MALDIVES: NAPA PROJECT PROFILE

MALDIVES

NAPA PRIORITY PROJECT 1

INTEGRATION OF FUTURE CLIMATE CHANGE SCENARIOS IN THE SAFER ISLAND STRATEGY TO ADAPT SEA LEVEL RISE AND EXTREME WEATHER RISKS ASSOCIATED WITH CLIMATE CHANGE

RATIONALE

All the islands of the Maldives are among the most vulnerable to the rise in sea level associated with climate change. Recent incidences of swells and storms have impacted more than half the populated islands resulting in flooding, loss of property, impacts on water resources and agriculture. The primary aim of this project is to enhance people's safety from climate change impacts and natural disasters, and the path selected is to improve and strengthen the Safer Island Strategy developed by the government to resettle communities from the smaller, more vulnerable islands onto larger, better protected ones. Several components of the Safer Island Strategy may in fact contribute to making islands more vulnerable to climate change impacts and natural disasters, if the climate change scenarios are not adequately considered in the land-use planning and development of safer islands.
At present, the Government of Maldives has planned to undertake a Detailed Risk Analysis of the proposed safer islands. Funding has already been secured to undertake the Disaster Risk Assessments for 9 of the proposed 14 safer islands. The initial risk assessment have highlighted the need to do more detailed analysis on aspects of coastal engineering and adaptation measures on all the islands. The aim of the proposed NAPA project is to ensure that climate change related hazards and vulnerability assessments are adequately covered in the Disaster Risk Assessments and also secure funding to conduct such an analysis for the remaining 5 proposed safer islands. This project would contribute to the resilience of the Maldives in the face of climate change and its capacity to respond effectively to increasing threats posed by climate change and natural disasters.

DESCRIPTION

Goal

Ensure climate change concerns are addressed in the Maldives Safer Island Strategy

Objectives

1. Undertake detailed hazard and vulnerability assessment for 5 of the proposed safer islands;
2. Develop a hazard mitigation and vulnerability reduction action plan Adaptation.

Activities

1. Undertake a hazard and vulnerability assessment which includes risks from climate change;
2. Undertake a composite risk assessment and action plan for hazard mitigation and vulnerability reduction.

Short term outputs

- Hazard assessment of identified safer islands
- Assessment of vulnerability to natural hazards, economic, social and infrastructure and building vulnerability and a coastal risk assessment
- Climate change sensitive criteria for safer islands identified
- Action plan developed

Potential long term outputs

Adaptation to future climate change scenarios integrated into the Safer Island Strategy of the Maldives

IMPLEMENTATION

Institutional Arrangement

Lead agency

Ministry of Planning and National development.

Partner agencies

National Disaster Management Centre; Ministry of Atolls Development; Ministry of Environment, Energy and Water; Ministry of Housing and Urban Development; Ministry of Construction and Public Infrastructure.

Risks and barriers

- Limited Data on hazards;
- Climate hazard at the specific island level difficult to predict;
- In some aspects there are no immediate solutions available.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

Total project cost: USD 248,820.

Activity	Cost (USD)
1. Undertake a hazard and vulnerability assessment which includes risks from climate change	135 200
2. Undertake a composite risk assessment and action plan for hazard mitigation and vulnerability reduction	113 620
Total	**248 820**

MALDIVES

NAPA PRIORITY PROJECT 2

COASTAL PROTECTION OF SAFER ISLANDS TO REDUCE THE RISK FROM SEA INDUCED FLOODING AND PREDICTED SEA LEVEL RISE

RATIONALE

The small size of the islands and their low elevation makes the Maldives one of the most vulnerable countries to the predicted climate change and impacts such as sea level rise, extreme weather events and storm surges. The Maldives NAPA process has identified strengthening coastal zone management and improving coastal protection of islands as urgent and immediate adaptation measures. This project is aimed to develop and implement demonstration coastal protection measures suitable for small islands, ensuring that risks from climate change impacts are addressed in the design of the coastal protection. The location for implementing this project is to be selected from the islands identified to be developed as a safer island under the Safer Island Strategy (SIS) developed by the Government of the Maldives. The SIS was developed following the Indian Ocean Tsunami of 2004, to resettle communities from the smaller, more vulnerable islands onto larger, better protected ones. The concept of the ìsafer islandî is to extend the population consolidation strategy to incorporate the aspect of extreme vulnerability and develop measures to mitigate ecological disasters and enable the communities to sustain social and economic development in times of emergencies and disasters. Initial risk assessment of 9 of the selected safer islands have highlighted the need to do more detailed analysis on aspects of coastal engineering and adaptation measures on all the selected islands. This project seeks funding to conduct such a detailed analysis on 5 of the safer islands where initial risk assessments have been undertaken.

DESCRIPTION

Goal

Reduce vulnerability of the developed safer islands to current climate risks and future climate change risks.

Objective

Demonstrate innovative coastal protection measures suitable for small islands

Activities

1. Undertake detailed technical and engineering studies for coastal protection options and adaptation measures for 5 safer islands
2. Implement demonstration coastal protection measure for 1 selected safer island.

Short-term outputs

- Climate change concerns addressed in the design and engineering for coastal protection of safer islands;
- Appropriate coastal protection for demonstrated safer island.

Potential long-term outputs

Increased resilience of safer islands and the consolidated population to current climate risks and risks from predicted climate change

IMPLEMENTATION

Institutional arrangements

Lead agency
Ministry of Construction and Public Infrastructure

Project Partners

National Disaster Management Centre; Ministry of Planning and National Development; Ministry of Housing and Urban Development; Ministry of Environment, Energy and Water

Risks and Barriers

High capital investment cost

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 3,055,000

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Undertake detailed technical and engineering studies for coastal protection options and adaptation measures for 5 safer islands	344 000
2. Implement coastal protection measure at selected safer island	2 711 000
Total	**3 055 000**

MALDIVES

NAPA PRIORITY PROJECT 3

ENHANCE ADAPTIVE CAPACITY TO MANAGE CLIMATE CHANGE RELATED RISKS TO FRESH WATER AVAILABILITY BY APPROPRIATE TECHNOLOGIES AND IMPROVED STORAGE FACILITIES

RATIONALE

Airports, especially the two international airports are amongst the most critical economic infrastructures of Maldives due their importance in the limited transportation network. The tourism industry is almost entirely dependent on the proper functioning of the international airports. Due to the major import dependency of food, the functioning of the airports is also extremely important for the food security of the country. At times of disasters it is also the main entry point for international aid, the main distribution points of emergency aid and perhaps the main evacuation point at times of a major disaster. Unfortunately, due their low elevation and proximity to coastline, the infrastructure of the five main airports are highly vulnerable to damage from severe weather related flooding and future climatic change. In the past, during natural disasters and severe weather events, airport operations have been interrupted due to extensive flooding of main infrastructures.

This project focuses on the protection of the Male' International Airport (MIA). The Maldives Airports Company (MAC) also identifies this as a priority but the lack of financial resources to undertake such a large scale protection of the infrastructure has been a barrier against implementation of the required coastal protection. The proposed project for the NAPA aims to facilitate the construction of appropriate coastal protection for the MIA and ensure that risks from climate change impacts are adequately addressed in the design of the coastal protection measures.

DESCRIPTION

Goal

Reduce vulnerability of the Male' International Airport (MIA) to current climate risks and future climate change risks.

Objective

Protect MIA from sea induced hazards and predicted climate change impacts.

Activities

1. Undertake detailed technical and engineering studies for the coastal protection of MIA, including cost-effectiveness of the proposed solutions;
2. Develop detailed engineering and design of coastal protection measures for MIA
3. Construction of demonstration coastal protection measures on part of the coastline of MIA

Short-term outputs

- Technical and feasibility studies developed for the coastal protection of MIA;
- Appropriate coastal protection measures identified for MIA;
- Detailed design developed for coastal protection of MIA;
- Climate change concerns addressed in the design and engineering for MIA coastal protection;
- Appropriate coastal protection demonstrated.

Potential long-term outputs

- Increased resilience of the main economic sectors, tourism and fisheries, to predicted climate change impacts;
- Increased resilience to food security and local food distribution;
- Increased capacity to adapt to disasters and predicted climate change impacts.

IMPLEMENTATION

Institutional arrangements

Lead agency
Maldives Airports Company

Project Partners
Ministry of Transport and Communication; Ministry of Construction and Public Infrastructure; Ministry of Environment, Energy and Water

Risks and Barriers

High capital investment cost

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 9,300,000

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Undertake detailed technical and engineering studies for the coastal protection of MIA, including cost-effectiveness of the proposed solutions	220 000
2. Develop detailed engineering and design of coastal protection measures for MIA	
3. Construction of demonstration coastal protection measures on part of the coastline of MIA	9 080 000
Total	**9 300 000**

MALDIVES

NAPA PRIORITY PROJECT 4

COASTAL PROTECTION OF MALE' INTERNATIONAL AIRPORT TO REDUCE THE RISK FROM SEA INDUCED FLOODING AND PREDICTED SEA LEVEL RISE

RATIONALE

Fresh water is one of most scarce resources in the Maldives. To the Maldivian community, the effect of climate change on water resources would mean changes to freshwater availability. The December 2004 tsunami had aggravated the limited freshwater availability of the islands. In addition to flooding causing salinization of the groundwater, a high percentage of rainwater storage tanks and/or catchment areas were damaged on the tsunami impacted islands. This event itself demonstrates the vulnerability of the water resources of Maldives to future impacts of climate change.
Increasing the capacity for rainwater harvesting and storage in the island communities has been identified as an important adaptation options by the NAPA process. This project is also intended to ensure that rainwater storage facilities are designed to be protected from impacts of flooding and high wave incidents. As seawater is an abundant resource in the Maldives, the use of desalination technologies to provide emergency freshwater has also been recognized as a needed adaptation measure. This project contains two components which looks into the above mentioned adaptation options. The location of the project will be an island selected for development as a Safer Island under the national development planning.

DESCRIPTION

Goal

To increase adaptive capacity to manage climate change related risks to fresh water availability

Objectives

1. Increase rainwater harvesting capacity and storage;
2. Acquire technology for emergency freshwater provision.

Activities

1. Establish rainwater harvesting and storage facilities on all public buildings;
2. Develop community awareness on safe rainwater harvesting and storage practices;
3. Establish emergency backup desalination system.

Short-term outputs

- Community rainwater collection and storage established;
- Information on safe rainwater collecting and storage practices developed and disseminated to community;
- Emergency water secured.

Potential long-term outputs

- Increased security of fresh water availability;
- Improved health and well-being of community due to access to safer drinking water;
- Increased resilience to water shortages in case of disaster, emergency and predicted impacts of climate change.

IMPLEMENTATION

Institutional arrangements

Lead agency
Ministry of Environment, Energy and Water

Project Partners

Ministry of Atolls Development; Ministry of Planning and National Development; Ministry of Construction and Public Infrastructure; Ministry of Housing and Urban Development; Atoll Offices; Island Offices; NGOs and community level organisations.

Risks and Barriers

Lack of human and financial resources.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 900,000

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Establish rainwater harvesting and storage facilities on public buildings	430 000
2. Develop community awareness on safe rainwater harvesting and storage practices	30 000
3. Establish emergency backup desalination system	440 000
Total	**900 000**

MALDIVES

NAPA PRIORITY PROJECT 5

ENHANCE ADAPTIVE CAPACITY TO MANAGE CLIMATE CHANGE RELATED RISKS TO FRESH WATER AVAILABILITY BY APPROPRIATE WASTEWATER TREATMENT TECHNOLOGIES

RATIONALE

The NAPA process has identified that the inappropriate treatment and disposal of wastewater in the Maldive islands is an important area that has to be addressed in terms of adaptation to climate change. This would address the identified adaptation strategies for water resource protection, promoting healthy lifestyles and islands and protection of the coral reef biodiversity in the Maldives. The Indian Ocean Tsunami of 2006 caused the destruction of the poorly constructed sewerage systems in the impacted islands of Maldives. This lead to contamination of the freshwater resources and caused subsequent health problems. This event demonstrates what similar impacts from climate change would cause. The access to safe drinking water, the provision of sanitation and the promotion of hygiene are the foundations of human dignity, public health and economic and social development and are among the priorities for Maldives outlined in the 7NDP.

The prevailing systems of sanitation in most of the islands depends onsite disposal systems using septic tanks and soak-pits. The government has started a programme to improve the sanitation situation of the islands. This project will look into demonstrating appropriate wastewater treatment technology and improving the design of existing systems and thereby complement the existing government programme by incorporating climate change related issues. This project will also help the Maldives achieve MDG targets to halve by 2015 the number of people without access to basic sanitation, and to halve by 2015 the proportion of people without sustainable access to safe drinking water. Although the project is targeted to reduce vulnerability to climate change and particularly extreme events, the project will lead to many cross-cutting benefits such as protection of water supplies, address land and marine-based sources of pollution, related downstream coastal area management, protection of coral reef biodiversity, sustainable management of fisheries, and tourism development. The project will be implemented in an island selected for development as a Safer Island under the national development planning.

DESCRIPTION

Goal

To increase resilience of water resources, human health and coral reef biodiversity to climate change related hazards by improving present wastewater treatment and disposal capacity.

Objective

1. Identify and demonstrate innovative, appropriate and cost-effective wastewater treatment and disposal systems;
2. Educate the community on appropriate wastewater treatment.

Activities

1. Design and construct appropriate wastewater treatment and disposal system;
2. Develop information material for public on best practices on wastewater treatment

Short-term outputs

- Demonstration of appropriate wastewater treatment and disposal
- Community educated on best practices for wastewater treatment

Potential long-term outputs

- Improved health and well-being of community
- Protection of ground water aquifer from contamination

- Assist in achieving national targets on access to safe sanitation

IMPLEMENTATION

Institutional arrangements

Lead agency
Ministry of Environment, Energy and Water

Project Partners
Ministry of Atolls Development; Ministry of Planning and National Development; Ministry of Construction and Public Infrastructure; Ministry of Housing and Urban Development; Atoll Offices; Island Offices; NGOs and community level organizations.

Risks and Barriers

- High initial capital investment;
- Lack of access to models and demonstrations of sewage and wastewater management technologies;
- Lack of appropriate policy, legislation, planning and administration.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 1,500,000

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Design and construct appropriate wastewater treatment and disposal system	1 300 000
2. Develop information material for public on best practices on wastewater treatment	200 000
Total	**1 500 000**

MALDIVES

NAPA PRIORITY PROJECT 6

INCREASE THE RESILIENCE OF LOCAL FOOD PRODUCTION THROUGH ENHANCING THE CAPACITY OF FARMERS, LOCAL COMMUNITIES TO ADDRESS FOOD SECURITY ISSUES CAUSED BY CLIMATE CHANGE AND CLIMATE VARIABILITY

RATIONALE

Climate change will impact agriculture and food production in the Maldives through sea level rise, salt intrusion into the ground water aquifer, salinization of soil and flooding caused by increased rainfall. In addition, the heavy import dependency of the Maldives for almost all of the food requirements makes the Maldives vulnerable to climate change impacts on the agriculture sector of other countries. The NAPA process has identified increased local food production as a key adaptation measure to tackle such food security issues posed by climate change.
Presently, in the Maldives, farming is done on subsistence to small and medium scale commercial level. Increasing local food production would require improving the sustainability and productivity of existing farming schemes through increased knowledge of innovative farming techniques, marketing approaches and particularly, strengthening of the links to consumer markets. This project is designed to increase the capacity of farmers and communities by enhancing knowledge, access to technologies and best practices. The most lucrative market for local farmers is the tourism industry and hence, this project focuses on analyzing the tourism market for local agriculture produce and trial commercial scale production based on the tourism market.

DESCRIPTION

Goal

To improve local food production for food security by introduction of sustainable commercial scale food production

Objectives

1. Strengthen the links between farmers and consumer markets to ensure sustainable local food production;
2. Improve local food production and at the same time reduce dependency on food import

Activities

Agriculture market analysis.

1. Undertake an analysis of the tourism market for major agricultural consumer preferences, including identification of options for development of local production

Identify future expansion options of local produce

2. Based on the tourism market analysis, trial an identified food produce(s) for commercial scale production
3. Educate farmers on commercial farming practices and on maintaining quality standards required for the tourism market.
4. Explore options for value-adding through further processing and branding of local produce
5. Develop information kits on commercial farming and value-adding practices for local farmers

Short-term outputs

- Agriculture market analysis report developed;
- Commercial scale farming introduced and trialled;
- Value-added to local produce;
- Community education materials developed and disseminated.

Potential long-term outputs

- Improved sustainability and productivity of existing farming schemes;
- Increased local adaptive capacity to tackle food security issues.

IMPLEMENTATION

Institutional arrangements

Lead agency
Ministry of Fisheries, Agriculture and Marine Resources.

Project Partners
Ministry of Atolls Development; Ministry of Tourism and Civil Aviation; Atoll Offices; Island Offices; NGOs and community level organisations

Risks and Barriers

Lack of human resources, technical expertise and financial resources.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 825,000

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Agriculture market analysis	10 000
2. Establishment of commercial scale farming	615 000
3. Educate farmers on commercial farming practices and on maintaining quality standards required for the tourism market.	50 000
4. Explore options for value-adding through further processing and branding of local produce	100 000
5. Develop information kits on commercial farming and value-adding practices for local farmers	50 000
Total	**825 000**

MALDIVES

NAPA PRIORITY PROJECT 7

IMPROVE THE HEALTH STATUS OF THE POPULATION BY THE PREVENTION AND MANAGEMENT OF VECTOR-BORNE DISEASES CAUSED BY CHANGES IN TEMPERATURE AND FLOODING DUE TO EXTREME RAINFALL

RATIONALE

Both the Maldives' First National Communication to the UNFCCC and the NAPA process in the Maldives has identified outbreaks of vector-borne diseases as a major impact of climate change and climate variability. Climate related diseases such as dengue and scrub typhus are major communicable diseases of public health concern in the Maldives. In December 2006 the country had its first outbreak of Chikungunya, another climate related vector-borne disease. The Maldives NAPA projects that the incidence of these vector-borne diseases in the Maldives will increase with the predicted climate change, particularly changes in temperature and rainfall regimes.
The control of vector-borne diseases is a priority of the government as outlined in the 7NDP. Vector control activities in the Maldives are currently confined to the health sector and mainly the non-systematic use of chemical interventions as the main form of vector control. As human stresses on the environment, such as poor solid waste disposal, poor sewage and wastewater disposal, increases vector breeding sites and hence, contribute to increasing the spread of vector-borne diseases, it would be more effective to use an integrated vector management (IVM) approach to control outbreaks of vector borne diseases. IVM is environmentally sound, intersectoral, selective, targeted, cost-effective and sustainable. IVM creates the opportunity to create synergies between various vector-borne disease control programs.

Presently, the Maldives lacks the technical guidance and expertise for planning and implementation of IVM. This project will help establishment a foundation for IVM in the Maldives and thus help to reduce the risks of vector-borne diseases in the country.

DESCRIPTION

Goal

To protect community health through improved management and surveillance of vector borne/climate sensitive diseases.

Objective

1. Undertake Integrated Vector Management (IVM) to control climate change related vector-borne diseases in target atolls;
2. Develop national capacity for IVM and disease surveillance;
3. Undertake community based behavior change programmes in target atolls to enable adaptation and reducing vector-borne disease impact of climate change.

Activities

1. Development of IVM plan
   - Undertake a Vector Control Needs Assessment Undertake epidemiological, entomological and ecological assessments;
   - Identify IVM objectives and targets;
   - Design interventions including selection of options, cost-effectiveness analysis and combination of methods.
2. Conduct training on IVM principles to health care personnel
   - Organise national workshop for health and agricultures to learn from IPM and Agricultural practices
3. Develop the capacity for early diagnosis and establish effective disease and vector surveillance system for planning and response
4. Educate community on elimination of vector breeding grounds and other vector control measures

Short-term outputs

- A national Vector Control;
- Needs Assessment developed;
- A national IVM plan developed;
- Mechanism developed for reporting and standard operating procedures on vector-bone diseases;
- Healthcare, agriculture and environment personnel trained in IVM;
- National capacity developed for implementation of IVM;
- Training materials developed on IVM principles;
- Community awareness materials developed.

Potential long-term outputs

- Technical capacity developed within Ministry of Health to implement IVM;
- Community empowered to undertake adaptation/protective measures to reduce health impact;
- Improved community health.

IMPLEMENTATION

Institutional arrangements

Lead agency
Department of Public Health/Ministry of Health

Project Partners
Ministry of Environment, Energy and Water; Ministry of Atolls Development; Male' Municipality; Atoll Offices; Island Offices; NGOs and community level organisations

Risks and Barriers

- Lack of human resources, technical expertise and limited financial resources;
- Limited staff time of various stakeholders will be a challenge unless there is strong ownership by public health, environment and agriculture sectors as well as the community;
- Possible pandemic influenza or natural emergencies are looming risks.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 350,000

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Development of IVM plan	85 000
2. Conduct training on IVM principles to health care personnel	75 000
3. Develop the capacity for early diagnosis and establish effective disease and vector surveillance system for planning and response	100 000
4. Educate community on elimination of vector breeding grounds and other vector control measures	90 000
Total	**350 000**

MALDIVES

NAPA PRIORITY PROJECT 8

IMPROVE RESILIENCE OF ISLAND COMMUNITIES TO CLIMATE CHANGE AND VARIABILITY THROUGH SUSTAINABLE BUILDING DESIGNS

RATIONALE

The low elevation and small size of Islands of the Maldives, makes the population highly vulnerable to the predicted rise in sea level and frequent and more intense extreme weather events. Over the last 6 years more than 90 inhabited islands have been flooded at least once and 37 islands have been flooded regularly or at least once a year. The average width of inhabited islands is 566m resulting in most settlements to be within close proximity from the coastline. There is little opportunity for communities to retreat inland. It has been found that 44% of the settlement footprints of all islands are within 100m of coastline which translates to 47% of all housing structures and 42% of the population being within 100m of coastline. Majority of the islands, have more than 50% of their housing structures within 100m of coastline.

There is currently low adaptive capacity due to insufficient knowledge, limited human resources in institutions and poor regulatory framework. The current building code does not take climate change associated impacts into account and the linkage is poorly understood due to inadequate information dissemination. This project proposes to review and improve existing building designs and methods to enable resilience to climate change impacts. This project would create an enabling environment for replication of similar projects. This project would also complement the tsunami reconstruction efforts of the Housing and Infrastructure Reconstruction Unit (HIRU) of the Ministry of Planning and National Development.

DESCRIPTION

Goal

Develop better and stronger buildings to increase resilience of island communities to climate change and variability.

Objectives

1. Develop and demonstrate climate change resilient building structures;
2. Develop building methodology to enable replication of more resilient building design.

Activities

1. Review existing designs and methods used for building design and compile methodology and guidelines for constructing more resilient buildings;
2. Construct demonstration structures on location identified by HIRU;
3. Based on experience of the demonstration project, translate and publish in local language and metric conversions, the building methodology and guidelines for replication purposes;
4. Develop and disseminate public awareness materials on development of more resilient building structures.

Short-term outputs

- Climate change concerns addressed in the design of building structures;
- Methodology for construction of climate change resilient buildings developed;
- Climate change resilient building structures implemented;
- Materials developed for replication of similar projects;
- Community awareness materials developed.

Potential long-term outputs

- Increased resilience of buildings to predicted rise in sea level and frequent and more intense extreme weather events;

- Improved protection of island communities.

IMPLEMENTATION

Institutional arrangements

The project will be implemented by the identified lead agency. The implementation of all the proposed NAPA projects will be overseen by the NAPA Steering Committee.

Lead agency

Ministry of Construction and Public Infrastructure

Project Partners

Ministry of Planning and National Development; Ministry of Housing and Urban Development; Ministry of Atolls Development; Ministry of Environment, Energy and Water; National Disaster Management Centre.

Risks and Barriers

Potential high costs of developing climate change resilient structures.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 1,970,000

An activities based budget for the project is given below.

Activity	Cost (USD)
Review existing designs and methods used for building design and compile methodology and guidelines for constructing more resilient buildings	50 000
Construct demonstration structures	1 865 000
Translate and publish the building methodology and guidelines for replication purposes	25 000
Develop and disseminate public awareness materials on development of more resilient building structures	30 000
Total	**1 970 000**

MALDIVES

NAPA PRIORITY PROJECT 9

INVESTIGATING ALTERNATIVE LIVE BAIT MANAGEMENT, CATCH, CULTURE AND HOLDING TECHNIQUES IN THE MALDIVES TO REDUCE VULNERABILITY OF THE TUNA FISHERY SECTOR TO THE PREDICTED CLIMATE CHANGE AND VARIABILITY

RATIONALE

RationaleThe ability of Maldives to manage its fisheries is crucial to sustain livelihoods and social and economic well being. The fishery catches almost 150,000t of tuna every year with fish exports valued at US$88 million. The fishing activity itself provides direct employment for about 16,000 people and thousands more in post-harvest activities. The fisheries contribution to annual GDP is more than 7 percent.

Live bait is a pre-requisite for the pole and line fishery in the Maldives. Without adequate and continuous supply of live bait pole-and-line fishery will not exist. Coral reefs are the habitats for live bait and they are highly vulnerable to changes in SST and other climate changes. This has significant implications for the availability of bait as shown by the 1998 coral bleaching event when abundance of long nose file fish (Oxymonocanthus longirostris) rapidly declined. With such direct vulnerability of live bait availability to changes in coral reef ecosystem evident, it is imperative that alternative ways and means of live bait is sought to adapt to climate change. One obvious means is mariculture. Captive culturing of live bait species is new and needs to be investigated in the Maldives. The possibility of catching live bait in the open outer atoll water will be another useful adaptation option. It will have the additional benefit of relieving exploitation pressure on coral reef for live bait. This will contribute to richer biological diversity and sustainable ecotourism development.

If successful, the activities proposed in this project have potential to limit or cease the bait fishing activities on the reef thereby promoting sustainable use of the coral reefs and making them more resilient to natural disturbances caused by climate change. The expected benefits in the immediate term would be better know how, and demonstration of alternative bait fishing methods and bait fish breeding options. Fishery research and development is a key priority policy in the seventh National Development Plan (NDP) and research on bait fish is a priority strategy of the seventh NDP. In addition to the national benefits, the proposed project would generate several global benefits and help fulfill important obligations of the Maldives under international conventions and agreements relating to sustainable use of living marine resources, and maintaining biodiversity.

DESCRIPTION

Goal

Better bait fishery management and exploration of alternative techniques of live bait catching, culture and storage to reduce the vulnerability of bait fish to predicted sea surface temperature changes and consequent habitat changes.

Objective

Enhance the knowledge on bait use and utilization, alternative live bait, catching methods and improved holding techniques.

Activities

1. Undertake a comprehensive analysis of bait fishing in the Maldives:
   - Review of bait biology, bait use and utilization,
   - Catalogue and map popular bait fishing grounds in each atoll;
2. Develop and implement a pilot on mariculture of alternative bait species;
3. Conduct bait fishing trails in various regions of the Maldives in different periods to investigate efficacy of attracting live bait using different methods;
4. Evaluate the cost effectiveness of alternative methods of bait catching;
5. Develop and disseminate information of findings to fishing communities.

Short-term outputs

- Targeted research study reports on bait biology, use and utilization;
- Bait resource use maps for each atoll;
- Practicality and applicability of mariculture for bait trialled;
- Information made available on different methods of attracting live bait;
- Economic and financial feasibility of alternatives to bait and different methods of bait catching established;
- Information material developed and disseminated.

Potential long-term outputs

Well informed decision making for sustainable development & management of bait fishery based on up-to-date scientific knowledge.

IMPLEMENTATION

Institutional arrangements

Lead agency
Marine Research Centre/ Ministry of Fisheries, Agriculture and Marine Resources

Project Partners
Ministry of Environment, Energy and Water; Ministry of Economic Development and Trade; Fishing communities.

Risks and Barriers

- Research and development investments are low in the Maldives;
- Few qualified scientists.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 1,027,000

An activities based budget for the project is given below.

Activity	**Cost (USD)**
Undertake a comprehensive analysis of bait fishing in the Maldives	10 000
Develop and implement a pilot on mariculture of alternative bait species	450 000
Conduct bait fishing trails in various regions of the Maldives in different periods to investigate efficacy of attracting live bait using different methods	487 000
Evaluate the cost effectiveness of alternative methods of bait catching	
Develop and disseminate information of findings to fishing communities	80 000
Total	**1 027 000**

MALDIVES

NAPA PRIORITY PROJECT 10

IMPROVE THE DESIGN AND CONSTRUCTION OF ACCESS INFRASTRUCTURE IN MALDIVES TO INCREASE THE RESILIENCE OF ACCESS INFRASTRUCTURE AND ISLAND BEACHES TO CLIMATE CHANGE

RATIONALE

The importance of sea transport in the socio-economic development of Maldives has meant that appropriate and functioning access infrastructure is a basic necessity in all inhabited islands. Unfortunately, such infrastructure is also highly vulnerable to severe weather events and predicted climate change risks. The unconsolidated nature of coral islands and low elevation means than the predicted sea level rise and increase in intensity and frequency of storm activity in the Indian Ocean could potentially expose access infrastructure to considerable risks. These climatic root causes and their potential magnitude of damage are exacerbated due to improper design and construction. High demand for access infrastructure combined with massive capital costs associated with construction, has inadvertently led the Government to adopt short-term solutions by constructing low cost harbours. Maldives being one of the least developed countries could not in the past afford the high costs of climate resilient structures. As a result, majority of the access infrastructure were poorly designed and constructed, and are not expected to withstand future climate change, let alone present severe climatic events. During the tsunami of 2004, 68% of all existing harbours were damaged, some beyond use. This project proposes to review existing studies and designs of access infrastructure and design infrastructure that is more resilient to climate change impacts.

DESCRIPTION

Goal

Improve the resilience of access infrastructure and island beaches to severe weather events and predicted climate change.

Objective

Develop and demonstrate climate change resilient, environment friendly and cost-effective engineering solutions for access infrastructure.

Activities

1. Review existing studies and designs of access infrastructure engineering, taking into consideration the current climate change scenarios;
2. Develop designs more resilient to climate change impacts and undertake a cost-effectiveness analysis of suitable designs;
3. Demonstrate and test the effectiveness of improved design by constructing a model harbour in a selected Safer Island.

Short-term outputs

- Climate change impacts incorporated in design of access infrastructure;
- More resilient and cost-effective access infrastructure designed;
- Climate change resilient access infrastructure implemented.

Potential long-term outputs

Cost effective climate change resilient and environment friendly access infrastructure designs developed and mechanisms to replicate new designs nationwide established.

IMPLEMENTATION

Institutional arrangements

Lead agency
Ministry of Construction and Public Infrastructure

Project Partners
Ministry of Planning and National Development; Ministry of Housing and Urban Development; Ministry of Atolls Development; Ministry of Environment, Energy and Water; National Disaster Management Centre.

Risks and Barriers

- Potential high costs of developing climate change resilient structures today;
- Long-term studies required to assess potential effective designs may be beyond the project timeframe.

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 3,800,000

Activities based budget is shown on left.

Activity	**Cost (USD)**
Review existing studies and designs of access infrastructure engineering, taking into consideration the current climate change scenarios.	100 000
Develop designs more resilient to climate change impacts and undertake a cost-effectiveness analysis of suitable designs.	100 000
Demonstrate and test the effectiveness of improved design by constructing a model harbour in a selected Safer Island.	3 600 000
Total	**3 800 000**

MALDIVES

NAPA PRIORITY PROJECT 11

INCREASE RESILIENCE OF CORAL REEFS TO REDUCE THE VULNERABILITY OF ISLANDS, COMMUNITIES AND REEF DEPENDANT ECONOMIC ACTIVITIES TO PREDICTED CLIMATE CHANGE

RATIONALE

Maldives is a nation with coral reefs as its geologic setting. The low elevation, small size and unconsolidated nature of coral islands makes the islands highly reliant on the biological and geomorphologic functioning of the reef environment for their stability. Much of the economic base such as tourism and fisheries, and livelihood of most Maldivians are directly linked to the coral reefs. The stability and survival of coral reefs has been questioned with the predicted climate change, particularly the risks associated with the Sea Surface Temperature (SST) rise and Sea level rise (SLR). Not only does the SST and SLR threaten physical survival of islands, but also could lead to the loss of major industries such as tourism and fisheries industry. The risks linked to climate change are further exacerbated due to non-climate related human activities such as sand and coral mining, snorkeller damage, anchor damage, inappropriate designs and methods used in coastal modifications, improper sewage disposal and overexploitation of reef fish.

There are a currently a number of hindrances to protect the reef from what now appears to be an obvious onset of climate change. The coral reef and coral island environment of Maldives is poorly understood and there are considerable gaps in scientific research. Research is required on coral reefs, coral islands and how they naturally adapt to climate change so that appropriate adaptation measure could be devised. The regulatory framework and management of human induced stress on coral reefs and islands are weak. Capacity to undertake coral reef protection and minimise human induce stress is limited. Finally there is an apparent lack of awareness amongst the public, community groups and even decision makers.

This project aims to overcome some of the gaps in scientific research, to pave way for climate risk adaptation programme for coral reefs. It is intended that the project will develop needed research capacity in coral reef management for the Maldives.

DESCRIPTION

Goal

Minimize human stress on coral reefs of Maldives to facilitate natural adaptation of reefs and islands in the face of predicted climate change.

Objective

Increase the knowledge base and understanding of the natural adaptation process in coral reefs.

Activities

1. Conduct research to understand how coral reefs and islands adapt to climate change and identify ways and measures required to enhance the natural adaptation process;
2. Conduct research on how human induced stresses such as reef fishery, tourism, land reclamation and other developmental activities affect growth and functioning of coral reefs to facilitate informed decision-making on coral reef management.

Short-term outputs

- Research report on how coral reefs and islands adapt to climate change and recommendations on measures to enhance the natural adaptation process;
- Research report on influence of human induced stresses on coral reef and recommendations on mitigating such stresses.

Potential long-term outputs

- Knowledge gap on coral reefs and coral island adaptation to climate change reduced.
- Increased national capacity for coral reef research and management.

IMPLEMENTATION

Institutional arrangements

Lead agency
Marine Research Centre/ Ministry of Fisheries Agriculture and Marine Resources

Project Partners
Ministry of Environment, Energy and Water; Ministry of Tourism and Civil Aviation; Ministry of Atolls Development; Ministry of Planning and National Development; Ministry of Construction and Public Infrastructure

Risks and Barriers

Lack of capacity in coral reef research and management

Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

FINANCIAL RESOURCES

The total project cost is USD 1,062,000

An activities based budget for the project is given below.

Activity	Cost (USD)
Conduct research to understand how coral reefs and islands adapt to climate change	354 000
Conduct research on how human induced stresses affect growth and functioning of coral reefs.	708 000
Total	**1 062 000**