

SOLOMON ISLANDS: NAPA PROJECT PROFILE

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SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 1

MANAGING THE IMPACTS OF, AND ENHANCING RESILIENCE TO,
CLIMATE CHANGE AND SEA-LEVEL RISE, ON AGRICULTURE AND
FOOD SECURITY, WATER SUPPLY AND SANITATION, HUMAN
SETTLEMENTS AND HUMAN HEALTH.

Goal

To increase the adaptive capacity and resilience of key vulnerable sectors

Rationale

The NAPA process has emphasized that adverse impacts of climate change in Solomon Islands will be felt in critical human systems affecting agriculture and food security, water supply and sanitation, human settlements and human health. These vulnerabilities are being exacerbated by lack of understanding, awareness and information regarding the adverse impacts of climate change and consequent sea-level rise. Most communities will be able to withstand and/or cope with negative effects of climate change and sea-level rise if they can better understand and are aware of the linkages between their experiential evidence of effects of climate change on the key sectors they depend on. Thus information will enable informed decision-making in respect of adaptation strategies, measures and actions.

Description

The adverse impacts on agriculture and food security are a major concern for many communities and/or villages. Evidence from changes in temperature and rainfall and the occurrence of tropical cyclones in Solomon Islands will have long-term effects on food production systems. These are likely to be exacerbated by the climate change and sea-level rise. Some of the impacts of concern are: increased intensity and frequency of tropical cyclones (e.g. Cyclone Namu destroyed rice industry in 1986); occurrence of pests and diseases; storm surges and flooding; sea-level rise and coastal erosion and inundation; increased temperatures; drought and ENSO-related changes to temperature and rainfall.

Water resources will also be affected immensely by climate change and sea-level rise. Adequate water supply is considered one of the key elements of food security and therefore directly linked to people's livelihood. Thus any change in rainfall will trigger changes in water supply. Water supply in Solomon Islands is sourced mainly from rivers and streams originating in high mountain and dense forest catchments on high islands, rainwater harvesting (especially on artificial islands) and from thin freshwater lens of

underground aquifers on small low-lying atolls and islands. These sources will be affected by climate change and sea-level rise on both high and low-lying islands. Information provided by communities and/or villages indicate that they are already experiencing contamination of their freshwater sources by rising sea levels (low-lying atolls), water shortages, saltwater intrusion and flooding of rivers and streams.

Closely associated with adequate water supply is the potential for declining quality of water related to unsanitary conditions. Communities and/or villages have often mentioned that sanitation is of great concern to settlements on low-lying coastal areas, islands and atolls. The human sewage, household and other debris is often washed up on public areas during flooding, storm surge, and coastal erosion associated with tropical storms. Wave storms and flooding also contaminates potable water and together with human sewage and debris pose a serious health risk to the communities and/or villages.

Droughts in Solomon Islands have caused serious shortages of water supplies. For example the 1997/1998 ENSO had caused reduction of water supplies by 30-40% in Honiara. Flooding also causes serious health risks. For example an increase in urban flooding undermines the water quality of town water supply and services as well as water infrastructure. Saltwater intrusion and sea-level rise has caused damage to water infrastructure and contaminated freshwater supplies.

Education, awareness and information on climate change impacts targeted to the needs and interests of the community are important tools to raise awareness of the impacts on water supply and on how to protect water supplies in the event of a climate extreme. Awareness raising and training will be focused at the central government level to help facilitate the inclusion of adaptation strategies to protect water in nation plans and budgets.

Awareness-raising with key stakeholders across the country is also needed such as for water services providers when discussing the rationale for any planned changes in the groundwater extraction rate for town water supplies. The Disaster Management Office continues to facilitate awareness programs through the local radio to promote education and awareness of various disasters to the general public and preparedness for such disasters should they occur.

This project is divided into five components focusing on the respective highly ranked priorities (agriculture and food security; water supply and sanitation; education, awareness and information; human settlements; and human health).

Component 1: Agriculture and Food Security

Objectives

The main objective of this component is to “increase the resilience of food production and enhance food security to the impacts of climate change and sea-level rise.”

This project will ensure that the future food security and food production is maintained in a sustainable manner. The project will facilitate the development and implementation of the following key priorities for food production and foods security in the country:

- a) National Food Security programme - The food security issue is common to all service providers in the agriculture sector.
- b) Provincial Food Banks - To mitigate and prepare against the effects of climate change such as cyclones, tsunamis, floods, and pest outbreaks, provincial food banks must be established at strategic sites.
- c) Crop diversification - The introduction of various crops to boost food production and economic development in the country must continue. This activity can be done by all players in agriculture development.
- d) Tolerant crop species – salt, drought, high rainfall, etc. - Crop varieties that are tolerant to extreme effects of climate change must be identified and rapidly propagated and distributed to hot spots.
- e) Rapid Response to disasters – exotic pests and diseases outbreaks, floods - An agriculture rapid response center must be established to prepare for any disasters such as pest and disease outbreaks.
- f) Weather forecasting- Predicting outbreaks of pest and diseases on crops -Developing capacity and capability to predict weather patterns such as weather simulations and pest and disease outbreaks would reduce crop loses.
- g) Weather stations establishment at agriculture production areas - The establishment of weather stations at agriculture field stations would ensure that data on rainfall, sunlight, and temperature are kept. This information is critical for crop production.
- h) National Urban Fruit Tree Planting - Planting fruit trees in urban centers such as Honiara, Auki, Gizo, Kirakira, Buala, Lata, Taro, Tulagi, and Tingoa. This will serve two purposes; as a source of fresh fruits and as beautification of the towns.

Outcome 1: Increased production of food crops in small islands' communities/villages

Outputs:

- 1.1 Arable land improved and rehabilitated
- 1.2 Coastal/flood protection systems constructed
- 1.3 Seawall/access roads and other protective systems upgraded and developed.

- 1.4 Organic composting encouraged and soil fertility maintenance improved
- 1.5 Diversification of food crops with a focus on improving access to foods promoted and used - e.g. introduction of salt-tolerant and high-yielding crop varieties
- 1.6 Food storage infrastructure and/or facilities constructed.
- 1.7 Food security program and extension services established
- 1.8 Important fruit trees are replanted and protected.
- 1.9 Capacity built for financial planning to manage family assets in times of food shortage

Outcome 2: Enhanced self-reliance and food security preparedness

Outputs:

- 2.1 Access to income generation and markets improved.
- 2.2 Small-scale income generation activities (e.g. retail and wholesale business) encouraged and promoted.
- 2.3 Diversification of crops.
- 2.4 Information on other business opportunities and income-generating activities disseminated.
- 2.5 Food banks established
- 2.6 Training of small-scale entrepreneurs provided and up-skilled

Outcome 3: Sustainable land management

Outputs:

- 3.1 Impacts of saltwater intrusion, droughts and floods, sea-level rise, salt spray, storminess managed and understood.
- 3.2 Soil fertility management improved.
- 3.3 Food crops, tree crops, livestock, cash and subsistence crops managed
- 3.4 Climate-resilient farming techniques and sustainable agriculture developed used.
- 3.5 Climate change adaptation and mitigation incorporated into development planning.
- 3.6 Sustainable agriculture promoted.

Outcome 4: Improved early warning system and improved agricultural information

Outputs:

- 4.1 Rapid response mechanism for responding to natural disasters developed.

- 4.2 Weather forecasting and information for farmers improved.
- 4.3 Weather stations in agricultural production areas established.
- 4.4 Training of adaptation experts in extension teams.
- 4.5 Implementation of pilot projects in local communities – rainwater harvesting, measures to reduce soil erosion, changes to design of reservoirs and irrigation channels to prevent risks from peak flows.
- 4.6 Dissemination of lessons learned at national and international levels

Outcome 5: Provision of effective climate information products and services to land and water resources managers.

- 5.1 Communication of climate information products and services strengthened
- 5.2 Farmers, land and water managers educated and trained on various decision-support tools.
- 5.3 The linkages between national meteorological and hydrological services and land and water managers strengthened.
- 5.4 Emergency toolkits for land and water resources management developed.
- 5.5 Agriculture, forest, and water managers trained to integrate climate change adaptation and mitigation.
- 5.6 National meteorological and hydrological services strengthened.
- 5.7 Public awareness and information on climate change impacts on food production heightened.

Component 2: Water Supply and Sanitation

The main objective is to increase the resilience of water resources management to impacts of climate change and sea-level rise.

The impact of sea-level rise will be strongly affected by human responses to the risks. The areas which are most vulnerable to sea-level rise are low-lying islands, atolls and flat deltaic regions at the mouth of larger rivers. Studies suggest that hundreds of small islands could permanently inundate and their cultural heritage lost in the event of a one meter sea-level rise. Intrusion of salt water from rise in sea level affect groundwater resources, especially small atolls and low-lying islands which rely on rainfall or groundwater for water supplies.

Incorporation of climate change considerations into the planning and design of infrastructures both urban and rural would assist in the mitigation against hazards and adaptation to climate change. Integrating climate change as formal considerations in the planning, design, construction, operation and management of water resources projects should be a government policy in order to mitigate and adapt to impact of climate change.

The overall objective of the water resources programme is to apply hydrology to meet the needs for sustainable development and use of water and related resources; to the mitigation of water-related disasters; and, to effective environmental management in the country. The government recognises that safe drinking water and proper sanitation facilities are basic necessities to better health. Basic water resources assessment program should support activities related to the impacts of climate change and variability and climate related extremes in Solomon Islands. These programs include:

- a) Promoting activities in operational hydrology to further hydrological services in Solomon Islands through the collection, processing, storage, retrieval and publication of hydrological data, including data on the quantity and quality of both surface water and groundwater; the provision of such data and related information for use in planning and operating water resources projects to meet the needs for sustainable development and use of water and related resources to benefit rural communities; to the mitigation of water and climate change related disasters; the provision of appropriate water and related information to SIWA to improve its service delivery and to provide for effective water resources and environmental management in Solomon Islands.
- b) Program on capacity building in hydrology and water resources should provide a framework by which national hydrological services can seek advice and assistance and provide support to efforts to build capacities to serve the country including the education and training of staff, increasing public awareness of the importance of hydrological work, impacts of climate change and support to technical cooperation activities.

Outcome 1: Integrate water conservation and sustainable water resources management in all sectors and communities.

Outputs:

- 1.1. Construction of village/community water tanks
- 1.2. Construction of water reservoirs for institutional and residential areas.
- 1.3. Upgrading of existing reservoirs, protective structures/access roads.
- 1.4. Promote/build household rainwater harvesting.
- 1.5. Construction of strategic storage water reserve tanks.
- 1.6. Construct engineered or “climate proofed” water reservoirs.
- 1.7. Develop and implement Water Use efficiency Plan.
- 1.8. Raise awareness for water conservation.

Outcome 2: Incorporate climate change adaptation strategies into the guidelines and criteria for design and construction of appropriate water infrastructure in vulnerable areas.

Outputs:

- 2.1 Guidelines for development of water supply in rural areas developed.
- 2.2 Inventory of persistent organic pollutants (POPs) and adequate storage and leakage prevention conducted.
- 2.3 Good practice guidance for pesticide storage and use, and application developed and used.
- 2.4 Drought and its effect on water distribution in rural areas assessed.
- 2.5 Use rainwater harvesting technologies developed and used.

Outcome 3: Increased reliability and quality of water supply to all sectors and communities

Outputs:

- 3.1 Capacity of water supply increased
- 3.2 Water reticulation and distribution systems improved and where necessary constructed
- 3.3 Arable land improved and rehabilitated
- 3.4 Sustainable use of water on commercial agriculture adopted
- 3.5 Build appropriate low-technology irrigation system for farmers.
- 3.6 Diversification food crops with a focus on high-yielding crop varieties promoted.
- 3.7 Promote water conservation and water use efficiency
- 3.8 Prevent land-based pollution.

Outcome 4: Enhanced institutional and legal framework for water resources management

Outputs:

- 4.1 Individual and institutional capacity for sustainable water management built and/or enhanced.
- 4.2 Water resources sector policy developed and implemented.
- 4.3 Water resources sector legislation developed and adopted.
- 4.4 Water sector plans and programmes developed and implemented

Component 3: Human Settlement

The main objective of this component is to improve the capacity for managing impacts of climate change and sea-level rise.

Vulnerability of a community is often related to its geographic location, environment in which it is situated and availability of resources it depends on. In Solomon Islands some communities/villages are located in highly sensitive and hostile environments and resource-poor areas. The artificially-built islands of Ngongosila, Kwai, Langalanga and Lau live on the sea for many generations. The islands of Ontong Java, Sikaiana, and Reef Islands also live on low-lying atolls and are subject to the vagaries of climate change and sea-level rise. While these communities and islands have survived and adapted well to the conditions over many generations, climate change and sea-level rise have now become the most imminent threat to their survival.

Additionally, there are also communities and/or villages that have been created as a result of the British Colonial Policy in the then British Solomon Islands Protectorate which are now faced with dealing with the adverse impacts of climate change and sea-level rise. Many of these communities and/or villages are located in highly vulnerable areas.

Both groups of people (islands people and migrants) have often moved partially as a consequence of disasters as well as opportunities for employment. Such communities often have very limited resources (natural capital) and adaptation options. One of the key potential adaptation options for many of these communities and/or villages is to relocate. The question of relocation has serious political, economic and socio-cultural implications.

Given the above, the focus of this component is to enhance the capacity of such islands and communities to plan for adaptation.

Outcome 1: Completed community vulnerability and adaptation assessments.

Outputs:

- 1.1 Consultations and assessments with the communities conducted.
- 1.2 Adaptation plans for communities prepared.
- 1.3 Awareness on climate change impacts promoted and information disseminated.
- 1.4 Key vulnerabilities and adaptation options, strategies and measures identified

Outcome 2: Improved community adaptation planning

Outputs:

- 2.1 Relevant authorities are consulted
- 2.2 Relevant resources owners are consulted
- 2.3 Plan for adaptation actions adopted
- 2.4 Key community adaptations implemented

Component 4: Human Health

The main objective of this component is to increase the capacity of health professionals to address adverse impacts of climate change on human health.

In the Solomon Islands the climate change and climate variability including extremes cause adverse impacts such as floods, storm surge and tropical cyclones. Information of late has shown that climate change and variability increases the potential for increase in tuberculosis and leprosy through mobility of the population, concentration of the people in an area and poor living conditions. These conditions are exacerbated by shortage of potable water (especially on low lying islands), and poor sanitation. Water resources are often affected by storm surge and wave-overtopping while sea-level rise affects sanitation.

Another area of concern is that during high rainfalls and very high tides water and sea would flood the villages, bringing in faeces from traditional toilets (from the surrounding areas) into the villages. Helminthes and other parasites brought in through this mechanism are easily passed on to children and adults.

Rainfall is becoming more frequent causing floods and high water log in flat areas. Root crops and vegetables could not grow in such conditions. Eighty percent of this country lives in rural areas and such disaster could cripple the country with regards to health. High and intense rainfall causes respiratory infections, high parasite infections such as diarrhea.

Malaria is transmitted by mosquito and mosquito's life cycle depends on breeding sites and humidity, both which are climate dependent. A lot of rain results in a lot of breeding sites. A lot of breeding sites means an increase in mosquito population and an increase mosquito population results in high malaria transmission. A lot of rain induces high humidity. Humidity is necessary for the survival of mosquitoes and the development of malaria parasite in them. These factors increase the efficiency of transmission of malaria.

There is no program specifically developed to address the impact of climate change. However the present programs contain activities that address health problems that are increasing due to climate change. Climate change causes frequent rainfall and flooding. This has resulted in the destruction of root crops and vegetables creating problems of lack of or shortage of proper food and increase in malnutrition and other non-communicable diseases.

The Ministry of Health and Medical Services (MHMS) does not have any response strategy addressing climate change issues as yet. Thus the impact of climate change and variability on health is not an issue of concern. However,

the MHMS intends to establish a country-wide programme on climate change and health under this programme which will include: advocacy; social mobilization; and community and behavioral change. The programme will facilitate climate change and health awareness-raising dissemination of results of research and training, increase the supply of bed-nets in affected areas, relocate health facilities from disaster-prone areas (e.g. from low to high ground), increase the supply of vitamins to populations affected by floods and storm surge, improve surveillance and monitoring of climate-related diseases and improve emergency services and improve climate change capacity-building and training to health professionals.

Outcome 1: Improved understanding of the relationship between diseases and climate change and variability.

Outputs:

- 1.1 Manual/guidelines on incidence of malaria and climate change and variability developed and used.
- 1.2 Community-based health and climate change awareness programme developed and implemented.
- 1.3 Targeted groups (women and youth) trained on health impacts, disease prevention, contamination of water supply prevention and managing sanitation during and after climate-related disasters.
- 1.4 Solomon Islands Medical Training Institute strengthened to conduct education, awareness-raising and information dissemination on impacts of climate change on human health.

Outcome 2: Strengthened capacity and capability of MHMS to address impacts of climate change on human health

Outputs:

- 2.1 Disease outbreaks predicted and efficiently managed.
- 2.2 Disease prevalence reduced
- 2.3 Climate change impacts on health mainstreamed into health planning
- 2.4 Information and data for early warning developed and implemented

Budget

It is expected that a total of USD 6,500,000 will be sought from the least developed countries fund (LDCF) through the GEF. Co-financing of this project will be sourced from the other development partners, national government and other bilateral agencies working in the health sector in the Solomon Islands.

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 2

CLIMATE CHANGE ADAPTATION ON LOW-LYING AND ARTIFICIALLY BUILT-UP ISLANDS IN MALAITA AND TEMOTU

Goal

The main goal is to facilitate adequate adaptation to climate change and sea-level rise

Rationale

While most communities are making every effort to deal with and cope with the changes resulting from climate change, variability and extreme events, there are some communities who have very limited opportunities for adaptation to climate change. These areas include Langalanga, Kwai, Ngongosila and Lau where most of the settlements are built on water. Others include the low-lying atoll islands of Ontong Java, Sikaiana, and Reef Islands. The settlements built on water depend almost entirely on rainwater and the supply of materials and resources such as mangrove for timber and firewood and sago palms for construction are in decline. In other low-lying atolls the vagaries of climate change and sea-level rise are putting additional pressure on limited resources.

The adverse impacts of climate change, climate variability and extreme events are manifested in the various changes that people experience and some adaptation effort is already being undertaken as a matter of course (outlined above). However many communities and/or villages have indicated that in order for them to better understand the adverse impacts of climate change and be able to make informed decisions about adaptation it is vitally important the climate change education, awareness-raising and information dissemination becomes part of long-term adaptation effort in the Solomon Islands.

Most communities and/or villages depend on subsistence activities for their livelihood. However increasing demand for material goods and services in a modern growing economy makes cash income opportunities necessary. Thus any adaptation measure, option and strategy will necessarily include income-generating opportunities and the infrastructure to support such effort. For example, Solomon Islanders depend entirely on road and sea transport to move their produce to market. If heavy and intense rains and sea storminess continues as often as it is being experienced now the ability of people to move their produce to market is seriously compromised.

Description

The NAPA process has identified the low-lying and artificially built-up islands as being the most vulnerable to climate change and sea-level rise. As indicated in Project Profile 1, Component 3, many of these communities and/or villages live on or at the edge of the sea and are often subject to impacts of storms, storm surge, sea-level rise, drought, saltwater intrusion, and flooding. For most of these communities relocation is a potential adaptation measure. However, relocation is problematic when they do not own land resources on nearby islands thus land tenure and land management systems prohibit any discussion let alone relocate to nearby islands. For example, Langalanga people cannot move to nearby island where they do not own land and its resources.

Relocation of communities and/or villages will necessarily become the responsibility of the governments at all levels (i.e. community/local, provincial and national).

Objective: To develop and implement plans to relocate as an adaptation measure.

Outcome 1: Develop and implement plans for relocation of communities

Outputs:

- 1.1 Capacity-building for adaptation planning conducted.
- 1.2 Vulnerable communities and government authorities consulted.
- 1.3 Land and resources owners consulted.
- 1.4 Plans for new settlements prepared and approved.
- 1.5 Communities and/or villages relocated.
- 1.6 Dialogue between the migrants and land and resource owners strengthened.

Implementation – see Chapter VII.

Sustainability of the programme

Distribution of lands currently do not account for the impacts of climate change and sea level rise. However, from the analysis of human settlements, relocation of communities will become one of the few practical options (if not the only one) for adaptation to climate change by communities and/or villages residing on houses built over the sea and low-lying atolls. There is currently no legislation or a legal framework which would allow climate change-affected communities to relocate. Thus relocation will require specific legislation and a legal framework to guide the process at every level of government.

The biggest risk is that land owners and resources owners may not agree to the terms and conditions of relocation and also may claim compensation to the amounts that could be prohibitive for the government. It is therefore imperative to engage the relocating people and the resource owners at the very early stage of planning. Such engagement and continuous dialogue will ensure the long term sustainability of this programme.

Budget

It is expected that an amount of USD 3,500,000 million will be requested from the LDCF to fund this programme. Co-financing will be sought from other development partners and the government budgetary support.

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 3

WASTE MANAGEMENT

Goal

Main goal of this project is to better manage impacts of climate change on waste management

Rationale

Droughts resulting from climate change, unlike floods have had little appreciable impact on waste management. Whilst effects of flooding including climate induced events are significant to waste management. With slack management practices as is current throughout much of the country; events of heavy rainfall can result in drastic negative waste repositioning impacts, such as waste from upstream can reach newer downstream locations that may subsequently contribute to causing coastal pollution.

Climate change induced fires including bush fires is a living threat particularly with prolonged drought periods. And the aftermath of such events can be drastically wasteful and can contribute to accumulation of large quantities of waste of disaster proportions.

As an island nation impacts of sea level rise including storm surges is an ever present threat. Concerns with storm surges extend beyond causing waste management issues, to property damage and even threats to peoples lives. In coastal towns and environments with uncoordinated waste disposal practices, storm surges would contribute directly to redepositing of coastal waste to coastal strips which are public access areas.

Tropical cyclones are increasingly becoming a common occurrence and its destructive effects contribute a great deal to accumulation of debris and waste. Minimum standards in disaster response, particularly for the relief phase of disasters normally address urgent needs of waste management. The follow on rehabilitation for waste management is the responsibility of the Government. Provisions under the currently developed waste management regulations would provide for national coordination with other relevant departments and organizations.

Whilst dealing effects of climate change is not an easy task. Appropriate education and awareness is the alternate and practical option to pursue. Naturally, time and patience are basic necessities required from the outset to convince minds and hearts of people to make easy the task of education. Any such awareness programme must call for expert input to tailor made a well

designed waste management educational programme that can be easily communicated for ease of digestion by the majority of Solomon Islanders. That too would necessitate serious consideration of dissemination tactics and methodologies that have been proven to work in our local environment.

Objective: To develop a national integrated sustainable Waste Management Plan and Strategy for incorporating impacts of climate change.

Outcome 1: To develop a database on impacts of climate change on waste management.

Outputs:

- 1.1 Data and information on impacts of climate change on waste management developed and used.
- 1.2 Climate-friendly and appropriate technologies for waste management identified and used.
- 1.3 Guidelines for waste management in climate-sensitive and highly vulnerable areas developed and implemented
- 1.4 Promote awareness and information exchange on waste management and impacts of climate change

Outcome 2: Encourage incorporation of impacts of climate on waste management into educational curricula.

Outputs:

- 2.1 Curriculum on impacts of climate on waste management is developed and implemented
- 2.2 Understanding of impacts of climate change on waste management is enhanced.
- 2.3 Climate change issues are incorporated into waste management regulations.
- 2.4 Infrastructure for waste disposal systems climate-proofed.

Implementation - See Chapter VII

Sustainability of the programme

Waste management is currently implemented under various legislations and by-laws. The absence of an institutional framework for managing waste means that waste is managed on a piece-meal basis. The growth of provincial and national towns have increased the production of waste. Some issue of

concern for sustainability include very old and rundown liquid waste networks, land tenure issues preventing new areas being developed for waste disposal and expansion of sewer networks. Unplanned urban development is also putting pressure on old sewer networks and the reliance on septic tanks particularly in exposed areas are prone to adverse impacts of climate change and sea level rise.

Budget

The cost of this project is estimated at USD1,500,000 which will be sought from the LDCF and other multilateral and bilateral development partners. Co-financing of this project will be sourced from government's recurrent expenditure, bilateral aid donors and others.

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 4 COASTAL PROTECTION

Goal

The main goal of this project is to increase the resilience and enhance adaptive capacity of coastal communities, socio-economic activities and infrastructure

Rationale

A major find of the first national communication is that coastal environments and systems are at risk from sea level rise and warmer sea temperatures. Areas most vulnerable to flooding and inundation as a result of sea level rise, with the combined effects of seasonal storms, high tides and storm surges associated with tropical cyclones, are the populated coastal lowlands and low-lying islands and atolls. Coastal erosion is already evident in many parts of the country.

Additionally, coral bleaching has occurred during El Nino events. Corals are highly sensitive temperature changes therefore a slight increase in water temperature causes bleaching.

Mangroves and Reefs ecosystems are breeding grounds for commercially important species of fish and shellfish located on shallow coastal waters. Mangroves in particular are an important breeding grounds and habitats for crabs prawns and important food species. Therefore change in water temperature or sea level rise threatens such breeding grounds, and other coastal habitats.

Changes in weather and ocean temperature can affect fish behavior and migration patterns. The NCSA stock take report highlighted that Solomon Islands Tuna industry could be affected with changes to ocean temperature. El-Nino could affect fishing industry terms of quantities and species composition. This could lead to a decline in fisheries productivity and earning in exports

Huge populations of Solomon Islands reside along low lying coastal areas and therefore heavily rely on marine and fisheries resources. Climatic factors such as sea level rise rainfall, strong winds, storm frequency, salinity, unusual tides, salinity and groundwater level could affect the productivity of marine and fisheries resources.

Coral reefs and Mangroves acts as buffer barriers zones protecting coastal communities and low lying areas from storms, tides, cyclones and storm surges and have important social and cultural importance.

There is a need for proper assessment has been done on the impacts of climate change on the coastal environments in the Solomon Islands. However increased erosion rate has been experienced from climatic conditions associated with human induced factors.

Description

The implementation of integrated coastal zone management (ICZM) will entail the implementation of sustainable projects that will create coastal sanctuaries and ecological parks that will act as buffers to extreme climate-related events, protect the environment and promote sustainable coastal development. Adaptation interventions will include (soft) non-structural and structural (hard) options that compliment each other. The listed activities below indicate community efforts to improve communities' resilience to natural hazards and for conservation and protection from further degradation.

Activities could include improving and rehabilitating coastal land, construction of coastal/flood protection systems, gravelling and upgrading/construction of seawall/access roads and regeneration and restoration of mangrove areas.

Objective 1: Integrate climate change adaptation (climate proofing) into construction of a roads and other infrastructure.

Outcome 1: Construction and climate-proofing of engineered coastal roads, bridges and other key infrastructure.

Outputs:

- 1.1 Construction of coastal/flood protection systems
- 1.2 Gravelling and upgrading of seawall/access roads
- 1.3 Construction of culverts, drainage, and outlets

Outcome 2: Integrated coastal zone management

Outputs:

- 2.1 Replanting of foreshore vegetation
- 2.2 Protection of lagoon and fringing reefs coral reefs
- 2.3 Establish set-back zones

- 2.4 Construct seawalls or other protective measures in built-up areas or critical socio-economic infrastructure and activities
- 2.5 Prevent land-based pollution
- 2.6 Institute and administer appropriate/relevant traditional resource management systems
- 2.7 Promote education, awareness and information on impacts of climate change on coral reefs and other sensitive marine ecosystems.
- 2.8 Protect and where relevant rehabilitate coral reefs and mangroves in build-up coastal areas.
- 2.9 Promote coastal zone management (ICZM) and integrate climate change adaptation into sustainable coastal development.
- 2.10 Produce country-driven guidelines/manuals for managing coastal and marine resources.
- 2.11 Promote and enhance income-generating opportunities in coastal communities
- 2.12 Establish monitoring and evaluation of coastal zone management
- 2.13 Protection of forests and littoral vegetation

Outcome 3: Enhanced self-reliance and food security preparedness

Outputs:

- 3.1 Improve access to income generation and markets
- 3.2 Encourage small-scale income generation activities (e.g. retail and wholesale business)
- 3.3 Provide information on other business opportunities and income-generating activities
- 3.4 Provide training/support to and up-skill small-scale entrepreneurs

Implementation – See Chapter VII.

Sustainability of the programme

The CNURA policy document has been very clear on its intent in the issues addressing environment issues and climate change. Ministry of Environment, Conservation and Meteorology, established by CNURA government is committed to *ensure the sustainable utilization and conservation of the natural resources and environment* and successful adaptation to climate change. MECM will work in partnership with other line ministries, provincial governments, non-government organisations and communities in ensuring that coastal management will be sustainable over the long term.

Budget

The total cost of this project is estimated at US\$1,750,000 which will be sought from the least developed countries fund through the GEF. Co-financing of the project will be provided by the national government, bilateral development

partners and other multilateral agencies working on coastal issues, problems and areas.

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 5 FISHERIES AND MARINE RESOURCES

Goal

To improve the understanding of the effects of climate change and climate variability including El Nino-Southern Oscillation on the inshore and tuna fishery resources

Rationale

The Solomon Islands has a rich and varied marine sector that is vitally important to the Solomon Islands people as a major food source, and to the economy for its export earnings. Marine resources also offer the potential for further commercial development, in ways that can be sustainably managed. The result would be a reliable and strong economic base for the nation well into the future. The ability to manage sustainably and the size of the resource makes the marine sector one of the most valuable long-term assets in the Solomon Islands.

Description

The health of the marine ecosystems is a major concern because of the potential impact on the health of the people, the availability of food, and the importance of the marine environment in attracting tourists to the Solomon Islands. Monitoring programs need to be put in place in sensitive areas so that the agencies and the local people can measure the changes that are taking place, and act before there is a degraded fishery. The formulation and adoption of lagoon management plans will be one component of a total solution. However ownership of the solution by the community, and the integration of the efforts of all the relevant agencies is seen as essential to being able to write comprehensive and relevant management plans, and ensuring that they are put into practice.

Objective 1: To improve the capacity to protect inshore fisheries and marine resources.

Outcome 1: Promote education, awareness and information on the impacts of climate change on fisheries and marine resources.

Outputs:

- 1.1 Stock assessment of near-shore fisheries and marine resources conducted.

- 1.2 Locally-driven indicators for monitoring of the coastal resources developed.
- 1.3 A guidebook on effects of climate change and variability on inshore marine resources prepared and disseminated.

Outcome 2: Protect and monitor coral reef bleaching.

Outputs:

- 2.1 Sensitive marine habitats protected.
- 2.2 Damaged reef areas rehabilitated.
- 2.3 Locally-driven monitoring system for inshore fisheries and marine resources developed.
- 2.4 Sustainable fishing techniques promoted.

Outcome 3: Establish coastal buffer zones and rehabilitate mangrove forests.

Outputs:

Mangrove replanting encouraged and promoted.

- 3.2 Guidelines for mangrove replanting developed and disseminated.
- 3.3 Set-back zones established.
- 3.4 Monitoring system for mangrove encroachment established.

Implementation: See Chapter VII.

Sustainability of the programme

Exploitation of fisheries and marine resources provides a sustainable livelihood for many communities and/or villages on all islands. However, this livelihood will be seriously affected by climate change and sea-level rise while demand for fish for food will continue to increase putting additional pressure on the resources. The Ministry of Fisheries and Marine Resources will need to conduct public awareness campaigns on the effects of climate change and variability on inshore and tuna fisheries.

Budget

It is expected that an amount of USD1,500, 000 will be sought from the LDCF to support this project. Co-financing will come from the governments budgetary allocation for MFMR, bilateral donors in the fisheries sector and other multilateral sources.

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 6 INFRASTRUCTURE DEVELOPMENT

Goal

To improve the resilience of key infrastructure to climate change and sea-level rise.

Rationale

Solomon Islands will struggle to cope with already highly variable climate, costing millions of dollars. Climate variability and change will exacerbate pressure on sensitive environmental and human systems including key infrastructure. Many of its roads, bridges, airports and wharves are built in or near disaster prone areas. Thus the protection and resilience of these infrastructures will be important for achieving sustainable development in the long term.

Description

Coastal zones in the Solomon Islands are often subject to adverse impacts of climate change and variability including extreme events such as tropical cyclones. Adverse impacts result from land loss due to inundation, coastal erosion, saltwater intrusion as a result of wave-overtopping and sea water flooding of both infrastructure and socio-economic activities. In most islands, coastal zones provide a lifeline infrastructure including harbours to much of their economies. Some of the provincial airports are located at or near the coastline.

Climate proofing the infrastructure will pave the way for a least cost design and implementation procedure integrated or mainstreamed into existing planning, design and implementation processes that take into account increased risk from climate change. The consequences of inaction or not taking into account climate change risks in an already vulnerable situation will result in high overall costs, including any rehabilitation costs which are likely to occur during the lifetime of the airport. This would enhance the livelihoods, improve adaptive capacity and foster sustainable development in the long term. The activities may include engineered design criteria that would allow for a 60-year storm event with particular wave heights for seawalls, hardstand/surface, retaining walls as well as a breakwater for dissipation of wave energy.

Other adaptation activities will include construction of coastal/flood protection/defence systems, gravelling and upgrading of seawall/access

roads, strengthening of surface area and climate proofing drainage and other protective infrastructure.

Objective: Integration of climate change risk proofing into infrastructure design and development.

Outcome 1: Improved operational safety and efficiency of airport and airport facilities.

Outputs:

- 1.1 Climate proof design criteria for airport development with a 60-year recurrence interval developed and used.
- 1.2 Coastal/flood protection systems constructed.

Outcome 2: Constructing of an engineered protective structures in the harbour and coastal areas.

- 2.1 Detailed survey of the island coastal system to identify built up areas surveyed.
- 2.2 Protective seawalls, revetments, culverts, bulkheads, jetties and floodgates constructed.
- 2.3 Drainage system for the protection of airport built.

Outcome 3: Climate proof key infrastructure.

Outputs:

- 3.1 Foreshore vegetation replanted.
- 3.2 Seawalls or other protective measures in built-up areas or critical socio-economic infrastructure and activities constructed.
- 3.3 Land-based pollution prevented
- 3.4 By-laws and/or regulations governing siting of infrastructure developed and implemented.
- 3.5 Climate change and sea-level rise impacts integrated into environmental impact assessments.
- 3.6 60-year return interval in all infrastructure design and implementation adopted and implemented.

Implementation: See Chapter VII.

Sustainability of the programme

Development of infrastructure remains a key concern of the government. However, there are some risks such as sufficient political stability, continuous

donor support, sound financial management, capacity and capabilities of the responsible agency and/or ministry and problems of high staff turnover. While the latter pose some risks to the sustainability of the programme, climate change will in no doubt have adverse impacts on key infrastructure. This will necessarily mean that livelihood and the economic activities will be compromised. The negative impacts of climate change and sea-level rise seem greater than those posed by the risks involved and therefore building resilience should not be delayed. Thus incorporation of climate change and sea-level rise in the design and construction should be the norm.

Budget

The total amount of funds to be requested from the LDCF is approximately USD2 million. Co-financing will be provided by other bilateral development partners and the national government.

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 7

TOURISM

Goal

To integrate climate change adaptation strategies and measures into sustainable tourism planning and development.

Rationale

The heart of tourism attractions in Solomon Islands is a combination of its culture, natural resources and a wide variety of ecosystems. Key ecosystems offering certain sporting facilities and beach holiday facilities will be directly threatened by climate change and sea level rise. Ecosystem degradation in individual destinations will negatively impact on tourism in that destination. Thus the future success of tourism depends on the quality of the environment, and the development of land use practices/policies that preserve and enhance the biophysical resources on which its sits.

Description

The environment and climate itself are part of the tourist attraction in Solomon Islands. In Solomon Islands most of the tourism infrastructure including resorts, roads and airports are concentrated on the coast. The tourism industry in Solomon Islands was drastically impacted upon by the ethnic tensions of 1998-2003 and continues to hinder development due to persistent problems with the country's image as a safe destination.

The tourism industry is seen to have failed to fully exploit the country's cultural, natural and historical assets and attractions. The government is aware that while tourism is not the only contributor to economic development in the country it is an important component.

Key hindrances to tourism development are land issues. 85% of the land in Solomon Islands is customarily owned where family group owners and boundaries are not formally recorded and are therefore open to disputes and at times conflict. There is an ineffective system to resolve these issues leading to uncertainty and can be a deterrent to potential investors and local entrepreneurs. In addition without formal title it can be difficult to obtain finance.

A review and update of the Tourism Development Plan supports previous findings that, as a tourism destination, Solomon Islands cannot sustain tourism development that is on a large scale or is mass tourism. It does not have the capacity to absorb the infrastructure institutions and impacts such development would require and result in. The future of tourism development is in diverse, small to medium scale developments targeted at niche markets.

There is a pressing need for a new policy that should emphasize sustainable tourism planning and development with a focus across the provinces. The current Government Policy Implementation Framework 2008-2009 for the Ministry of Culture and Tourism focuses on tourism development that is sensitive to the diverse cultures and environments of the country and brings local benefits through job creation and poverty reduction. According to the Ministry's Corporate Plan its priorities include Tourism Policy Reform and Planning.

Coastal developments such as the construction of roads, hotels and residential areas are potential threats to coral reefs through increases in sediment run-off, and sand and coral rubble extraction for building. Hotels and resorts on the shores usually have wharves and protective piers, which involve dredging the adjacent reef for rocks and creating boat channels. Once resorts are established, most resort owners seek to protect the surrounding reef life to enhance scuba diving. Most tourist operations have positive impacts on coral reefs, especially those involved in scuba diving, and some operators have taken measures to protect nearby reefs. They are also valuable sources of information about the state of coral reefs. Careless or inexperienced divers can contribute to coral reef damage by breaking corals, taking target species through spear fishing and purchasing large quantities of shells.

Objective: To build capacity in managing impacts of climate change on tourism.

Outcome 1: Integration of emergency planning tourism industry.

Outputs:

- 1.1 Consultations with relevant stakeholders conducted.
- 1.2 Tourism database established.
- 1.3 Training on emergency planning developed and implemented.
- 1.4 Emergency Plan developed and implemented.
- 1.5 Monitoring and review of emergency plan developed and implemented.

Outcome 2: First aid training of tourism operators conducted.

Outputs:

- 2.1 First Aid training kit developed.
- 2.2 Occupational Health & Safety procedures established.
- 2.3 Safety and emergency drills conducted.
- 2.4 Safety Manuals developed.
- 2.5 Group of resourceful persons organised.
- 2.6 Key persons in communities identified.
- 2.7 Traditional methods of food preservation (Relate to Agriculture & Health Sector) documented.
- 2.8 Traditional food preservation methods promoted and used.

Implementation: See Chapter VII.

Sustainability of programme

Solomon Islands has a fledgling tourism industry. Thus the full potential is not yet realized. There is some recognition that climate change and sea-level rise impacts will also affect tourism there is no clear policy on incorporation of climate change and sea-level rise issues into tourism development. This project will provide that vehicle for climate proofing tourism development in the country.

Budget

It is anticipated that an amount of USD500, 000 will be sought from the LDCF. Additional funding will be through government budgetary allocations and bilateral donors.