Technology Fact Sheet for Adaptation

Restoration of coastal vegetation [i]

Technology: Restoration of coastal vegetation	
Sector : Coastal Zone	
Subsector :	
Technology characteristics	
Introduction	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. Salt marshes, mangroves, and seagrasses, part of coastal wetlands play the same role and in addition are reservoirs of natural, free, and sustainable carbon storage potential. This is jeopardized by alarming trends in coastal habitat loss, totaling 30–50% of global abundance over the last century alone. [1] Introduction of exotic vegetation species has been party responsible for this decline. Non-native species disrupt vegetative communities, pollination cycles, water use, nutrient transfer, and patterns of erosion.
Technology characteristics/highlights	This technology consists of : • Removal of exotic vegetation • Additional research (when necessary) to identify native vegetation species. Sometimes the plants would need to be produced first in nurseries or plants could be salvaged from ecologically similar sites, and used in restoration to decrease the recovery time. • Re-vegetating the dunes or wetlands with native plants. • In case of wetlands: preparing the soil increases the successful growth of plants and often includes loosening of compacted soils and addition of organic material, such as decaying leaves. • In case of dune restoration, fencing of replanted areas and building pedestrian dune crossings is complementary to re-vegetation efforts. • Stream bank stabilization methods, often required for wetland restorations along stream channels generally include use of plants (either as live plants or seeds) in combination with natural or artificial fiber rolls or mats. • Ongoing management

[1] Irving AD, Connell SD, Russell BD (2011) Restoring Coastal Plants to Improve Global Carbon Storage: Reaping What We Sow. PLoS ONE 6(3): e18311. doi:10.1371/journal.pone.0018311

Institutional and organizational requirements	This technology is in line with government's national priorities in implementing adaptation activities to reduce the adverse impacts of and risks posed by climate change in Mauritius. Restoration of coastal vegetation projects normally relies on community participation and requires hands on training about different plant species and their usefulness in protecting shorelines.
Operation and maintenance	An ongoing commitment to weed and animal pest management is needed until the plants have successfully established. It may also be necessary to maintain coastal planting by replanting areas that have been damaged by slips and harsh coastal conditions.
Endorsement by experts	Internationally, coastal vegetation is recognized as a natural tsunami mitigation strategy that is cheap, easy and locally beneficial.
Adequacy for current climate	Fits well, both for present and expected climate
Scale/Size of beneficiaries group	Beneficiaries groups include residents, beach users and industries dependent of healthy coastal ecosystems (e.g. fisheries and tourism).
Disadvantages	For the investment in restoring coastal vegetation to be most effective, this technology should be made part of wetland and dune restoration efforts and other hard defenses such as dikes or seawalls. See opportunities and barriers section for more information.
Capital costs	
Cost to implement adaptation technology	The Adaptation Fund project for Mauritius has provided estimates for beach crest vegetation at Riviere des Gallets (US$20,000 for 60m) and Mon Choisy (US$30,000 for 100m) that correspond to Rs9,400/m and Rs8,460/m, respectively. This gives an average cost of around **Rs9,000/m**. Information obtained from the practical experience of the Beach Authority puts the cost of re-vegetation of a beach with endemic species, including labour and fencing costs, at Rs 40,000 for an area 15m x 90m. This translates into **Rs 444/m** with a 15m re-vegetated area across the dynamic beach. Please note that the cost does not include removal of Casuarina trees from the dynamic beach. This would add significantly between Rs1,000 and Rs10,000 depending on size and quantity of trees, and accessibility of terrain (ICZM Division, Ministry of Environment & SD).
Additional cost to implement adaptation technology,	The above cost is additional since no re-vegetation is carried out in the baseline or 'doing nothing' scenario. Vegetation is the most

compared to "business as usual"	effective method of stabilizing coastal dunes. The preservation of dunes prevents sediment deficit and subsequent erosion, thus mitigating the need for more costly erosion prevention or compensation operations.
Long term cost (i.e. 10, 30, or 50 years) without adaptation	Limited ability of wetland and dune ecosystems to protect shoreline from erosion and onland from storms. Increased vulnerability and a sense of insecurity in coastal areas.
Long term cost (i.e. 10, 30, or 50 years) with adaptation	Ongoing implementation of coastal management plans and protection of coastal vegetation.
Development impacts, direct and indirect benefits	
Direct benefits	Reduced rate of erosion during cyclones and fast rate of recovery of the shoreline.
Reduction of vulnerability to climate change, indirect	Reduction in human casualties, reduction in physical damage to property and contribution to resilient coastal ecosystems.
Economic benefits, indirect Employment Growth & Investment	The tourism industry could benefit as native coastal vegetation creates a beach environment unique to Mauritius. Reduced risk of damage from surges and erosion could save considerable amounts of money which would otherwise go towards maintenance and repairs of hard defenses. Also native plants require less maintenance and save energy – planted properly, they require little or no extra water, fertilizer, or pesticides. In addition, they display resistance to insects and disease and often attract desirable wildlife including birds, butterflies, and pollinators.
Social benefits, indirect Income Education Health	Job security and maintenance of current quality of life, as the beach is maintained Community awareness of National's adaptation plans and understanding of natural ecosystems Lowered risk from surge flooding.
Environmental benefits, indirect	In the long term, coastal vegetation modifies shorelines in a ways that increase its integrity and thus provide a lasting coastal adaptation measure that can protect against accelerated seal level rise and more frequent storms.
Local context	
Opportunities and Barriers	A possible barrier to keep in mind is that it is crucial for people and animals to stay off the newly planted areas for the period it takes the plants to become established. To educate people about this, restoration programs can be linked to environmental education initiatives that also aim at re-establishing an appreciation for

	naturally functioning coastal landscapes. Property owners, who have removed native vegetation and natural debris and replaced it with non-native ornamentals, might argue to keep it that way.
Market potential	Not a market technology. Generally technology initiated by government incentives and carried out by NGOs and volunteers.
Status	Re-establishment of native coastal vegetation and removal of the Filao trees is one of the actions recommended in Ministry of Environments, Mauritius Coastal Erosion report.
Timeframe	The technology can be implemented in conjunction with dune restoration and raising public awareness of their importance. The vegetation should only require maintenance in the medium term, and become part of the ecosystem in the long term.
Acceptability to local stakeholders	Property owners, who have removed native vegetation and natural debris and replaced it with non-native ornamentals, might argue to keep it that way.

[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment Reports For Climate Change Adaptation – Mauritius. You can access the complete report from the TNA project website http://tech-action.org/**