Technology Fact Sheet for Adaptation

Restoration of degraded areas inside and outside the protected area network to enhance resilience [i]

1. SECTOR:	Biodiversity
1. **TECHNOLOGY CHARACTERISTICS**	
2.1 Technology name:	Restoration of degraded areas inside and outside the protected area network to enhance resilience
2.2 Introduction: *Low/high, Brief introduction to the technology*	Resilience will allow biodiversity to better withstand the impact of climate change. Resilience can be defined as the capacity of a system to absorb disturbance and reorganize, while undergoing change so as to retain essentially the same function, structure, identity, and feedbacks[1]. Some protected areas, although legally declared are degraded due to illegal activities such as encroachments for settlement and clearing, and logging. There will be other areas outside protected areas that many not be legally protected but be important for conservation now, or when species shift their range as a result of climate change. Restoration will require selecting suitable native species and recreating the former conditions of the ecosystem. Some ecosystems that can be restored include forests, wetlands, coastal areas, coral reefs etc. This can be considered to be a low-medium level technology. *Reference in existing policies, strategies and action plans:* The Biodiversity Conservation - Framework for Action recommends to 'initiate programs to rehabilitate degraded critical habitats', to address impacts on biodiversity[2]. According the National Action Plan for Haritha Lanka Strategy 3.5 to 'Expand

[1]Walker BH, Holling CS, Carpenter SR, Kinzig AS. 2004. Resilience, adaptability and trans-formability. *Ecology and Society* 9(2):5

[2]Ministry of Environment and Natural Resources. 2007. Biodiversity Conservation in Sri Lanka: A Framework for Action – Addendum.

	programs for afforestation, reforestation and forest rehabilitation, using indigenous species as far as possible'; while Strategy 8.3 recommends to 'Initiate programs to identify and rehabilitate degraded critical habitats'[3]. In addition to this Mission 3 of the National Action Plan for Haritha Lanka Strategy is to meet the challenges of climate change. In this section, Strategy 5 broadly refers to 'Promote carbon sequestration. More specifically Strategy 5.1 refers to 'Conserve existing carbon pools such as forests' and 5.2 refers to 'Increase the size of the carbon pool by reforestation and afforestation of degraded forests, marginal croplands and waste lands'[4]. The Climate Change Adaptation Strategy[5] for Sri Lanka and the Sector Vulnerability Profile for Biodiversity and Ecosystem Services[6] has identified to 'Link/restore/conserve, forests and other habitat refugia to increase resilience of ecosystems and species' - (B i).
2.3 Technology characteristics/highlights : *Few bullet points, ie. Low/high cost, advance technology; low technology*	Restoration is not a new technology, in Sri Lanka forest[7], aquatic[8], reef and coastal areas have been restored. Some of these technologies are currently in place, and has been so for several decades. It will require medium to high investment, and will depend on the level of degradation. Restoration in some cases may require manpower and skills as opposed to high infrastructure or hard technologies. However in the case of costal/marine restoration groynesetc can be very expensive. In some cases restoration could even mean minimum intervention of just creating the suitable environment for natural restoration. Some restoration strategies/methods include: • Aided natural restoration • Creation of analogous ecosystem • Expanding market opportunities for products from restoration.
2.4 Institutional and organizational requirements: *How much additional capacity*	As this is not a 'new technology' the departments currently engaging in this activity will have sufficient capacity to deal with this strategy. Capacity building and knowledge transfer will be required to select suitable restoration methodologies.

[3]National Council for Sustainable Development. 2009. National Action Plan for Haritha Lanka Programme

[4]National Council for Sustainable Development. 2009. Op. Cit.

[5]Ministry of Environment. 2010. National Climate Change Adaptation Strategy for Sri Lanka 2011 to 2016.

[6]Ministry of Environment. 2010. Sector Vulnerability Profile: Biodiversity and Ecosystem Services.

[7] Ashton, M.S., Gunatilleke, C.V.S., Singhakumara, B.M.P. and Gunatilleke, I.A.U.N. 2001. Restoration pathways for rainforest in south west Sri Lanka: a review of concepts and models, *Forest Ecol. Manage.* 154 (2001), pp. 409–430

[8] MDG SriLanka. 2009. *Ensure environmental sustainability.* Available online from: http://www.mdg.lk/ images/flash/learningzone.swf

building and knowledge transfer is required for the adaptation option to be implemented.	
3. OPERATIONS AND MAINTENANCE	
3.1 Endorsement by experts:	For details of endorsement by local experts and relevant agencies see section on *'Reference in existing policies, strategies and action plans'* in Section 2.1. There are several international experts who endorse this strategy as an essential climate change adaptation strategy for biodiversity in papers published in peer-reviewed journals[9,10].
3.2 Adequacy for current climate: *Are there negative consequences of the adaptation option in the current climate? Some adaptation may be targeted at the future climate but may have costs and consequences under the current climate.*	There is no negative consequence of this option as this is not a new technology. In fact it will also be beneficial for carbon sequestration, which is vital for climate change mitigation. This strategy has been recommended in Sri Lanka as the Biodiversity Conservation - Framework for Action as a current recommendation to address impacts on biodiversity[11].
3.3 Size of beneficiaries group: *Technology that provides small benefits to large number of people will be favored over those that provide larger benefits, but to fewer people.*	Restoration will ensure that ecosystem services are maintained for the local communities and the larger population. It will also ensure that the ecosystems are healthy, and withstand some of the impacts of climate change. This would mean that ecosystem services will be minimally affected by climate change in the future. It will be beneficial due to various income opportunities such as direct involvement in restoration activities, community conservation, payments for ecosystem services, REDD and ecotourism.
4. COSTS	
4.1 Cost to implement	This technology will be medium-high in cost. It could be relatively low if it is an

[9]Mawdsley, J.R., O'Malley, R., Ojima, D.S., 2009. A review of climate-change adaptation strategies for wildlife management and biodiversity conservation. Conservation Biology 23, 1080–1089.

[10] Heller, N.E. &Zavaleta, E.S. (2009) Biodiversity management in the face of climate change: a review of 22 years of recommendations. *Biological Conservation*, 142, 14.

[11]Ministry of Environment and Natural Resources. 2007. Op. Cit.

adaptation options: *Cost measures*	activity such as tree planting, but costly if it requires hard technology in the case of coastal restoration. It is estimated that this activity will cost Rs. 100 million annually. This is based on the assumption that a budget increase of 5% of current conservation budgets will be necessary for this activity (based on total Forest Department and Wildlife Department annual budgets). It is estimated that 25% of this will be borne by the public sector. This activity will need to be carried out until most prioritized sites are restored, and will have to be an annual budget. Cost will be for site selection (with assistance of models), prioritizing sites, selecting a suitable restoration method (forest restoration, coral planting etc), and monitoring.
4.2 Additional costs to implement adaptation option, compared to "business as usual"	There will be costs associated with the restoration process as opposed to do nothing, this additional cost could be fairly significant.
5. DEVELOPMENT IMPACTS, INDIRECT BENEFITS	
5.1 Economic benefits: **Employment** - *Jobs* **Investment** - *Capital requirements*	**Employment:** • There will be job creation, as restoration will require manpower. Local communities can easily be involved with some training for this purpose. • Once restored there could be job opportunities associated with ecotourism and sustainable utilization related jobs. **Investment:** • There will be investment required, especially if the restoration requires hard technologies (eg: groynes to restore beach, artificial reefs).
5.2 Social benefits: **Income** – *Income generation and distribution* **Education** – *Time available for education* **Health** – *Number of people with different*	**Income:** • There will be social benefits from jobs created due to restoration related work. • There could also be an income from the harvest of non-timber forest products and ecotourism related activities once restoration is completed. **Education:** • An opportunity for students to learn about restoration techniques. • University students can learn and contribute to solutions.

diseases	**Health:** • Good quality ecosystems will contribute to the quantity of life of communities. This for example could be through the provision of watershed services, providing sufficient water for drinking and sanitation.
5.3 Environmental benefits: *Reductions in GHG emissions, local pollutants, ecosystem degradation etc.*	The main benefit of restoration would be from carbon sequestration and thus a mechanism from which climate change can be mitigated. It will also ensure that other ecosystem services are restored.
6. LOCAL CONTEXT	
6.1 Opportunities and barriers: *Barriers too implementation and issues such as the need to adjust other policies*	**Opportunities:** • There will be no requirement to change policy or legislation. • Restoration for various ecosystems has already been carried out. **Barriers:** • Lack of funds for restoration activities. • There will be a barrier if the degraded lands have an opportunity cost and can be utilized for another purpose.
6.2 Status: *Status of technology in the country*	This is not a new technology. The technology is currently in place and has been so for several decades. For example the Beira lake[12] is an example of an aquatic system that has been restored, degraded parts of the Sinharaja forests have been restored[13], while costal areas, wetlands, reefs etc have also been restored in the country.
6.3 Timeframe: *Specify timeframe for implementation*	Restoration of a particular area will take a few months but will need monitoring and intervention from time to time.
6.4 Acceptability to local stakeholders: *Whether the technology will be attractive to stakeholders*	It will have high acceptability, as it will create environmental benefits and maintain/restore ecosystem services. There could be income related opportunities for local communities and stakeholders.

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

[12] MDG SriLanka. 2009. Op. Cit.

[13] Ashton et al. 2001. Op. Cit.