

that information and awareness campaigns be undertaken in the use of the technologies and this would contribute to the better acceptance and appreciation of the benefits of these technologies.

Lack of experience and capacity to design and implement the technologies has also been identified as a barrier to their use. However, the experience and capacity is being fostered through the implementation of projects related to the technologies.

The legal framework, including the enforcement of existing laws and regulations, to deal with the implementation of the technologies is also a barrier especially for wetland protection. Appropriately enforcing the laws and regulations would partly resolve the problem as some wetlands are under private ownership and as such ensuring proper protection may be problematic. Having wetlands under some official jurisdiction can address the issue with the appropriate legal instrument such as a dedicated protection law to support such measure.

3.2 Action Plan for Dune and Vegetation Restoration

3.2.1 About the technology

Coastal dunes offer a buffer against storm extreme tides and storm surges. This buffering capacity, however, is minimized and potentially eliminated when dunes are over-stabilized by invasive plant species or other alterations brought about by urbanization and development. Over-stabilization makes dunes more susceptible to loss from erosion by not enabling them to move or migrate naturally in response to sea level rise and changes in erosion patterns.

Coastal vegetation is a vital part of a reef-lagoon-beach ecosystem. The restoration of native coastal vegetation normally takes places as part of bigger projects, namely dune and coastal wetland restoration. Healthy dunes are vegetated by native vegetation: self-tolerant with dense root system, effective at holding onto the sand, thus diminishing rate of dune erosion caused by waves and winds. The succession of creeps and shrubs also acts as filtering/regulation run off during rainstorms and are able to recover rapidly from erosion events.

The implementation of this technology would require an initial investment of the order of MUR 75000 per meter of coast. This investment shall ensure that the stretch of beach is rehabilitated and protected and indirectly it shall contribute to the economy of the country by preserving its beaches therefore ensuring the continued development of the tourism industry. It will also enhance the local recreational areas used by the local population.

3.2.2 Target for technology transfer and diffusion

The target to be achieved for the transfer and diffusion of dune and vegetation restoration would be during the next five years.

3.2.3 Barriers to the technology's diffusion

3.2.3.1 Lack of appropriate space for implementation

The major barrier in the implementation of the dune restoration technology in Mauritius is the inappropriateness and unavailability of space along the shoreline. The Pas Géométriques around Mauritius comprises of Hotels, the public beaches and also the Campement site. These areas are in great demand and of high value and they have undergone major transformation to accommodate the hotels and bungalows.

It is a major challenge to restore the dunes to their original height over most part of the shoreline due to

the now existing infrastructure over those areas. In certain areas though along with public beaches, it is still possible to restore the seaward face of the dunes especially where adequate setback exist.

3.2.3.2 High cost involved in terms of materials required

Dune restoration requires large quantity of sand and availability of such material is very limited in Mauritius given that only inland quarries are allowed to supply these. Moreover there is a high cost associated with dune restoration as the material itself and its implementation cost including machinery and labour is also high.

3.2.3.3 Inadequate legislative / regulatory framework

The dunes in Mauritius do not have per say a legislative or regulatory framework for its specific protection. The setback requirement of having no hard construction within 30 m from high water mark is more of a measure to control erosion than the actual protection of the dunes. Beach reprofiling for the upgrading of the beach is an undertaking requiring an EIA Licence.

3.2.3.4 Lack of information to concerned stakeholders

Given the limited area that is available as public beaches and for dune restoration it is difficult to convince the public and the officials of the need and usefulness of dune restoration as this measure may appear to hinder access to the beaches. Conflicts of interest may also arise, especially if dune construction takes place in an area primarily used for residential or tourism purposes, where local landowners or lease owners may be concerned about maintaining sea views.

The local population appreciate the Casuarina sp. trees, and removal of these trees to be restored with native species may find public opposition as they are not familiar with the specifics of both. Native plants on the other hand are often perceived as being home to various little animals, insects and reptiles and thus their limited popularity.

3.2.4 Proposed action plans for Dune and Vegetation Restoration

In view of ensuring the dune and vegetation restoration it would be important for following actions to be taken:

- a) Provision of Financial incentives
- b) Improve Legislations and regulations and
- c) Information and awareness raising

a) Provision of Financial Incentives

Why	The cost for implementing Dune and Vegetation restoration is relatively high due to the cost of materials, labour and machinery to be used at around MUR 75,000 per meter of beach.
Who	The financial incentives should come from the Government for implementation of the technology in places other than public beaches
When	0 – 5 years
How much the measure/ action will cost, how can it be funded years	The cost for implementing dune and vegetation restoration is estimated to be around Rs 75,000 per meter Funding for such action can be through participatory or cost sharing with the lessee of the Pas Geometrique and through International Funding Agencies
Indicators of success, risks	Implementation of the technology would be an indication of success along with the control of erosion at the site A risk would be the unwillingness and non-participation of the Lessee of the Pas Geometrique

The Government should provide incentives that would encourage the lessee of the plot of land adjacent to the shore to undertake such appropriate measure to protect and restore the dunes and vegetation within their plot. Such incentives could be a decrease in their rent upon completion of works or facilities at attractive rates for the implementation of works.

Participatory and cost sharing between neighbors, as most areas along the shore are under lease, and also with the government is a measure that can be put forward in view of implementing dune and vegetation restoration despite the high cost that can be involved especially if sand has to be replenished. The protection of the shoreline from erosion is usually to be addressed in an integrated way over large areas and this participatory and cost sharing approach would make the implementation of the technology more affordable and feasible.

This participatory and cost sharing approach is an adaptation from the usual practice of the Government to initiate projects under a Built-Operate-Transfer basis whereby a technology or project is implemented with the government as partner in the venture and eventually following an agreed period of operation, the assets are transferred to the government.

b) Improve Legislations and regulations

Why	Dunes are not properly protected under actual legislation
Who	The Government
When	0 – 5 years
How much the measure/action will cost, how can it be funded	Approximately MUR 1,000,000 for consultancy services for review and putting forward appropriate legislation. Domestic Funding
Indicators of success, risks	The success would be the enactment of specific legislation for the protection of Dunes and native vegetation A risk would be the time usually taken from drafting to enactment of a proper legislation.

The proper legislative or regulatory framework for the implementation of the technology should be promulgated in an Act that is closely related to the coastal zone. Usually the best candidates for amendments would be the Pas Géométriques Act of 1982 and the Environment Protection Act of 2002. These should be amended so that the implementation of the technology becomes feasible and also the dunes become appropriately protected especially from developments.

c) Information and awareness raising

Why	Lack of awareness of the importance and role of Dune and vegetation along the shoreline
Who	The government with the support of NGOs
When	0 – 5 years
How much the measure/action will cost, how can it be funded	MUR 1,000,000 for the production of leaflets and sensitization materials. Can be funded domestically and through the support of International Funding Agencies under environmental programmes.
Indicators of success, risks	Increase awareness of the Officials and the public in general

A three tier approach can be envisaged for the proper dissemination of the information regarding the benefits and use of dune and vegetation restoration. The approach would have to touch different level of stakeholders including official and Authorities, the lessee as the direct beneficiary and the public at large.

The information and awareness campaign could further be merged into a larger programme which aims at providing appropriate information with regards to climate change and coastal erosion to the stakeholders and the public at large.

The most pertinent information to be disseminated would be to explain how such measures can help in controlling erosion, any alternatives that can be used and also the benefits of the use of such technology especially in terms of being environment friendly with little negative impacts on the surroundings.

3.3 Action Plan for Wetland Protection

3.3.1 About the technology

The backfilling of wetlands along the Mauritius coast has significantly decreased the area of wetlands and significantly increased surface water flow to the sea. This has resulted in elevated levels of suspended solids, nutrients from sewage and fertilizers, and contaminants entering coastal lagoons. Declining water quality and algal growth has already been detected in several portions of the lagoon (Baird report 2003). Coral-reef ecosystems are also highly sensitive to eutrophication (such as algal blooms that rob the water of oxygen) from nutrient runoff, sedimentation, and temperature changes, and must be protected from such sources if possible.

Wetland restoration re-establishes these advantageous functions for the benefits of coastal flood and erosion protection. Techniques have been developed to reintroduce coastal wetlands to areas where they previously existed and to areas where they did not, but conditions will allow.

The major cost involve in the implementation of this technology would be in the purchase properties that holds wetlands and a buffer area of 30 m. The benefit of having these wetlands under official jurisdiction would ensure its proper protection and rehabilitation and also ensure that the wetlands provide their services to the environment.

3.3.2 Target for technology transfer and diffusion

The target group for the implementation of this technology would be those private property owners with portions of land under wetlands or in the buffer of 30 m from the wetlands. The target to be achieved for the transfer and diffusion of wetland protection would be during the next five years. It is urgent to address the issue of wetland protection as these are sustaining enormous pressure from property developer.

3.3.3 Barriers to the technology's diffusion

3.3.3.1 High Cost

Wetlands usually occur close to the coastal zone and as such are in areas where properties are of very high value, examples are Grand Bay and Flic en Flac. In view of offering the best protection