

Some of the chosen sites were actually or will soon be under a project of coastal rehabilitation or control of erosion and these sites have been left out so as to avoid any duplication of effort.

3.2 Specific Project Ideas

3.2.1 Project Idea for dune and vegetation restoration

Sand dunes are an important component of the lagoon-beach ecosystem. Naturally occurring sand dunes are wind-formed sand deposits representing a store of sediment in the zone just landward of normal high tides. Dunes effectively store excess beach sand and serve as natural erosion buffers for shorelines during extreme events such as cyclones and storm surges. However, dunes remains fragile features that are easily altered by the actions of people e.g., trampling by pedestrians, destruction by vehicular traffic, levelling for development, mining for construction, introduction of inappropriate invasive or exotic species. Sand dunes also provide a valuable coastal habitat for many highly specialised plants and animals. As such, sand dunes may be considered important both ecologically and recreationally.

Vegetation planting may be used to stabilise natural or artificial dunes. This promotes the accumulation of sand from wind-blown sources around their stems – over time, this causes dune growth. Over time, dune vegetation root networks also help to stabilise the dune. Planting can be achieved by transplanting vegetative units from nursery stocks or nearby intact dunes. One advantage of vegetation planting over dunes is that it can be undertaken at the community level using widely available tools and thus a major reduction in cost.

3.2.1.1 Summary sheet for dune and vegetation restoration

COASTAL ZONE SAMPLE PROJECT SHEET: Dune and Vegetation Restoration		
Brief Project description The control of erosion through the restoration of existing coastal dunes and vegetation along 2 identified public beaches in Mauritius.		
Results Oriented Framework		
Overall Goal i. Control of erosion along 2 identified public beaches ii. Improve legislation for the better protection of the dune areas iii. Raising awareness on the importance of dunes and the need to protect them		Development Objectives Implementation of beach and dune reprofiling works for dune restoration and planting of native coastal vegetation along the dune areas.
Inputs i. Sand from inland quarry or from offshore site ii. Native coastal plants from specialised nursery or from other beaches having these plants iii. Publication of leaflets and other media campaigning materials iv. Review and amend existing laws and regulations for the better protection of Dunes	Outputs i. Newly reprofiled beach at the identified sites. ii. Dunes planted with native plants and exotic species removed. iii. Leaflets and other media advert material iv. Improved legislation	Impacts It is expected that the dune and vegetation restoration work will provide some control over the erosion occurring at those sites. Public users become more informed of the importance of dunes Dunes legally are better protected
Estimated costs MUR Flic en Flac – MUR 53.2 Million for 700 m of coast Le Morne – MUR 40.28 Million for 530 m of coast Leaflets and media campaign– MUR 1 Million		

Proposed timeframe 2 Years	Executive bodies Beach Authority
Cost-benefit analysis 700 m of coastline restored for Flic en Flac and offering better protection for an area of 4.2 Ha of Public beach 530 m of coastline restored for Le Morne and offering better protection for an area of 5.3 Ha of Public beach	Risks Erosion of material put in place during an extreme event Reluctance and opposition from general public as access to beach may be restricted
Expertise required	
Profile Local expertise in Coastal Processes (Physical Oceanographer) Coastal engineer Environmental Educators Media professional Legal Consultant	Key tasks <ul style="list-style-type: none"> • Identify and assess root causes of erosion • Put forward most appropriate technical details for beach reprofiling works including beach slope and grain size to be used. • Put forward mitigation measures • Prepare leaflets and other media material to reach the different targeted groups • Formulate appropriate amendments to better protect the dunes under existing legal instruments
Identification of key stakeholders Beach Authority Ministry of Environment Ministry of Fisheries Ministry of Housing and Lands Local NGOs and Force Vive	

3.2.1.2 Project overview

Project Scope

The main objective of this project is to provide control of erosion at two sites, namely Flic en Flac and Le Morne, through dune and vegetation restoration. Moreover, as an integral part of the project, there shall be an information and awareness campaign in view of sensitising the general public on the importance of dunes and the need for having native plants. In addition, the legislative and regulatory framework around dunes shall be reviewed and appropriate amendments will be brought so as to better protect the dunes around Mauritius.

The project shall be implemented at Flic en Flac and Le Morne. These shall be restricted to areas which are proclaimed public beaches so as to facilitate the implementation of works and in view of benefitting the public in general.

In Flic en Flac the dune to be restored shall be from Pearl Beach to around 700 m north ending near Manisa Hotel. The dune shall be restored over a width of approximately 15 m and shall be stabilised through the use of native vegetation. The dune profile shall be such that the beach as well shall be to some extent reprofiled. Part of the beach is already under management with vehicle access restricted.

The public beach between Dina Robin and Les Pavillions hotel will find the implementation of works for dune and vegetation restoration. Part of the beach is already under management with vehicle access restricted. The dune in this area shall be restored over a length of 530 m and 15 m wide. The beach shall also be reprofiled. Native vegetation shall be planted over the dunes.

Preliminary works at both sites shall comprise the removal of exotic trees like the Filao trees. Additional measures should be taken in view of mitigation the possible effects of major events like cyclones at both areas. The use of breakwaters close to the reef edge is recommended and this shall have the added benefit of providing an appropriate substrata for coral to colonised or be transplanted upon.

This dune and vegetation restoration projects could involve many volunteers that require hands on training

about effectiveness of different grass species in dune restoration. The local community should have a prominent role in this project and this will form an integral part of an education process that would raise awareness of likely coastal hazards if dunes are not preserved and protected. At a larger scale, it is useful for governments to adopt proactive coastal management plans to protect, enhance, restore and create marine habitats, and through that align the dune and vegetation restoration projects around the country.

In addition to the above, leaflets shall be designed and printed and eventually distributed to the general public mainly at the public beaches where the project shall be located. Other media campaign shall be formulated and thereafter shall be broadcasted on the national television, national and private radios, and printed in local newspaper.

The review of the existing legislation shall be effected and amendments would be proposed for the eventual enactment. Enforcement measures will also have to be devised in view of ensuring better protection of the dunes and vegetated areas.

Project Timeline

The whole project shall have a timeline of 2 years for its implementation. However there shall need to have a rigorous monitoring and maintenance programme that shall follow the evolution of the dunes after works have been effected.

The time line shall include the following

- Expression of Interest – 2 Months
- Tender exercise – 4 months
- Design and implementation of works- 6 months
- Legal review – 4 months
- Information and awareness campaign – 1 year

Budget and Resource requirement

The project would require a budget of around MUR 95 Million for its implementation. Funding can be sought from international agencies in view of securing the necessary funds for implementation of works.

Components

The major component of this project would be the implementation of works for the dunes and vegetation restoration. Technologies used in this project are quite low tech and most of the times rely on the local natural material and community volunteering and monitoring services. Dune and vegetation restoration technologies involve:

- Removal of exotic vegetation (e.g. Casuarina trees) that dramatically reduces dune effectiveness.
- Filling and re-grading the slope with bulldozers.
- Installing sprinkler or dripsystems
- Constructing dune walkovers to protect from erosion caused by human access
- Re-vegetating with native dune plants. Additional research might also be needed to identify key vegetation species that need to be produced.
- The application of fences to stabilise bare sand, encourage dune growth and protection.
- Monitoring and maintaining the dune.

The other component of this project would be the information and awareness campaign whereby leaflets and other media support would be designed and developed. The target for these campaigns shall be the public in general.

The review of the existing local legislation would play a vital role in view of ensuring the better protection of the dunes in the future. As such the legal review shall put forward amendments of local legislation in view of attaining this objective.

3.2.1.3 Project framework

Project Goal: Control of erosion through dune and vegetation restoration					
Development objectives:					
<ul style="list-style-type: none"> • Dune and vegetation are restored • Information and awareness campaign targeting the local population • Legal review of legislation and propose amendments for better protecting the dunes 					
Project Component	Expected Outcomes	Expected Inputs	Expected Outputs	Objectively Verifiable Indicators	Expected Impacts
1. Dune restoration at two public beach	Control of erosion at the identified sites	Graded sand and machinery for implementation works	Dunes reshaped and restored	Dune in place	Control of erosion through the provision of sand source along the shoreline
2. Native vegetation restored at the two public beaches	Stabilisation of the dunes with the native vegetation	Native plants that are resilient to the coastal characteristics	Stabilisation of dunes	Native Vegetation planted over dunes	Dunes stabilised
3. Information and awareness campaign	Better informed public	Design and publication of appropriate media materials	Leaflets and other media materials including adverts	Better use of dune areas by the public	Local population informed of importance of dunes
4. Legal review for better protection of dunes	Better legislation for the protection of dunes and its vegetation	Review of existing legislation	Amendments to existing local legislation for better protection of dunes	Amendments proposed	Dunes better protected under local legislation

3.2.1.4 Project Justification

This project is in line with the various policies of the government including which treat the subject of erosion and biodiversity conservation and to which this project become directly or indirectly relevant. These include:

- i. 2nd National Environmental Strategy and Action Plan (2000 – 2010)
- ii. National Environment Policy
- iii. Climate Change Action Plan
- iv. National Physical development Plan (NPDP) – Development Strategy and Policies
- v. National Development Strategy
- vi. National Biodiversity Strategy and Action Plan
- vii. Development of an Integrated Coastal Zone Management Framework (ICZM)

Moreover, Dune and Vegetation restoration was proposed by the Study of Coastal Erosion around Mauritius in 2003 as part of the soft nonstructural methods to be used to control erosion.

3.2.1.5 Monitoring and Evaluation (M&E)

The results-oriented framework will be used for M&E of project implementation. More specifically, the progress made against the Objectively Verifiable indicators (OVIs) will be monitored and reported under the governance structure of the project.

3.2.1.6 Risks and their mitigation

The risks in the implementation of this present project would be as follows:

Risk	Level (Low, Medium, High)	Response
Dunes are eroded following an extreme event	High	Appropriate measure would have to be taken within the lagoon and would include the use of breakwaters
Reluctance or opposition of general public	Medium	Information and awareness campaign would have to ensure proper understanding of measures put forward
Reluctance and delay in amending the local legislation	High	Proper briefing of officials and political actors on the importance of dunes and the necessary amendments.
Native plants not properly stabilizing the dunes	Low	Necessary research undertaken in view of ensuring the most appropriate plants are used.

3.2.1.7 Stakeholder mapping

The key stakeholders to be involved in this project would be as follows:

Stakeholder	Roles and responsibilities
Beach Authority	Responsible for the proper management and maintenance of public beaches around Mauritius
Ministry of Environment	Responsible for the management of the coastal zone
Ministry of Fisheries	Responsible for the management of coastal and marine resources
Ministry of Housing and Lands	Responsible for the management of the local land territory including beach areas
Local NGOs and Force Vive	Immediate actors and beneficiaries for proposed project

3.2.2 Project Idea for wetland protection

Coastal wetlands provide a number of important ecosystem services including water quality and climate regulation, they are valuable accumulation sites for sediment, contaminants, carbon and nutrients and they also provide vital breeding and nursery ground for a variety of birds, fish, shellfish and mammals.

3.2.2.1 Summary sheet for dune and vegetation restoration

COASTAL ZONE SAMPLE PROJECT SHEET: Wetland Protection	
Brief Project description Wetland protection and restoration for the region of Belle Mare and Palmar with the view to improve the biological and hydrological quality in the surrounding areas.	
Results Oriented Framework	
Overall Goal i. Improve water quality in surrounding areas ii. Improve the biodiversity of surrounding areas iii. Raising awareness of the need to conserve wetlands iv. Promulgation of a wetland protection bill	Development Objectives Wetland acquisition with the view to conserve and protect these environmentally sensitive areas along with raising awareness on the importance of wetlands in our environment and to have the necessary legal instrument to fully protect the wetlands.