



# **Ecosystem-based adaptation approaches**

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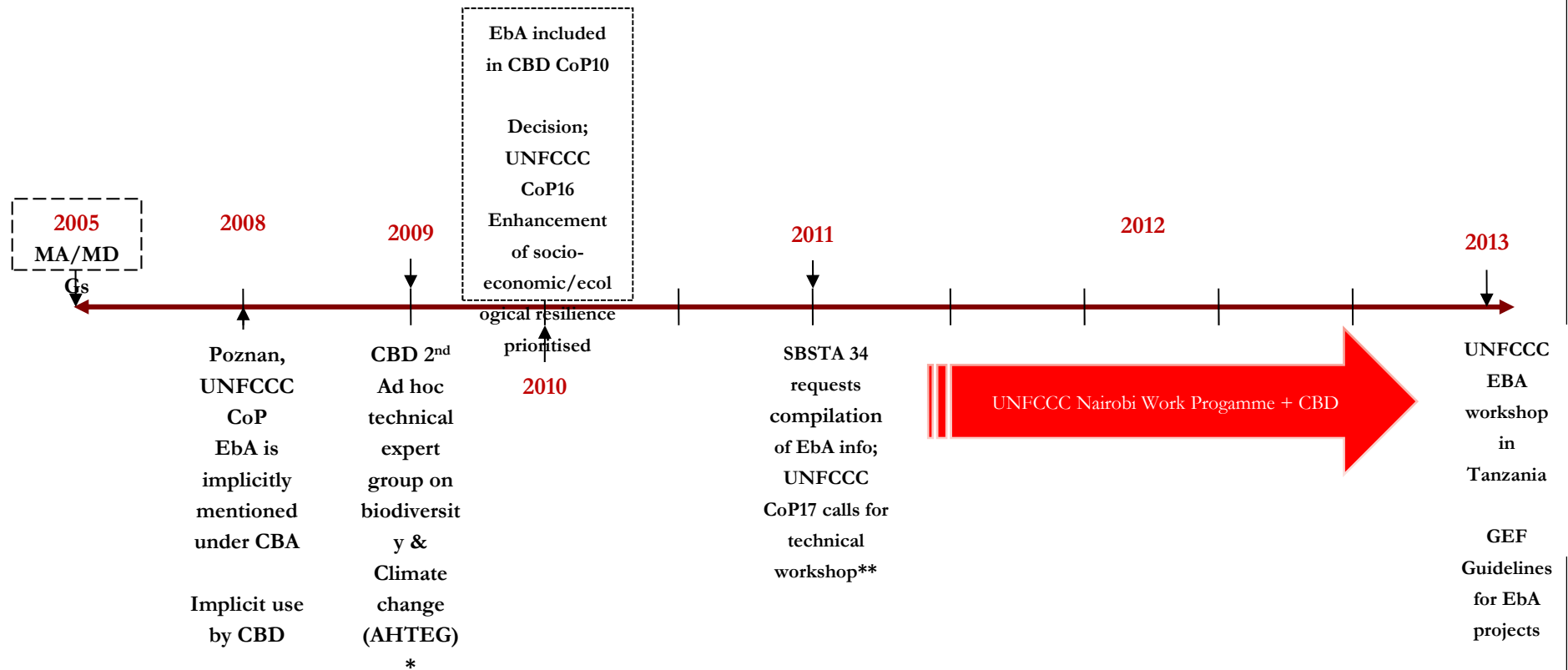
# Why do ecosystems matter?

- Natural ecosystems provide a wide range of **goods and services**, including resources such as water, soil, forests, and fisheries
- **Healthy ecosystems** and their services provide opportunities for sustainable economic prosperity while at the same time providing defense against the negative effects of climate change.
- **15.5% of sectors** prioritized in LDC NAPAs focus on ecosystems
- At least **13 of the 46 countries** that had submitted their NAPAs by September 2011 included terrestrial ecosystems in their adaptation strategies

# EbA definition in international policy

- **CBD** definition: “the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change”
- **UNEP** definition: “the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels”
- **GEF & IUCN** definition: ‘the use of the biodiversity as part of the overall adaptation strategy to help people adapt to adverse impacts of climate change”

# Evolution of EbA concept



# EbA in UNEP



## Science and Assessments

UNEP has a legacy of facilitating credible impact assessments. UNEP has launched PROVIA to assist countries undertake such assessments. Assessments respond to demands from Governments, and are normally led by them.

## Knowledge and Policy integration

UNEP works to enhance the capacity of developing countries to make adaptation decisions that are based on best available knowledge and technical information

## Ecosystem Based Adaptation (EbA)

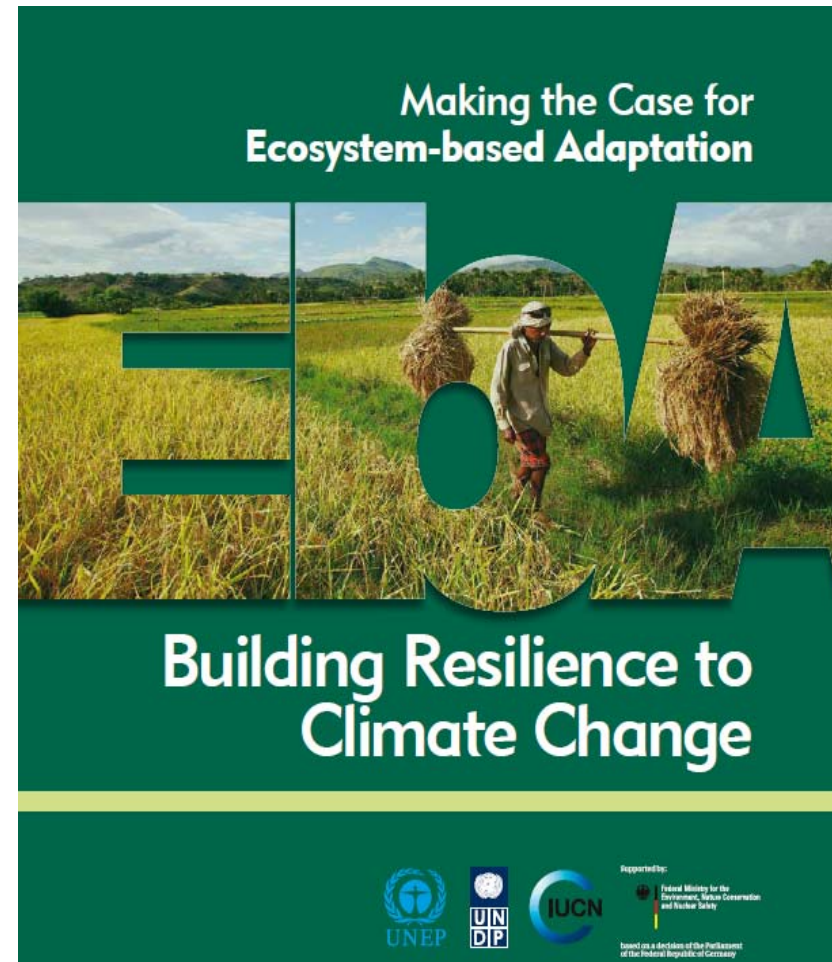
UNEP works to develop effective EbA approaches, and helps vulnerable communities adapt to climate change through the use of ecosystems and their integration into national development. UNEP's EbA Flagship is being implemented in diverse ecosystem settings, including mountains, river basins, dry-lands and low-lying coasts.

## Adaptation Finance

UNEP supports countries in accessing available adaptation finance. As one of the Implementing Agencies of the various funds managed by the GEF UNEP assists vulnerable countries to access those funds (LDCF, SCCF, AF). UNEP helps countries on direct access to AF resources modality as well.

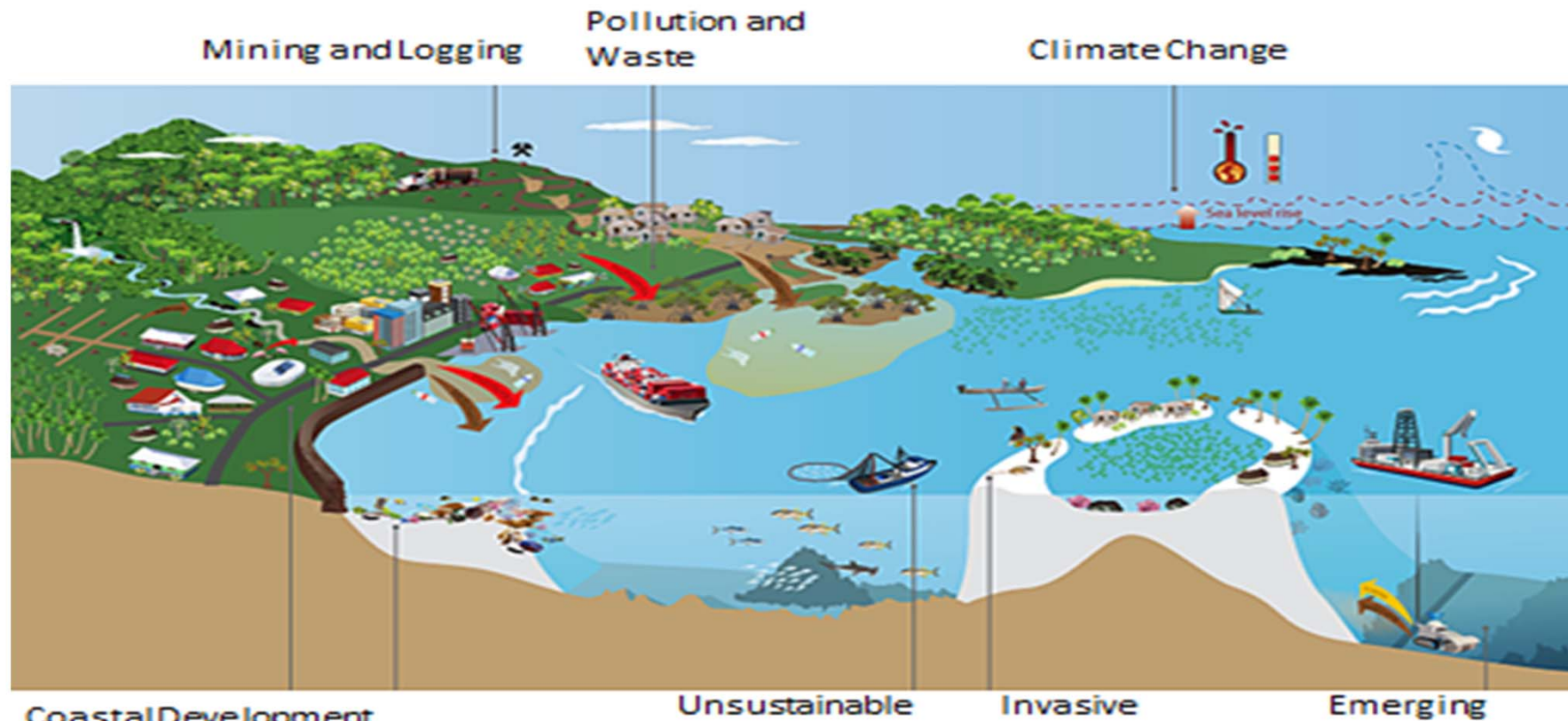
# UNEP's EbA Flagship: Making the case for EbA

- EbA provides numerous **opportunities** for natural solutions to manage the impacts of climate change
- EbA provides social, economic, environmental **co-benefits**
- Requires **comparatively small investment** relative to long term benefits
- Key **challenges** restrain implementation (lack of information, lack of financial resources institutional resistance),
- Incorporates best science and local knowledge and fosters **knowledge** generation and diffusion.
- Is **participatory**, transparent, and culturally appropriate while embracing gender and equity appropriately.

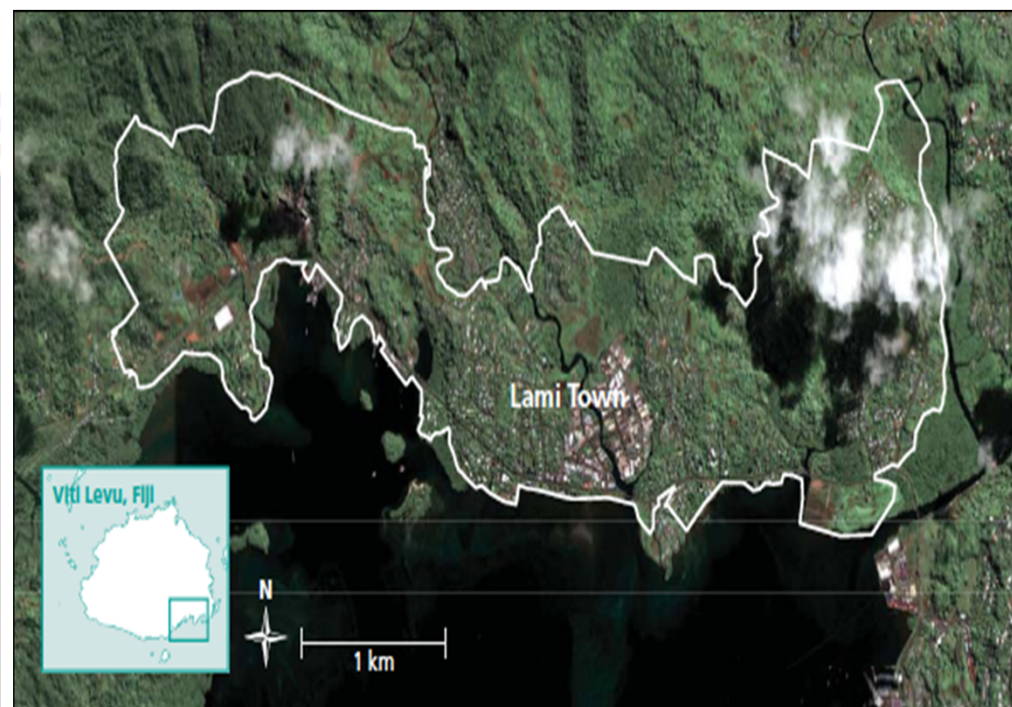
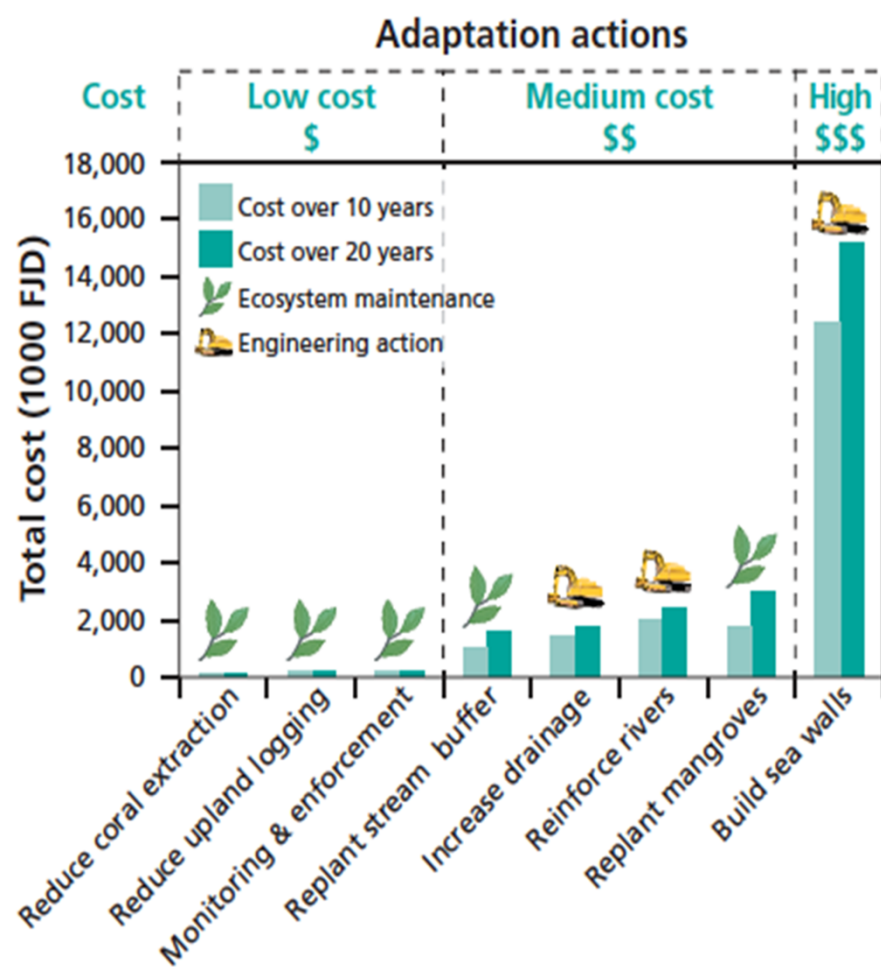


# Making the case: evidence has started emerging- Lami town project









## Threats to Pacific Island Ecosystems



# Lami town project –cost of adaptation actions











# Lami town project – cost of damage avoided per (FJD) spent

		Assumed % damage avoided		
Cost of damage avoided per dollar spent (FJD)	Adaptation action	50%	25%	10%
	 Replant mangroves	\$77	\$38	\$15
	 Replant stream buffer	\$146	\$73	\$29
	 Monitoring & enforcement	\$1,498	\$749	\$300
	 Reduce upland logging	\$2,035	\$1,018	\$407
	 Reduce coral extraction	\$2,988	\$1,494	\$598
	 Build sea walls	\$15	\$8	\$3
	 Reinforce rivers	\$96	\$48	\$19
	 Increase drainage	\$140	\$70	\$28

# Lami town- Values of ecosystem services

Ecosystem	Type of value	Value (FJD)	Unit/year		Benefits (FJD year <sup>1</sup> )
			Hectare	Household	
Mangroves	Direct	\$41	-	200	\$8,200
	Indirect	\$471	320	-	\$150,720
Ecosystem benefits of mangroves					\$158,920
Coral reefs	Direct	\$521	-	10	\$5,210
	Indirect	\$471	1,387	-	\$653,277
Ecosystem benefits of coral reefs					\$658,487
Mudflats/seagrasses	Direct	\$123	-	200	\$24,600
	Indirect	\$139	330	-	\$45,870
Ecosystem benefits of mudflats/seagrasses					\$70,470
Upland forests	Indirect	7	1,151	-	\$8,057
Ecosystem benefits of upland forests					\$8,057
Streams	Direct	60	32.5		\$1,950
Ecosystem benefits of streams					\$1,950
Total ecosystem benefits for Lami Town					\$897,884

# Lami town - Cost of scenarios

Adaptation action	Percentage implementation of adaptation actions			
	Ecosystem maintenance	Emphasis on ecosystem maintenance	Emphasis on engineering actions	Engineering actions
Replant mangroves 	100%	75%	25%	0%
Replant stream buffer 	100%	75%	25%	0%
Monitoring & enforcement 	100%	40%	20%	0%
Reduce upland logging 	100%	50%	20%	0%
Reduce coral extraction 	100%	50%	20%	0%
Build sea walls 	0%	25%	75%	100%
Reinforce rivers 	0%	25%	75%	100%
Increase drainage 	0%	25%	75%	100%

Scenario	Benefit to cost ratio (FJD)	Assumed damage avoidance
Ecosystem maintenance	\$19.50	10–25%
Emphasis on ecosystem maintenance	\$15	25%
Emphasis on engineering actions	\$8	25%
Engineering actions	\$9	25–50%

# Examples of UNEP-LDCF adaptation projects

	Country	EBA coverage	Other than EBA
1	<b>Djibouti - LDCF</b>	<ul style="list-style-type: none"> <li>-Mangrove restoration with salt tolerant species in the north of Djibouti to reduce coastal erosion</li> <li>-Degraded watersheds and wadi shores rehabilitated in 2 project areas to reduce sea water intrusion and intense rains</li> <li>-Rehabilitate and strengthen water retention works alongside wadis to retain water, recharge aquifers and prevent floods</li> </ul>	<ul style="list-style-type: none"> <li>- Borehole restoration / relocation</li> <li>- Alternative livelihoods to</li> </ul>
2	<b>Rwanda - LDCF</b>	<ul style="list-style-type: none"> <li>-Climate proofing of integrated watershed management practices in Gishwati ecosystems</li> <li>-Land-use management practices in Gishwati pilot areas are adjusted for anticipated climate change risks.</li> </ul>	
3	<b>Comoros - LDCF</b>	<ul style="list-style-type: none"> <li>-Reforestation of 95 ha in Grande Comoros and 90 ha Anjouan .</li> <li>-Undertake research into reforestation in the Comoros using the data generated by small-scale weather stations.</li> <li>-Raise awareness of community members of the benefits associated with reforestation activities (and conversely, the costs associated with deforestation).</li> </ul>	<ul style="list-style-type: none"> <li>- Water network rehabilitation to resist to climate change risks</li> <li>-Borehole rehabilitation</li> </ul>
4	<b>Cambodia - LDCF</b>	<ul style="list-style-type: none"> <li>-Tree planting (14 ha) in Krasaora beach to stabilize sand and reduce erosion.</li> <li>-Replanting 60 ha of mangroves</li> <li>-Plant "Teap Tus " trees (15 ha) to stabilise dyke soils by preventing the dykes situated near mangrove forests from sinking into the soft mud and thus protect agricultural fields from increased flooding as result of climate change.</li> <li>-Deepen the natural lake (to have a capacity of 50,625 m3) to allow it to hold more water, which can be utilized by the Toul Ki Kroum Village for drinking and agricultural purposes.</li> </ul>	<ul style="list-style-type: none"> <li>- 0.5 m dyke rehabilitation (Ouk Gha Heng and Toul Tokoeng) to protect agricultural fields from increased SLR, flooding and storm surges as a result of climate change.</li> <li>- Provide 20 rainwater harvesting tanks to improve access to water</li> </ul>

# Examples....cont.

	Country	EBA coverage	Other than EBA
5	<b>Lesotho-LDCF</b>	<ul style="list-style-type: none"> <li>-Rehabilitation of pastures and rangelands in the 3 pilot locations using resilient species,</li> <li>-Rehabilitation of water points</li> <li>-Introduction of pasture management, including anti-erosive measures</li> <li>-Climate resilient crops</li> </ul>	<ul style="list-style-type: none"> <li>-EWSs</li> <li>- GIS</li> </ul>
6	<b>Tanzania – AF/LDCF</b>	<ul style="list-style-type: none"> <li>-Mangrove rehabilitation through planting of resilient seedlings, dredging and the creation of no-take buffer zones;</li> <li>-Coral reef rehabilitation and protection in coastal sites</li> <li>-Beach nourishment, coastline reforestation (trees and grasses)</li> <li>-Shoreline management and rehabilitation, using trees and grasses, replanting, stone dikes (rip rap) and no-build zones</li> <li>-Wetland rehabilitation</li> <li>-One EBICAM plan for the coastal region</li> </ul>	<ul style="list-style-type: none"> <li>-Sea wall raised or rehabilitated in areas showing particular damage;</li> <li>-Effective storm and flood drainage systems in urban areas and near coastal communities;</li> <li>-Water extraction, conservation and harvesting infrastructure rehabilitated, along with adequate monitoring at local level</li> <li>-Boreholes and wells showing signs of salinization relocated</li> </ul>
8	<b>Afghanistan - LDCF</b>	<ul style="list-style-type: none"> <li>- agriculture management practices including drought tolerant varieties, diversified crops, adapted cultivation practices, seed banks</li> <li>- watershed management practices adapted to intensive and prolonged droughts and intensive floods (including grazing management, terracing, planting of grass and trees, improvement of water canals);</li> </ul>	<ul style="list-style-type: none"> <li>- Water management practices (drip irrigation, water harvesting, water canals)</li> </ul>

## Examples....(cont)

	Country	EBA coverage	Other than EBA
9	<b>Madagascar - AF</b>	<ul style="list-style-type: none"> <li>- climate resilient rice varieties selected through participatory field testing</li> <li>- best available land preparation, production and harvesting techniques disseminated to reduce deforestation, maintain soil fertility and integrity, and to provide adequate growing conditions</li> <li>- watershed management and rehabilitation in productive landscapes introduced, including through reforestation, wetlands restoration and protection</li> </ul>	<ul style="list-style-type: none"> <li>- Water efficiency, management and conservation technologies and infrastructures</li> <li>-EWS</li> </ul>
10	<b>Nepal - LDCF</b>	<ul style="list-style-type: none"> <li>- hyper-beneficial, biodiversity-rich forests established in landscapes that were initially highly degraded</li> <li>- ecosystem restoration that increase infiltration of rainwater into topsoil undertaken in degraded forest and rangeland watersheds</li> <li>- Increased base flow of streams at demonstration sites used for water-efficient crop production and/or for the installation of micro-hydro power plants, resulting in an increase in agricultural productivity and/or electricity supply for local communities</li> <li>- Alternative livelihoods based on the benefits of fully-functioning ecosystems developed (Tourism - protection of highly endangered species: tigers and snow leopards in forest ecosystems and high hill rangelands respectively.</li> </ul>	

# EBA in UNEP GEF LDCF projects: Rwanda

***Building resilience of communities living in degraded forests, savannahs and wetlands of Rwanda through an ecosystem management approach***

- Budget: LDCF - 5.5 M USD; co-financing - 10.7 M USD
- EA: Rwandan Environmental Management Authority (REMA) in cooperation with MINIRENA and MINAGRI
- Project will reduce the vulnerability of rural Rwandan communities to climate change by enhancing the capacity of national and local institutions to undertake climate change adaptation using an ecosystem management approach
- Implementation of innovative techniques for restoring degraded ecosystems and establishing climate-resilient ecosystems to decrease vulnerability of communities relying on these ecosystems
- Focus on 3 ecosystems:
  - savannah woodland and grassland
  - degraded forest on hill slopes
  - wetlands in the central and north-western high hills

# EBA in UNEP GEF LDCF projects: Rwanda

Project Component	Expected Outputs
<b>1. Local and national institutional capacity development for an ecosystem management approach to adaptation</b>	<ul style="list-style-type: none"> <li>- Multi-disciplinary national committee established</li> <li>- Training to local communities and user groups on specific techniques for restoring degraded ecosystems</li> <li>- Policy briefs and technical guidelines developed and distributed to policymakers</li> <li>- PhD and MSc theses produced</li> </ul>
<b>2. Climate change adaptation policy and strategy strengthening</b>	<ul style="list-style-type: none"> <li>- Revisions on existing national ecosystem management and development policies and strategies produced</li> <li>- National up-scaling strategy developed and institutionalized to promote an ecosystem management approach to adaptation</li> <li>- National forestry, agricultural and water sector budgets, policies and strategies revised</li> </ul>
<b>3. Interventions that reduce vulnerability and restore natural capital</b>	<ul style="list-style-type: none"> <li>- Biodiversity-rich ecosystems developed</li> <li>- Techniques to reduce erosion and ensure regular river flow</li> <li>- Capacity of communities to undertake ecosystem management-based adaptation activities increased</li> <li>- Alternative livelihoods based on the benefits of functional ecosystems developed and promoted</li> </ul>

# Key challenges implementing EbA

- **Lack of information**
  - Uncertainties in future CC projections, ecological vulnerability and economic growth
  - Exacerbated by general paucity of information from M&E of EbA interventions
- **Lack of financial resources**
  - Lack of financial resources for project implementation
- **Institutional resistance**
  - Benefits of EbA are spread across several ministries
  - Long-term benefits of EbA vs. shorter timescales of institutional decision-making

# EBA in UNEP GEF SCCF projects

## Enhancing Capacity, Knowledge and Technology Support to Build Climate Resilience of Vulnerable Developing Countries

- SCCF: 4.9M USD, co-financing: 34.7 M USD
- Project goal: to reduce the vulnerability of LDC and developing African and Asia-Pacific countries to climate change impacts by providing capacity, knowledge and technology support
- Activities on an inter-regional level and national level
- 3 components:
  1. Inter-regional coordination and capacity building for African and Asia-Pacific developing countries to plan and implement EBA
  2. Inter-regional online EBA knowledge support
  3. The transfer of specific EBA technologies to pilot African and Asia-Pacific countries
    - **Mauritania** – arid/semi-arid (desertification control measures and reforestation)
    - **Nepal** – mountain (community-based watershed restoration)
    - **Seychelles** – coastal (mangrove restoration)

# EbA in UNEP GEF LDCF projects: challenges (1)

- Some of the same **challenges** as for 'non-EbA' LDCF projects:
  - Finding **appropriate baseline projects**
  - Demonstrating **CC risks to baseline projects** & describing how baseline projects are inadequate to meet these risks
  - Measuring progress
- Drawing the line between EbA and non-EbA project when using EBA guidelines
- Long term nature of EBA activities

## EBA in UNEP GEF LDCF projects: challenges (2)

- **Adaptation interventions** funded by LDCF need to focus on the role ecosystem management plays in reducing vulnerability of local communities
  - Need to identify **specific ecosystem services** that are vital for communities' well-being under a changing climate
- **Supporting activities** are needed in addition to ecosystem management to tackle baseline problem and provide more viable cost reasoning
- **Introduction of EBA guidelines** will need to be reflected in GEF review sheet and AMAT

# EBA in UNEP GEF LDCF projects: best practices

Baseline projects Goals and activities	Climate change hazards affecting the baseline projects	Impacts to the baseline projects and targeted populations as a result of climate change	Targeted ecosystem services of the baseline project	Alternative scenario including complementary activities of the LDCF project	Expected LDCF project benefits
<b>Support Programme for Rwanda Reforestation (PAREF &amp; PAREF II)</b> <ul style="list-style-type: none"> <li>Agroforestry and reforestation of public land through Participatory Forest Management</li> </ul>	<ul style="list-style-type: none"> <li>Increased frequency and severity of droughts</li> <li>Increased frequency of intense rainfall events</li> </ul>	<p>Climate change and variability is expected to:</p> <p>Reduce forest productivity and tree seedling establishment as a result of:</p> <ul style="list-style-type: none"> <li>increased temperature and water stress</li> <li>increased incidence of landslides and soil erosion</li> <li>reduced access to those project sites affected by landslides</li> </ul> <p>Increased rate of exploitation of forest resources as a result of:</p> <ul style="list-style-type: none"> <li>increased food insecurity and loss of livelihood due to climate impacts on agriculture</li> </ul>	<p>Increased soil stabilization and availability of woodfuel and timber through reforestation of degraded areas with indigenous and exotic tree species</p> <p>Increased protection of indigenous forest resources by increasing capacity and public awareness of forest management, and promoting alternatives to current patterns of forest use</p>	<p>LDCF resources will be used to build resilience of this baseline project in the following ways:</p> <p>Increased knowledge of and capacity for ecosystem management and climate change adaptation at a local, regional and national level;</p> <p>Restoration and reforestation using climate-resilient, multiple-use indigenous tree species, which will result in:</p> <ul style="list-style-type: none"> <li>Increased stabilisation of erosion- and landslide-prone degraded hillsides;</li> <li>Increased provision of shade for climate-stressed crops;</li> <li>Increased rainwater infiltration; and</li> <li>Improved and diversified livelihoods and increased food security as a result of increased availability of NTFPs.</li> </ul>	<ul style="list-style-type: none"> <li>Increased forest canopy and enhanced seedling survival rate, leading to enhanced water infiltration, reduced soil erosion and protection from floods and landslides.</li> <li>Increased availability of non-timber forest products</li> </ul>

# Monitoring & Evaluation

- Lack of information is a key challenge for EBA implementation - exacerbated by paucity of information from M&E of effectiveness on past and ongoing EBA interventions
- Compilation of indicators and targets in the project results framework, validated by a baseline study
- UNEP uses **a simple quantitative vulnerability index** to assist in monitoring and evaluating project indicators
  - Calculation of the cumulative vulnerability index before and after the project (can be based on several components)
  - Vulnerability index as a function of separate exposure, sensitivity and adaptive capacity indices

**Thank you!**

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