest natural high point of any country in the world. IPCC (2014) projection up to 0.98 m of global sea level rise by 2100 with a rate during 2081–2100 of 8-16 mm/y, may drive most of the land areas flooded.
- **Low lying, near shore critical infrastructures** – Approx.44% of the settlement footprints, 47% of all housing structures, 70% of all fisheries infrastructures, 80% of the powerhouses, 75% of communication infrastructures, and 90 % of waste disposal sites are within 100m of coastline, indicating the high risk of critical infrastructure and vulnerability of the local livelihood to climate change.
- **High economic dependency on vulnerable coastal resources** – The main industries of the Maldives are tourism and fisheries. The tourism sector accounts for 25.3% of the total GDP and 39.8% of the government revenues. If tourism-related sectors⁴ included, total contribution will share 67% of nominal GDP and 77% of real growth (WB, 2016). The fishing sector accounts for limited 1.3% of GDP, although employs half of the country's workforce and 98% of export products. However, this indicates that Maldives economy is dependent on coastal resources, which

⁴ Transport, communication, financial services and business services benefit directly from tourism activity and tend to be highly correlated to tourism bed-nights, while real estate and construction are heavily determined by investment in the tourism sector.

is forcing the country's economy highly vulnerable to predicted climate change impacts. For example, direct damage to the tourism infrastructure and businesses from the 2004 Indian Ocean tsunami was approximately US\$100 million, while the indirect loss from the sharp drop in tourism arrivals following the tsunami was approximately US\$130 million (2004 USD; World Bank et al., 2005).

- **Lack of climate change impact modelling capacity** – Climate change impact modelling system are not available in Maldives to correctly predict its future impacts due to lack of financial and technical resources. Especially, the difficulty of analysing whether the erosion was caused from human impacts (i.e. seawalls or harbours etc) or natural impacts, is requiring highly advanced modelling and simulation capabilities.
- **Weak disaster preparedness** - Insufficient disaster warning accessibility and lack of information transmission is making the nation to be more vulnerable to storm surge, especially at the small islands where the information disparities often occur. Local people's awareness on disaster risk reduction was found relatively low according to UNISDR (2009), stating that this is probably due to the low occurrence of disasters in the past. However, the National Disaster Risk Profile shows that Maldives has moderate hazard levels except for the low probability and high consequential tsunami hazard in the near future, and high probability and high consequential sea level rise hazard in the distant future. Maldives exposure risk to climate disaster is already occurring at the most vulnerable outer islands where information disparities are making the nation more vulnerable.
- **Limitations in technical and financial capacity for coastal protection**- The Maldives government itself has been allocating its budget for coastal protection each year, since 2013 according to the current record, as a total 464,508,268 MVR (Approx. USD30 Million) for 2013-2017. Realistically, the government has been allocating the budget since 80's for coastal erosion before the current records. However, the construction cost for shore protection in Maldives is very high due to factors such as transport of materials, and accessibility to the outer islands. Government of Maldives is in need of financial assistance to construct coastal protection measures and maintain shorelines in the wide spread inhabited islands. Additionally, the finance is insufficient to provide a lasting solution to the coastal erosion with attention to the coastal ecosystem, limiting the coastal protection technology to installation of sand cement bags and rock boulders where some of these solutions are not effective and durable.
- **Climate Change risks**
 - **Increasing Coastal erosion** – Over 80 % of the island face erosion issues. In 2014, 116 (61.7%) inhabited islands reported erosion, out of which 38% reported severe erosion status (MEE, 2017). Although coastal erosion is a real challenge faced daily by the Maldivian communities, erosion trends in the Maldives are not regularly monitored due to lack of resources. According to the analysis of historical aerial images of 4 case study islands ('H.A. Thuraakunu', 'B. Hithaadhoo', 'K. Bandos', and 'Gn. Fuvahmulah'), the islands have experienced a land loss between 0.81ha (2004-2008) to 3.66 ha (1969- 2013) per island, 0.8-6.3% of its total island area (SNC, 2016).
 - **Inundation due to Storm surges and Sea level rise**– According to the historical data, maximum storm surge height was reported to be 0.84m with a return period of 100 years. If coupled with high tide, this historical trend could generate a storm tide of 1.82m in height. Future predictions on maximum storm tides for different regions of the Maldives based on medium and high sea level rise scenarios, and given that the average height of Maldivian islands is 1.5m above MSL, sea level rise would cause regular tidal inundations in most islands even at the medium prediction. Storm surges can create up to 2.78m waves under medium prediction, enough to completely inundate a medium to small sized islands in Maldives. A storm surge at higher-end prediction could cause a 3.18m wave that could inundate even the largest islands (UNDP, 2006).
 - **Climate disaster risks** – Maldives has moderate hazard levels expect for the low probability and high consequential tsunami hazard in the near future, and high probability and high consequential sea level rise hazard in the distant future. For example, series of swells between 10 to 15 feet hit the islands in 2007, affecting 68 islands, causing inundation of up to 600m from the coastline, and 1649 people evacuating from their homes, while flooding caused damage to 579 housing units. Atolls are also currently facing cyclone risks, Cyclone Nilam (2012) affected over 33 islands, 826 people and caused an estimated damage of USD 133,090 (ADRC,2015), Cyclone Madi (2013) caused extensive damage in several regions. Indian Ocean Tsunami in 2004 was one of the most apocalyptic natural disaster experienced in Maldives history, with total economic loss of approximately 470 million USD, 82 people dead, 26 missing and more than 2000 homes destroyed.

Governmental Policies : This project is expected to contribute to below policies realization.

- Maldives' Intended Nationally Determined Contribution, submitted as NDC in 2016 - Maldives places a priority on 10 adaptation actions on the NDC, of which, 'Coastal Protection', 'Early warning and Systematic Observation', and 'Infrastructure Resilience', expected to be contributed from this project.
- The National Climate Change Policy Framework 2015- 2025 policy goal 3: Strengthening of adaptation actions and opportunities and build climate-resilient infrastructure and communities to address current and future vulnerabilities.
- National Adaptation Program of Action- identified the priority adaptation measures including below:
 - Capacity development: Coastal protection, zone management and flood control, protect beaches through soft and hard-engineering solutions, and integrate adaptation into national disaster management framework.
 - Critical infrastructure: develop coastal protection for airports and development focus islands.
 - Tourism: protect beaches and tourist infrastructure.
- Safer Island Policy - The government developed the Safer Island Development Programme after 2004 tsunami to bring comfort to the population as a backbone of long-term development. The idea is to extend the population

consolidation approach to incorporate the aspect of extreme vulnerability and develop measures to reduce natural disasters. A "Safer Island" is considered to have better coastal protection, elevated public buildings for vertical evacuation, emergency supplies, an appropriate harbour, and more reliable communications systems, and also serve their neighbouring islands as refuges in disaster events.

B.2. Project / Programme description (max. 3 pages)

Project Summary

This project will aim to develop climate resilient 'Safer Island' by combination of hard and soft adaptation approaches. Project will start with urgent response to continuous coastal erosion by implementing Coastal protection construction activities (Component1) at the two pilot areas considered in Addu Atoll and Gan Island (Lammu Atoll) (to be determined in further study). Secondly, as an emergency action to storm surge and climate change disasters, critical infrastructure resilience will be enhanced (Component2), and Disaster Risk Reduction system will be introduced (Component3). Lastly, institutional strengthening and capacity building conducted for project sustainability (Component 4).

Japan has high capability of integrated coastal management approach through its experience in the Okinawa archipelago, which aim to harmonize the coastal area's multiple functions such as coastal protection function, environmental function (ecosystem, natural landscape, cultural and climate area), and utilization function (Industry area for fisheries, sightseeing, recreation and environment activities). This integrated coastal management approach will be adopted, and transform the Maldives' coastal protection works into an ecosystem based climate resilient measures - maintaining its beautiful and rich coastal environment and strengthening resilience of the communities at the same time.

➤ **PROJECT OBJECTIVES**

This project will support the government's initiative "Safer Island Policy" by strengthening the Maldives's adaptive capacity to climate change by introducing innovative coastal protection technologies to the Maldives in harmony with its rich ecosystem, strengthening the disaster risk reduction system, and safeguarding the critical infrastructure. The project will focus especially on the more climate vulnerable outer islands.

The project will comprise 4 components with their respective outcomes, outputs and major activities as following;

➤ **Component 1 - Coastal Protection**

The frequency and magnitude of the coastal erosion in the Maldives has significantly increased over the last decade mainly due to the increasing impact of sea level rise and storm surges. Coastal erosions have also increased by the imbalance of coral gravel loss and supply, which are considered to be caused not only from the environmental effects, but also some human works (i.e coastal development) are affecting the coastal erosion and loss of sands and gravels.

The coastal sand loss will not only affect the coastal environment and beach utilization, but will increase the wave overtopping and negatively affect the safety of critical infrastructures and human settlements and coastal infrastructures tolerance. Facing the budgetary and technical limitations, the Maldives government have been implementing a limited number of coastal protection works, such as rock boulder revetments, and sand and cement bag structures. However, while consideration of environmental and utilization function in coastal protection works have been attempted to be included, the degree of inclusion of these functions can be further strengthened, especially combined with coastal erosion modelling by several climate change simulation. Additionally, as the government is in short of financial and technical resources, most of the current coastal protection works are not considering the coastal sand flow and sediments modelling, resulting in construction structures not lasting to the expected service lifetime.

This project will incorporate and utilize the Ecosystem-based Disaster Risk Reduction (Eco-DRR) concept to coastal protection works. Recognizing the importance and effect of sand beach, mangrove forests and coral reefs, this project will adopt coastal protection works imitating the nature, such as beach nourishment, artificial reefs, mangrove reforestation etc. These works are expected to expand the natural beach protection effects, and select the scientifically reasonable method of coastal conservation measures as a pilot project for further work spread through the nation.

Detailed coastal protection methods will be determined by comparison of various measures such as beach revetment, breakwaters, and seawalls etc, in consideration of the shoreline modelling and climate change simulation to avoid imbalance of the sand and sediment flow by construction works. The pilot project will first analyse the effects of the natural hazards and climate change to the coastal protection and design the engineering treatments. Detailed design will be determined based on the stakeholder consultation process.

Outcome 1; Strengthen the coastal protection facilities against coastal erosion effects

Sub-Components;

Implementation and detailed design phase;

- (1) Introduction of knowledge and experience of Japan especially Okinawa and the Maldives on coastal protection
- (2) Introduction of ocean modelling system of the hydrodynamics and sediment transport, and information gathering of the pilot areas coastal structures, climate, oceanographic, bathymetry and topography data.
- (3) Cost benefit analysis for the comparative study of technical options to prevent coastal erosion, considering sand and sediment budget analysis and simulation.
- (4) Engineering design which comprise the functions of protection, environment, and utilization, to enable ecosystem based beach conservation as a countermeasure to coastal erosion

Construction phase;

- (5) Preparation and consultation of the detailed procurement plan including the construction materials and civil engineering work execution plan.
- (6) Procurement of the equipment and materials of coastal protection and construction, engineering work implementation.

➤ **Component 2 - Low carbon and Climate Resilience Infrastructure**

The Maldives government has been providing the infrastructure at the outer islands necessary to adapt to climate change and to be better prepared for storm surges and natural disasters, to realize the “Safer Island” concept. Government policy on infrastructure resilience is stated as one of the important adaptive measure to climate change, in the NDC and its Second National Communication to the UNFCCC. The demand for infrastructure resilience is expected to increase due to the increasing future prediction of storm surges and inundation damage.

Component 2 will aim to strengthen the resilience of critical infrastructure at the target islands by confirming the current infrastructure development situation (specifically, harbour, water network, drainage systems, solar PV etc.), and if necessary, additional measures to strengthen the infrastructure resilience will be taken by the government.

The outcome of the Component 2 is expected to develop the infrastructure capable to maintain its functions in climate disaster events. The island development plan and climate hazard information (current and prediction) will be considered. The government administrative functions are expected to maintain its functions in storm surge and disaster events, and critical infrastructures resilience strengthened.

Outcome 2; Strengthen infrastructures (such as basic traffic) climate change resilience, to maintain the government administrative functions in events of storm surges and disasters.

➤ **Component 3 - Strengthen Disaster Risk Reduction**

Component 3 will aim to reduce the climate disaster risk, by mainstreaming disaster risk reduction (DRR) into the local development planning process based on 'the Sendai Framework for Disaster Risk Reduction 2015-2030,' and implementing community based disaster risk reduction approach at the priority area.

Although the Maldives outer islands face high disaster risk, essential works for comprehensive DRR measures are not sufficiently prepared, such as hazard map preparation, early warning system, communications routes on climate/disaster information transmission in emergency, awareness on disaster prevention activities etc. The evacuation site and essential lifelines are not properly maintained and secured.

This project will combine soft and hard adaptation measures for DRR. For soft adaptation, local DRR plans with comprehensive DRR management system, such as pre-investment for disaster prevention and preparation, and restoration plan etc. will be developed with local governments of the target areas. The roles of local governments and the central government will be clarified, and action plans prepared. From these action plans, pilot projects on climate resilient community development and DRR strengthening will be implemented. For hard adaptation, Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) television network will be installed in developing Emergency Warning Broadcast System throughout the Maldives, making emergency warning information more accessible to residents and reducing information disparities among outer islands. Expected project activities are shown below;

- (1) Mainstreaming disaster risk reduction into the urban planning and land use planning
- (2) Hazard map preparation
- (3) Installation of Digital Broadcasting-Terrestrial (ISDB-T) television network
- (4) Develop appropriate early warning system to cover all the communities of the Maldives
- (5) Evaluation of critical infrastructures' resilience to disaster risk. Government buildings and hospitals to be prioritised considering its demand in disaster occasion. If necessary, disaster risk prevention measures are to be implemented.
- (6) Prepare evacuation route and facilities. (including stockpile for emergency)
- (7) Awareness raising activities for climate change and disaster risk reduction

The Japanese Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) television network installation throughout the nation will be provided by the official grant support. The digital broadcasting terrestrial network is expected to establish the speedy communication of emergency warning information as a measure against non-climate and climate-related disasters, and strengthen climate disaster preparedness.

Outcome 3 ; Develop local disaster risk reduction plan and establish early warning system, and facilitate community-based activities

➤ **Component 4 - Institutional Strengthening and Capacity Building**

With an aim to sustainably maintain and replicate the project outcomes, capacity building and institutional strengthening will be conducted in the Component 4. Maldives government's institutional capacity will be strengthened and effective collaboration within the government agencies related to climate change resilience and disaster risk reduction to be promoted, and capacity development activities will be implemented.

This project aims to implement a coastal protection technology in harmony with the coastal ecosystem, which is a new and innovative technology for the Maldives. To realize the introduction of this new adaptation measure to the country, executing entities' institutional strengthening and collaboration with the relevant organizations is crucial within the government. Specifically, capacity building at MMS (Maldives Meteorological Service) and NDMC (National Disaster

Management Center) for monitoring of meteorological and oceanographical situation and climate change impacts for disaster risk reduction, as well as prompt climate/ disaster information transmission. For the Coastal Protection Unit under Environment Department of MEE, technology of the Japanese coastal protection experience such as from concept of Okinawa will be transferred, and strengthen their capacity of project management. For the local governments, action plans will be developed with a participatory approach through appropriate consultation process, and capacity development will be facilitated to enhance community participation in operation. Also, through development and implementation of these participatory action plans, women's participation will be enhanced and capacity building of women's empowerment realization will be implemented. Through all the capacity development above, the sustainability of this project will be maintained and enhanced, shifting the development pathway toward a more climate resilient and eco-system-based approach of coastal protection measures that maintains the coastal ecosystem and enhance the community's climate resilience at the same time.

Outcome 4; Sustainability of this project will be maintained through Institutional strengthening and capacity building with effective collaboration within the relevant government organizations.

Sub-Components (to be confirmed of details);

- (1) Strengthen monitoring ability of the meteorological and oceanographical situation and climate change impacts
- (2) Strengthen skills of the technical staff for forecasting and climate modelling, data assimilation and interpretation techniques for providing better weather and climate services.
- (3) Introduce drifting sand simulation and modelling technology
- (4) Capacity development of coastal protection engineering works newly introduced to the Maldives, which aims to both protect the island from climate change impacts and also maintain the coastal ecosystem.
- (5) Develop local disaster risk reduction organization structures and stockpiling system.
- (6) Capacity development of project management and capital management
- (7) Raising awareness activities of climate change and disaster risk reduction.
- (8) Community based management, efficient utilization and promotion of coastal protection facilities and disaster risk reduction facilities including the strengthening of the community organization structure. Women's empowerment will be facilitated through this community based approach.

Project organization framework AE and EE' s role

- AE: JICA (Japan International Cooperation Agency) 's role
 - Provide support to developing the new coastal protection engineering technology in Maldives, climate change risk profiling, participatory project management, and developing disaster risk reduction plans.
 - Responsible for project oversight, and provide support to project management, monitoring and evaluation.
- EE: The Ministry of Environment and Energy of Maldives (MEE)
 - Responsible and accountable for managing this project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of GCF resources. A dedicated Project Management Unit (PMU) would be set up to implement this project.
 - A Project Steering Committee will be set up, comprising of representatives of the major stakeholder agencies. The Project Board would advise on project management and ensure results, best value for money, fairness, integrity, and transparency.
 - MEE would be responsible for overseeing the PMU. Component 2 would be supported and guided by NDMC, MMS and EPA in addition to MEE. Component 4 –capacity development will be provided to all relative government organizations including MEE, NDMC, and MMS.etc.
 - The NDA would provide general oversight and guidance to the project, and would be representative to the project steering committee.

Key financial and operational risks and any mitigation measures

The following risks are considered and need analysis through further study;

Environmental Risks

- Physical climate impact risks, such as extreme climate events as cyclones may affect the progress and implementation of the project. To manage this risk, the construction will be planned with considerations to the high climate risk season.
- Environmental and social impacts will be assessed and evaluated by conducting the examination of environmental and social considerations, and properly managed by considering necessary mitigation plans and developing Environmental Management Plan (EMP). Potential environmental and social impacts will be properly managed according to JICA Guidelines for Environmental and Social Considerations (April 2010), and Maldives Environment Impact Assessment (EIA) regulations.
- In order to avoid high environmental risk in Component 2, sub-projects assigned by Category A will be excluded through further study.

Financial Risks

- Due to remoteness of the project site from major markets, project costs may exceed the planned budget. As a mitigation measure, detailed cost estimate survey will be conducted and the financial management plan and procurement plan will be developed through further study.

Operational Risks

- MEE's Institutional capacity and human resource is limited for adequate coastal and climate risk management. Smooth implementation of the project will be ensured through setting up a dedicated Project Management Unit (PMU) for implementation. The Coastal Protection Unit of the MEE would be responsible for overseeing the PMU.
- As the project is an integrated climate change adaptation project including multi-sector activities, the multiple stakeholder engagement may cause difficulties. Mitigation measure to be taken to set up a Project Board, comprising of the major stakeholder agencies, and they would advise on project management and ensure results.

B.3. Expected project results aligned with the GCF investment criteria (max. 3 pages)

➤ Expected impacts

1. Impact potential

This project will contribute to the climate change resilient 'Safer Island' atoll realization for the Maldives, which would protect the coast as an adaptation measure, and also co-benefits the population by preservation of its unique ecosystem and economically important beach, detailed technology would be designed through detailed design. The newly introduced coastal protection works will avoid lock-in long-practiced coastal protection measures and develop the nation's technical capacity to be climate resilient in harmony with nature simultaneously.

Additionally, this project will not only benefit the pilot 'Safer Islands', the whole population will be benefited by strengthening its disaster risk management capacity and installation of early warning system, a first nationwide coverage information access service for making emergency information more accessible to residents in a timely manner by the digital broadcasting terrestrial network. It will benefit in particular the outer small islands where vulnerability is relatively high, strengthening disaster preparedness in remote areas.

a) Direct beneficiary

- Strengthen Disaster Risk Reduction
 - In-Direct Beneficiaries; 100% of the resident population 357,566 will have improved access to early warning system and disaster information by installation of early warning system in each of the atolls. Additionally, tourist visiting 1.2 million people/ year will be in-directly benefited from improved disaster risk reduction and early warning system within the country.
- Coastal Protection :
 - Direct Beneficiaries; Population of the targeted pilot Atolls (Addu Atoll and Gan Island (Laamu Atoll) (To be determined in further study) 36,631 (10 % of population) will be protected by the coastal protection investments.
 - In-Direct Beneficiaries; 100% of the population 357,566 will benefit by the improvement of main industries economic resilience to climate change.

b) Strengthening of institutional and regulatory systems

- A Project Steering Committee would be set up comprising of representatives from the major stakeholder agencies. Currently in Maldives governments, inter sectoral coordination is weak and over-lapping mandates for different institutions creating additional barriers for various project implementation. The Project Steering Committee would be responsible for the delivery of the project outputs and the attainment of project outcomes. The Project Steering Committee would also be a 'Multi-Stakeholder Platforms' enabling periodic consultation opportunity to strengthen the multi-sectoral cooperation within the government.

c) Strengthening of awareness of climate threats and risk-reduction processes

- Community based coastal management system would be discussed and developed in a participatory basis, and public early warning system related activities would be conducted according to the plan. JICA will provide an Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) television network throughout the Maldives, making information more accessible to residents and reducing information disparities among islands. This further digital migration would enable the early warning system to spread throughout the nation, strengthening the awareness of climate threats through information provision on natural disaster including climate change impacts to the most vulnerable outer islands.

2. Paradigm shift potential

a) 'Safer Island' - Climate-resilient island development by integrating multi-sectoral approach.

This project will realize the first 'Safer Island' model in the target pilot atolls. 'Safer Island' realization could be replicated to other atoll islands of the nation, and further scaling up to the climate change vulnerable islands of other SIDS. The 'Safer Island' model will be realized through this project's activity on coastal protection works, strengthening resilient infrastructures, disaster risk reduction works, and capacity development of related stakeholders.

b) First Innovative engineering technology - Ecosystem-based coastal protection work

Coastal protection technology were made in the Maldives by the existing technology of sand bags and rock boulders that needed to cover up the natural beach in consideration of the cost and coastal protection effect in the past. This project will create paradigm shift from the existing technology to new engineering technology in the Maldives, that will

realize not only coastal protection but also preserve the unique beach ecosystem, which are economically and culturally important in the Maldives. This technological paradigm shift to create an enabling environment will realize the enhancement of disaster prevention function, preservation of the coastal ecosystem – coastal conservation preventing sand runoff, and maintaining the main tourism industry. This technology transfer introduced by international coastal engineering experts to Maldives will also contribute to strengthen the knowledge for the engineers and relevant institutions in Maldives.

c) ***Scaling up and replication potential to cover the other vulnerable atolls in Maldives, and to other small island developing states (SIDS)***

As the 'Safer Island' concept is the government backbone long term development, this project's realization of the 'Safer Island' has the potential of scaling up and replication to other outer islands in the Maldives, spreading the project contribution to cover wider areas enabling the sustainable development economically and ecologically over the country. Moreover, from this success, the new development concept for climate vulnerable small islands, has potential to be spread to other vulnerable countries of small island developing states, as an innovative climate resilient island developing model.

3. **Sustainable development potential**

Detailed project benefit potential to be assessed in further study

a) Economic co-benefits;

- The coastal protection technique will protect the 'beach' from disaster damage and loss, which will preserve the economic center within the Maldives, and maintain its main tourism industry.
- Technology development will be enabled by the project implementation that provide locally-tested solutions for atoll islands that are increasingly impacted by climate change, and this developed technology has the potential to benefit the other atoll island states, and further to other small island developing states (SIDS).
- The project will employ contractors for project implementation which will create employment opportunities.

b) Social co-benefits;

- Coastal culture preservation by the coastal protection work enabling the preservation of the Maldives culture center 'beach'.
- Disaster risk reduction especially for children, women, people with disabilities, and the elderly whom are especially considered vulnerable in climate change disaster occasions.
- Strengthen the awareness of Climate change impact within the outer remote islands.

c) Environmental co-benefits

- Ecosystem based coastal protection work would be built based on the coastal meteorological prediction and coastal tidal flow/ sediment change assessment, ensuring both the prevention of coastal erosion exposed areas and reducing the risk through natural solutions, and preservation of the unique ecosystem. This technology will reinforce the climate resilience coastal ecosystem and also maintain the beautiful beach by preventing the loss of beachline.
- Technical transfer of the coastal tidal flow/ sediment change assessment method, and future climate change impact modelling technic would strengthen the capacity of the Maldives engineers to consider more detailed environmental impacts when considering coastal infrastructure development.

d) Gender-sensitive development impact

- Women in Maldives tend to stay in houses more than men. The disaster risk reduction system will be spread through each household television will address the climate vulnerability of women. Women could also be the first notice person of climate-disaster potential and are disproportionately affected when disasters occur.
- Women in Maldives are primarily responsible for looking after the young, elderly and disabled family members. Therefore strengthened disaster resilience will particularly benefit women, as they would be expected to take up the burden of care giving for the vulnerable in the aftermath of disasters.
- Furthermore, the majority of population engaged in agriculture in the Maldives is women (HIES 2012), and the sector is highly vulnerable to extreme weather events. Women are also engaged in subsistence fishing from the lagoon (Mohamed 2012). Reducing coastal vulnerability, and the potential impact of wave actions on agricultural activities will therefore help maintain women's livelihoods under a changing climate.
- Culturally, the beach is an important site for socialisation and recreation, for all social groups including children, women, men and the elderly in the Maldives. Preserving the beaches would benefit all these groups and in maintaining the island way of life.
- Coastal protection and management, efficient utilization of coastal protection facilities and disaster risk reduction facilities will be implemented by community based approach, with focus on women's active participation. Women's empowerment would be enhanced through this community consultation process and future planning of coastal and disaster risk reduction work. Additionally, as staff in the Coastal Protection Unit under Environment Department of MEE is all women, this project will be led by female governmental officials.

4. **Needs of the recipient**

The Maldives government allocates resources for coastal protection each year approximately 5-11 million USD per year and total expenditure 30 million USD from 2013 to 2017. However, since the population is scattered in 188 inhabited islands, many of which less than 1000 people, the limited resources at the government's disposal are insufficient to provide a lasting solution to the coastal erosion issues these islands face, as the necessary budget for coastal protection works to the whole inhabited areas within the Maldives is estimated to be 3.3 to 55 billion USD. At the same time, the government recognizes that communities have the right to live and practice their way of life on their islands as they have for countless generations with its beautiful beach and rich coastal ecosystem. Providing ecosystem-based coastal protection works preserving the important assets and beachline is vital to the island communities as it is also contributing to the island economy. Although, the government cannot afford the high cost for technology development and engineering works for developing the ecosystem based coastal protection technology. Additionally, the overall cost for any coastal protection works in Maldives is very high due to factors such as transport of materials, and accessibility of some islands. Since the government cannot neglect any small islands and its culture, the Government of Maldives is in dire need of foreign assistance to technically and financially assist in creation of coastal protection measures also preserving the precious ecosystem and maintain shorelines in the inhabited islands of the Maldives.

5. Country ownership

- Coherence with the Maldives policies; This project will enable the realization of the government's long-term backbone 'Safer Island' policy for island climate-resilient island development, and also is expected to contribute to government policies such as NDC, NAPA, and Maldives Climate Change Policy Framework (MCCPF) as described before.
- Capacity of AE to deliver; AE (JICA) has several experience in ecosystem based coastal protection works such as beach nourishment in Tuvalu, Mauritius Island, and Bali Island of Indonesia, and also has the monitoring data of few years after construction up to 15 years. The long term experience and high engineering technology will contribute to the Maldives in developing the locally-fit ecosystem based coastal protection techniques.
- Capacity of EE to deliver; EE (MEE) of Maldives has the GCF project implementation experience for northern atolls of the states for water resource management project. Under this project, MEE set up the PMU and handled the procurement and tendering processes, this experience will enable the efficient and effective project implementation for this proposed project
- Engagement with the civil society and other relevant stakeholders;
 - Multi-sectoral project implementation will be enabled through setting up a Project Board made by the related organizations, such as MEE and Ministry of Housing and Infrastructure, Maldives meteorological services, National Disaster Management Centre (NDMC)..etc.
 - Stakeholder consultation planned to be conducted through further study.

6. Efficiency and effectiveness

- Application of best practices and degree of Innovation; Innovative best practice for coastal protection will be developed and installed, realizing the coastal conservation by combining both soft and hard adaptation measures. This will be enabled through development of new coastal protection engineering work in harmony with coastal ecosystem, and also implementing disaster risk reduction measures for the whole nation at the same time.
- Appropriateness of Concessionality; According to the total necessary project cost, 15 % is co-financed by Maldives government expenditure. The Maldives government recognize the coastal protection work in the atoll island is vital for future development and describes its importance in the long term development plan, thus, the government have the insight to allocate the coastal protection budget for the next decades to maintain and scale up the project effect.
- Amount of Co-financing
 Total project cost: 84.4 Million USD
 Requested GCF amount (Grant): 46 Million USD
 Government of Japan (Grant): 25.3 Million USD
 Government of Maldives (Grant): 13.1 Million USD
- Cost effectiveness and efficiency
 Total detailed project cost estimation will be calculated in further study. Cost and impact effective coastal protection technology will be considered by the Maldives government and JICA.

C. Indicative financing / Cost information (max. 3 pages)

C.1. Financing by components (max ½ page)

Please provide an estimate of the total cost per component and disaggregate by source of financing.

Component	Indicative cost (USD)	GCF financing		Co-financing		
		Amount (USD)	Financial Instrument	Amount (USD)	Financial Instrument	Name of Institutions
Component 1		40 M USD	Grant		Grant	

Coastal Protection						
Component 2 Climate resilience infrastructure				13.1 M USD	Grant	<i>Government of Maldives</i>
Component 3 Strengthen disaster risk reduction		3 M USD	Grant	25.3 M USD*	Grant	<i>Government of Japan</i>
Component 4 Institutional strengthening		3 M USD	Grant			
Indicative total cost (USD)		46 M USD		38.4 M USD		

*The Project for the Digital Terrestrial Television Broadcasting Network Development 2.792 billion Yen (Rate: 110.099 yen/USD)

C.2. Justification of GCF funding request (max 1 page)

➤ Necessity of the GCF funding

The government of Maldives has been allocating its resource from 2013 for coastal protection works. However, considering the conservation demand from the local communities for their cultural and economically centered 'beach' and also realizing the disaster risk protection from the coastal erosion, the government cannot afford the total coastal protection cost considering the ecosystem and industry preservation throughout the scattered 188 island. Additionally, considering the climate future prediction for the sea level rise and every year's loss of land due to coastal erosion, the coastal protection works are in urgent need to be done simultaneously.

- GCF funding will paradigm shift this situation enabling to develop the innovative ecosystem based coastal protection works for the first time in the nation, from the existing coastal protection works which could not be implemented without coverage and loss of the beachline. Additionally, adequate tidal flow and sediment change analysis will be conducted before detailed design, which were not assessed in details for existing project. This high-engineering technology assessment on coastal protection including climate-risk prediction will benefit the whole country for long term development economically and ecologically, as a leading climate-resilient small island state.
- GCF project will contribute to the capacity development of related institutions for monitoring and maintenance the coastal protection structure, which will ensure the Maldives long term development sustainably.

➤ Alternative funding options and barriers

- Alternative fund: The government have already allocated its resource for coastal protection works since 2013 as a total to be approx. 30 Million USD. Considering the urgent need to adapt to the increasing climate change effect, the government has made sufficient efforts to request support from multiple donors. However, support from international organizations was limited in three, which total financial support to be 25 Million USD.
- Funding barrier: The government have been allocating its resource for approx. 0.65 to 10 Million USD per year recognizing the importance and urgency for the coastal protection works. Although, considering the high cost of revetment construction in Maldives due to the need of transportation and purchase for the materials and accessibility, the government budget cannot cover especially the scattered outer vulnerable islands.
- Technical barrier: Due to the financial and technical limit, the government currently lack in adequate climate vulnerability assessment capability, which is limiting the country to consider the detailed future climate-risk into Maldives infrastructure and land use design.

➤ Justification of the rationale of GCF fund and financial structure

- Justification of the rationale of GCF funding:
 - Scale up investments in critical coastal infrastructure: the government allocates approximating USD 10 million annually for coastal adaptation investments. However, with the increasing rate of coastal erosion, this is vastly insufficient to address the needs of the 188 inhabited islands of Maldives. GCF involvement therefore is essential to preserve the coastal ecosystems and increase disaster resilience in order to enable Maldivian communities to continue their traditional way of life in the remote outer atolls, if climate change continues unmitigated.
 - Address financial and technical barriers to coastal adaptation: coastal adaptation solutions to reduce the vulnerability of Maldivian islands require large investment and long term engagement, which the government of Maldives cannot draw upon from its own resources or existing multilateral funds such as Adaptation Fund. The large capital investment required puts coastal protection beyond the scope of projects conventionally financed by most bilateral donors or other adaptation funds that are available to the country today. The GCF project is expected to build the technical capacities within the Government to design, monitor and maintain the results.
- GCF financial structure

The GCF fund will be passed to the MEE project management unit (PMU) through the AE (JICA) and Maldives Ministry of Finance and Treasury. JICA will enter into a signed project document with MEE. MEE will be accountable to JICA for the effective use of resources. MEE will not receive any direct operational fees. Eligible direct costs of MEE will be financed through the project budget. JICA's overall role in the project will include oversight and supervision of financial management. JICA will provide oversight of project implementation to ensure a steady delivery and compliance with committed results including financial risk management (adherence to the principles of competitiveness, fairness and transparency) and auditing.

➤ **Justification for grants**

- The importance of providing grants for the proposed investments is multi fold:
 - (i) There has been an increased severity and frequency of observed erosion in the Maldives attributed to climate change impacts (MEE, 2016). This requires expensive investments in coastal protection infrastructure. The GCF funding would help to cover this incremental cost to sustainable development and enable the government to reduce vulnerability of island communities to the impacts of climate change and sea level rise;
 - (ii) It is difficult to impose a user fee on coastal protection and critical basic infrastructure investments or other income, thus, does not provide a return on investment that can be monetized. Considering this aspect, it is generally done by the government as a public service, and therefore other financial instruments than grant, such as equity from private company or loans requiring repayment resources cannot be applicable.
 - (iii) The Maldives's public debt levels are already very high, making the severe situation for further external debt.

C.3. Sustainability and replicability of the project (exit strategy) (max. 1 page)

➤ **Project sustainability**

- This project's sustainability in the long run has been considered in all aspects of its design, In particular as below;
- Coastal protection design; Several design features for the coastal protection work will be considered in the proposed project, which will ensure the sustainability of the structure beyond the project lifespan maintaining balance of the social, environment, and economic sustainability of the project areas.
 - Climate change resilient infrastructure components will be detail designed with the planning horizon over few decades and sized taking into account the impacts of climate change and designed climate-proofed.
 - Capacity Development and Institutional strengthening; Sustainability of this project will be maintained through the project Component 4, on Institutional strengthening and capacity building. Institutional strengthening with relevant government authorities will enhance the effective collaboration within the government to implement the multi-sector 'Safer Island' from the government side basis. For the local community basis, community based management of coastal protection and disaster risk reduction system will be discussed and implemented through participatory approach, also awareness raising activities on climate change and disaster risk reduction would be conducted in islands, thus will develop the local communities' ability to tackle and manage predicted future climate risk. Therefore, climate risk and disaster risk will be properly managed by the community effectively lead by the government, which will ensure this project's outcomes to be sustainably managed and spread to other Atolls.
 - Mainstreaming adaptation into island development policy; Implementation of project activities to develop a climate resilient island model will support adaptation measures mainstreamed into island development policies. The project target islands will be the model to mainstreaming climate change modelling and adaptation measures into each islands' strategies, policies and plans expected to be replicated to other Atolls through government efforts.
 - All these initiatives and efforts supported by the project will put the conditions for the sustainable maintenance of the investments supported by the project, the replication of the integrated climate resilient island development strategies promoted by the project, and the institutionalization of the climate resilient coastal and disaster management along the entire Maldives coastal stretch. These exit strategy consideration in design will expand and continue the project contributions beyond the project closure.

C.4 Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)

➤ **Concept note development procedure**

- The Maldives government has started its public service on coastal protection from the 2013 and already conducted coastal protection works by sand bags and rock boulders technique to 17 islands, and 6 ongoing projects are running at current November 2017 stage.
- Recognizing the past coastal protection cooperation from JICA for the Male Island and its resilience, the Maldives government contacted Japanese government for GCF support financially and economically.

➤ **Discussion procedure for project development**

- JICA mission for GCF project formulation for Maldives coastal protection project was conducted in October 2017. The JICA team worked with the NDA and relevant ministries and stakeholders to discuss the possible project component and structure, and made site visits to understand the current situation.
- The JICA and MEE have also discussed for project detail consideration at COP23 in November 2017.
- The JICA and MEE have started to co-develop this Concept Note, and made the submission to GCF secretariat.

D. Supporting documents submitted (OPTIONAL)

- Map indicating the location of the project/programme
- Diagram of the theory of change
- Financial Model
- Pre-feasibility Study
- Evaluation Report of previous project

Self-awareness check boxes

Are you aware that the full Funding Proposal and Annexes will require these documents? Yes No

- Feasibility Study
- Environmental and social impact assessment or environmental and social management framework
- Stakeholder consultations at national and project level implementation including with indigenous people if relevant
- Gender assessment and action plan
- Operations and maintenance plan if relevant
- Loan or grant operation manual as appropriate
- Co-financing commitment letters

Are you aware that a funding proposal from an accredited entity without a signed AMA will be reviewed but not sent to the Board for consideration? Yes No

ⁱ Ministry of Tourism (2015) Economic Costs and Benefits of Climate Change Impacts and Adaptation to the Maldives Tourism Industry