



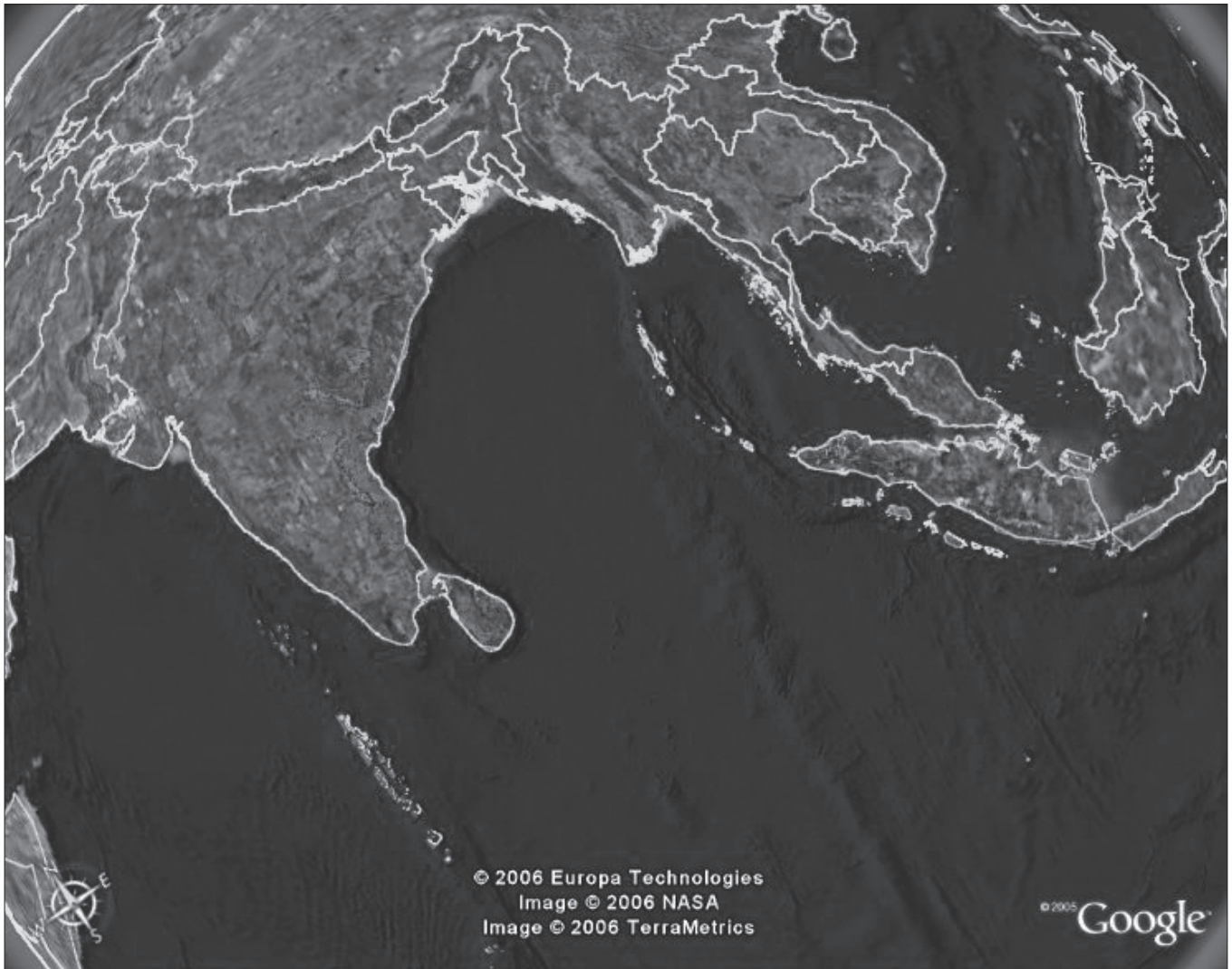
Mangroves for the Future

A strategy for promoting investment
in coastal ecosystem conservation

2007-2012



IUCN
The World Conservation Union



Mangroves for the Future involves countries affected by the 2004 Indian Ocean tsunami. Bangladesh, India, Indonesia, Kenya, Malaysia, Maldives, Seychelles, Sri Lanka, Tanzania and Thailand

Photography of the cover: seascape by Jerker Tamelander, mangroves and fish landing in Sri Lanka by Sriyanie Miththapala

Table of Contents

Acknowledgements	i
SUMMARY: Mangroves for the Future	i
THE SITUATION: Ecosystems and livelihoods in Indian Ocean countries.....	1
The links between ecosystem services and human well-being.....	1
The state of coastal ecosystems and ecosystem services.....	3
The state of livelihoods and human well-being.....	4
Vulnerability and resilience after the tsunami.....	6
Mechanisms for coastal management.....	7
THE NEED: Investment in coastal ecosystem conservation	12
Identifying priorities through consultation	12
Issues and challenges to be addressed	12
Sharing responsibility for the state of coastal ecosystems and livelihoods in Indian Ocean countries	13
Applying a new paradigm: ecosystems as essential “infrastructure” for coastal development.....	14
THE RESPONSE: Mangroves for the Future	16
The initiative.....	16
Goal and objectives	17
Influencing Change.....	17
Building knowledge, strengthening empowerment, enhancing governance	18
THE FRAMEWORK FOR IMPLEMENTATION: partnership and financing	20
Implementation through partnership.....	20
Coordinating national and regional efforts.....	20
Financing mechanisms	21
Phased approach.....	21
Indicative budget.....	22
THE CONSULTATION: organisations who contributed to MFF development ..	23
Bangladesh.....	23
India	23
Indonesia	23
Maldives.....	24
Seychelles.....	24
Sri Lanka.....	24
Thailand	25
Regional and international	25

Acknowledgements

We gratefully acknowledge the assistance and cooperation of many individuals and organisations who have helped in the development of this strategy. The Swedish International Development Cooperation Agency (Sida) provided generous funding to enable the consultations to be carried out and the strategy to be prepared, and the grant support of Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) underpinned the development of information materials on mangroves and other coastal ecosystems which were used in consultations. Acknowledgement is also due to the country offices of the World Conservation Union (IUCN) in Bangladesh, Sri Lanka and Thailand, the United Nations Development Programme (UNDP) country offices in India, Indonesia and Maldives, and the Coordinator of the Disaster Management Branch of the United Nations Environment Programme (UNEP) in Indonesia, for their assistance in arranging country dialogue meetings. UNEP's Disaster Management Branch volunteered a technical expert as a member of the drafting team who prepared this strategy. The United Nations Office of the Special Envoy for Tsunami Recovery facilitated the initial presentation of the Mangroves for the Future initiative in April 2006 and the roundtable meeting at which it was presented to donors in September 2006. Last but not least, thanks should be expressed to the many individuals, organisations and government agencies who gave of their time so freely to share information and ideas on the needs for coastal ecosystem management and sustainable development in Indian Ocean countries.

SUMMARY: Mangroves for the Future

Mangroves for the Future is a partnership-led initiative aimed at promoting investment and action in ecosystem conservation for sustainable coastal development. The Initiative is founded on a vision for a more healthy, prosperous and secure future for all Indian Ocean coastal communities, where all ecosystems are conserved and managed sustainably.

Conserving ecosystems as essential development “infrastructure”

Mangroves for the Future promotes investment in natural ecosystems as essential “infrastructure” for coastal development — in other words, as a vital part of the stock of assets, facilities and services that are needed for the economy and society to function properly. In order to ensure ecosystem productivity and continued support to human development, they need to be maintained and improved to meet both today’s needs as well as future demands and pressures just like any other component of infrastructure. Degrading this valuable stock of natural capital puts a serious strain on the economy and society, at local, national, regional and even global levels — as has become all too apparent in the aftermath of the 2004 Indian Ocean tsunami. The Initiative uses mangroves as the flagship species but works in all types of natural coastal ecosystems.

Addressing long-term threats to coastal ecosystems and livelihoods in tsunami-affected countries

Mangroves for the Future takes a long-term view which addresses the continuing challenges to coastal ecosystems and livelihoods. The tsunami did not create the current problems facing coastal ecosystems and livelihoods, but rather brought them sharply into focus. Although it is impossible to prevent natural disasters from happening, it is possible to take steps to decrease the likelihood of them occurring, to reduce people’s vulnerability to them and to mitigate their impacts. Mangroves for the Future targets countries that are recovering from the Indian Ocean tsunami. Its “focal countries” are among the worst-affected by the 2004 tsunami: India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand. The Initiative will also open a dialogue to share information and experiences with other tsunami-affected countries in the region that face critical ecosystems and livelihood issues, including Bangladesh, Kenya, Malaysia, and Tanzania. Additional countries within the Asia Indian Ocean region will also at a later stage be brought into these dialogues, such as Cambodia, China, Pakistan, the Philippines and Vietnam. An ocean-wide approach will be promoted to coastal management.

Shared objectives and common actions

Mangroves for the Future has two objectives

- to strengthen the environmental sustainability of coastal development, and
- to promote the investment of funds and effort in coastal ecosystem management for sustainable development.

The initiative seeks to effect demonstrable changes and results across four key areas of influence: regional cooperation, national programme support, private sector engagement and community action using a strategy of generating knowledge, empowering institutions and people to use that knowledge, and thereby promoting good governance in coastal areas (see Figure 1.).

Mobilising resources to foster regional action

At the regional level, implementation of the initiative will be overseen by a Regional Steering Committee co-chaired by IUCN – The World Conservation Union and the United Nations

Development Programme (UNDP), which will include representation from national governments, UN agencies and non-governmental organisations. At the national level, Mangroves for the Future will be coordinated and steered through strengthening the existing mechanisms for coastal management which bring together different agencies, sectors and civil society groups. Action at the local level will be implemented through a series of individual actions that are linked by a common goal and strategy, but are spread out geographically, temporally, and in terms of management and implementation responsibility. Many different agencies and organisations will take the lead in implementing these actions.

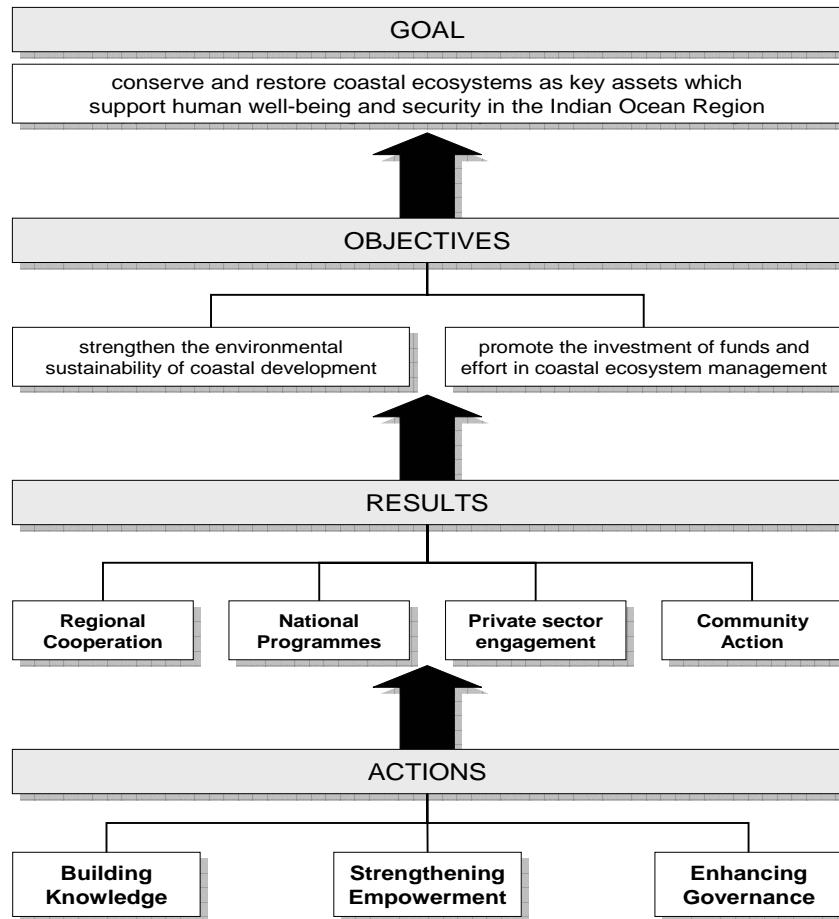


Figure 1. Mangroves for the Future – Initiative Outline

Building a collaborative platform to enhance sustainable coastal development

The initiative builds on the long history of coastal management interventions in the region, as well as from recent lessons learned during the course of post-tsunami reconstruction. This strategy has been developed based on needs and priorities identified during consultations with more than 200 people from over 160 institutions involved in coastal management in Indian Ocean countries, at local, national, regional and global levels. Mangroves for the Future establishes a collaborative platform among the many different agencies, sectors and countries who are addressing coastal ecosystem and livelihood issues, to work towards a common goal.

Promoting investment in ecosystem conservation for coastal development

Immediately after the tsunami, the region saw an unprecedented injection of investment and development projects in coastal areas, prompted by the urgent need to rebuild settlements and

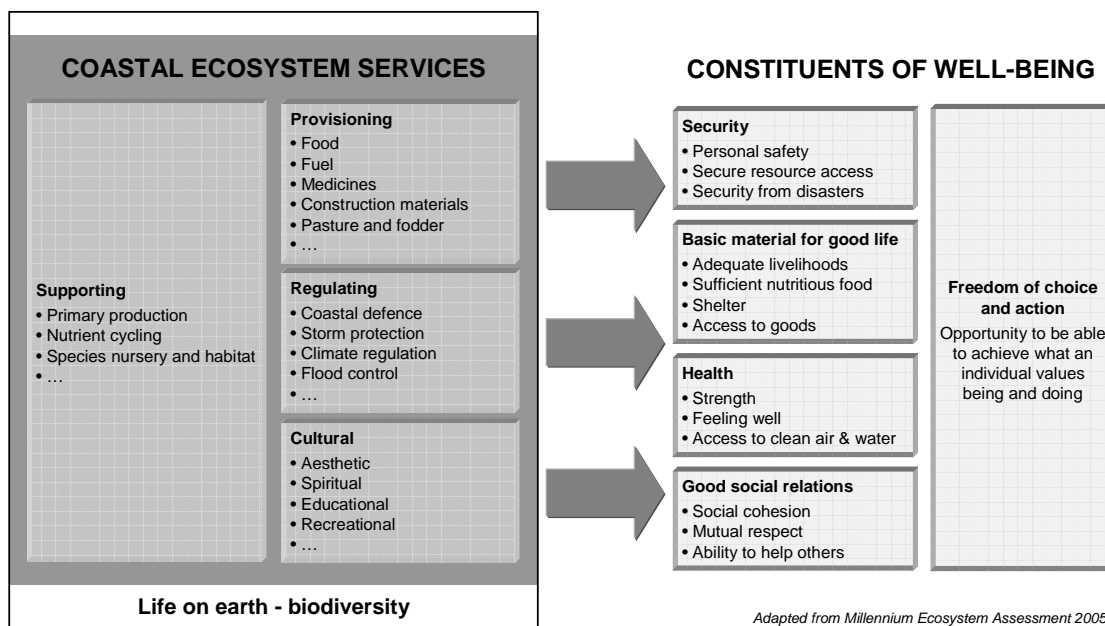
infrastructure, and restore livelihoods. Many of these activities are now winding down — often without having achieved their intended goals, and having raised serious concerns about long-term impacts. Mangroves for the Future aims to address the need for better regional and national coordination as well as the need for sustained investment in coastal ecosystem management for sustainable development. The estimated funding requirements of Mangroves for the Future for 2007-2012 are USUS\$62 million.

THE SITUATION: Ecosystems and livelihoods in Indian Ocean countries

The links between ecosystem services and human well-being

Ecosystem health and human livelihoods are intimately interrelated. Coastal ecosystems underpin human well-being (including the basic material needs for a good life, health, good social relations, security, and freedom of choice and action) through providing provisioning, supporting, regulating and cultural services (Figure 2). Many types of coastal ecosystems provide these benefits, including mangroves and other coastal forests and wetlands, estuaries, lagoons, sandy beaches, sand dunes, coral reefs and seagrass communities.

Figure 2. Links between coastal ecosystem services and human well-being



There are ample examples of the ways in which coastal ecosystem services underpin human wellbeing in Indian Ocean countries. Mangroves, for instance, provide a home to many commercially important species, such as finfish, crustaceans and molluscs, and yield an array of products such as food fish, timber, fuel wood and medicines.

Most people are well aware of the importance of resource-based industries such as fisheries and tourism to coastal economies. There is perhaps less comprehension of just how important these goods and raw materials are in terms of their multiplier effects at national and local levels. In the Seychelles, for example, coastal and marine biodiversity contributes a quarter of all employment opportunities, one third of government revenues, and two thirds of foreign exchange earnings¹. In parts of Indonesia, traditional use of mangrove products contributes up to a half of income among the poorest households², and in southern Thailand is thought to generate products worth almost a quarter of per capita GDP among coastal villages³.

What is much more poorly understood is the enormous contribution that coastal ecosystems make in safeguarding production and consumption, reducing vulnerability, strengthening resilience, and mitigating disasters — their supporting and regulating roles. Mangroves and other ecosystems also protect against extreme weather events; they act as barriers or buffers which moderate the action of waves and consequently limit both coastal erosion and storm damage; they function as sponges to minimise the impact of floods; they trap and retain

sediments that are carried in by rivers and floodwaters; and they trap carbon and other minerals and convert these to useful nutrients. Their role as a carbon sink is a service of particular global importance — mangroves and their soils are the second largest repository of terrestrial sequestered carbon after tropical forests.

These services have an immense economic value. Large-scale fisheries, tourism, mining and shipping industries generate high levels of income, employment and foreign exchange earnings, and some of the region's major centres of commerce and industry are located on the coast. The coastal regions of Sri Lanka, for example, encompass 22% of total land area, 32% of the country's population, 65% of urbanised areas, and contain 4 out of the 6 cities; over 80% of tourist hotel rooms, and two thirds of all industrial production in the country⁴. Many households in Indian Ocean countries, particularly the poor, depend on the natural resource base for their day-to-day survival. Fishing provides a basic source of food and income for 13 million people, and various other marine and coastal species are also exploited both for subsistence and for commercial purposes. Plant and animal products provide important sources of food, energy, building materials, medicines and livestock fodder at the household level.

In Indian Ocean countries, the coastal environment is the cornerstone of an extensive tourist industry that was devastated by the tsunami. For example marine and coastal tourism, the largest industry in the Maldives, directly accounts for 20% of GDP and its wider effects help produce 74% of national income⁵. Tourism contributes more than 60% of foreign exchange receipts, over 90% of government tax revenue comes from import duties and tourism-related taxes, and almost 40% of the workforce is employed in the industry. As a result of the tsunami, 2005 visitor exports were expected to fall 29.9% from pre-Tsunami growth forecasts, while government expenditures and capital investment are expected to increase 6.6% and 14.6% respectively — the bottom-line impact was predicted at a loss of 30% or US\$55 million in tourism industry contribution to 2005 GDP and 10,440 jobs⁶.

In addition, the benefits of mangroves for shoreline protection and storm damage control have been estimated to run into tens of thousands of dollars per km² in Sri Lanka⁷ and Malaysia⁸. Studies carried out in Vietnam show that the net present value of mangroves in protecting against extreme weather events lies at around US\$5,000 per square kilometre⁹. In Sri Lanka, costs and damages arising from the degradation of coastal wetlands rise to hundreds of thousands of dollars per hectare in terms of lost water purification and flood attenuation services¹⁰.

Ecosystems need to be maintained in a good state — and even improved — if they are to continue to provide these essential services to humankind. Mangroves and other coastal forests and wetlands, estuaries, lagoons, sandy beaches, sand dunes, coral reefs and seagrass communities have all been under threat for decades from ill-planned and unsustainable development activities, and these pressures continue to escalate and intensify in Indian Ocean countries — with devastating impacts on the region's rich, productive and fragile natural ecosystems. The 2004 tsunami and its tragic consequences drew attention to the vulnerability of tropical coastal ecosystems, and the dangers of undermining the services they provide to humans

The state of coastal ecosystems and ecosystem services

The countries participating in *Mangroves for the Future* have a combined coastline length exceeding 140,000 km, and a territorial sea area of almost 4 million km² (Box 1). They encompass some of the most extensive, and biodiverse, tropical coastal and marine ecosystems in the world, containing more than 65,000 km² of mangroves¹¹ (more than a third of the world's total) and just under 80,000 km² of coral reefs¹² (30% of total). Indonesia alone has up to a quarter of the world's mangroves¹³.

To the south east, the seas hold some of the highest coral reef biodiversity in the world, with Thailand and Indonesia forming major centres of diversity. To the centre and north, the massive arc of reefs comprising Lakshadweep, the Maldives and the Chagos Archipelago, has some of the world's largest atoll structures and together with Sri Lanka, has been identified as one of ten global priority areas for coral reef conservation¹⁴. More than 50 of a total of 70 known mangrove species are present, almost 6,000 fish species have been documented, and there are known to be at least 80 species of hard corals¹⁵. In the Maldives alone a staggering 1,200 fish species have been recorded to date. In the Western Indian Ocean, the mainland coast of East Africa and islands of the Western Indian Ocean also have extensive reefs. These highly productive ecosystems provide a habitat for many rare, endangered and important species. In India, for example, mangrove ecosystems are known to host almost 4,000 species of fauna and flora¹⁶.

Box 1. Indian Ocean Ecosystems: key data

	Coastline length (km)	Territorial sea area (km ²)	Mangroves (km ²)	Coral reefs (km ²)	Marine & littoral Protected Areas (no.)
Bangladesh	3,306	40,257	5,767	50	5
India	17,181	193,834	6,700	5,790	120
Indonesia	95,181	3,205,695	42,550	51,020	116
Kenya	1,586	12,382	530	630	11
Malaysia	9,323	152,367	6,424	3,600	67
Maldives	2,002	125,858	n/d	8,920	n/d
Seychelles	747	45,411	29	1,690	10
Sri Lanka	1,340	30,544	89	680	19
Tanzania	3,461	36,578	1,155	3,580	8
Thailand	7,066	75,876	2,641	2,130	19
TOTAL	141,193	3,918,802	65,885	78,090	375

Source: Spalding MD, Ravillious C, Green EP (2001) *World Atlas of Coral Reefs*; World Resources Institute www.earthtrends.wri.org/

With the exception of some isolated atolls, all reefs and mangroves lie on or adjacent to the coast, and more than half occur within 25 km of urban centres inhabited by 100,000 people or more. These rich and fragile ecosystems are under serious threat, and show steep downward trends in terms of area, species diversity and general integrity. In tropical countries, rates of loss of mangrove forest exceed those of reefs and rainforests¹⁷. Between 1980 and 2000, 28% of the total area of mangroves in Indonesia, Sri Lanka, India and Thailand was lost¹⁸. In addition to over-exploitation and clearance for settlement and industry, conversion to shrimp farms is a major cause, estimated to account for almost 30% of losses¹⁹.

Human activities are thought to have put more than half of reefs in Southeast Asia at "high" or "very high" risk. As well as being affected by human-induced factors such as land-run off, other forms of pollution and over-exploitation, more than half of the coral reefs in the region were severely damaged by the massive El Niño related bleaching mortality event in 1998²⁰. Coral reefs worldwide are apparently undergoing an ecological "phase shift", from framework building coral species to algal-dominated communities. This is the result of a combination of factors, the most important of which are over-fishing and nutrient enrichment — which will not only compromise their ability to keep pace with sea level rise, but will ultimately lead to loss of the many species that shelter and feed in the structure of a coral reef.

In addition to habitat loss and degradation noted above, causes of coastal ecosystem changes include pollution; resource overexploitation; invasive species, and climate change.

A critical transboundary pollution issue concerns the suspended solids generated by large-scale land-use changes, including infrastructure development, deforestation and agriculture. Marine litter is also a growing problem, polluting the coast as well as adversely affecting submerged species and habitats, and undermining ecosystem functioning.

Fish catch has escalated rapidly in recent years across the Indian Ocean region, and fisheries are generally considered over-exploited. Over-fishing is primarily caused by the excessive fishing effort of industrial fishing fleets, but small-scale fishers also overexploit near-shore fish stocks. An increasing number of fishers throughout Asia are using destructive fishing methods to supply the global aquarium trade, and to meet the growing and lucrative export market for live seafood in China and other parts of Asia²¹.

There are already indication that the growing impacts of climate change are being felt across the Indian Ocean region, especially the island states. A recent publication reports that as a result of climate change, sea level changes could lead to the additional loss of mangrove area²². In addition, the effects of climate change are likely to cascade into those of the other drivers of ecosystem loss, compounding the result.

In certain locations, particularly near the epicentre of the earthquake, the Indian Ocean tsunami caused immediate and extensive damage to coastal and marine ecosystems. In many cases natural ecosystems acted as buffers which took the major force of the waves themselves, or were affected by the silt loads and rubble carried by the wave. Mangroves and other ecosystems became further threatened, and degraded, as post-tsunami reconstruction took place. Land in coastal areas is scarce and under heavy demand, and in several areas mangroves and other natural ecosystems have been destroyed or degraded as infrastructure and settlements were rehabilitated and relocated, often in an unplanned or poorly planned manner.

The state of livelihoods and human well-being

The coasts of Indian Ocean countries host a striking concentration of human settlement and economic activity. Of a total population of just under two billion people in the countries participating in Mangroves for the Future, almost 40% — more than 625 million — live within 100 km of the coast (Box 2). Coastal settlements are diverse in socio-economic terms, ranging from large cities to remote villages, and contain a wide array of ethnic groups, economic activities, land and resource use patterns. They typically make a significant contribution to regional, national and local economies.

The human population in the region has been rising rapidly. Rates of population growth are particularly high in coastal areas. At the same time coastal zones are becoming increasingly urbanised, reflecting intensifying levels of industry and commerce, and witnessing high rates of immigration from rural parts of the coast and from inland areas.

Development patterns and trends are extremely unequal in Indian Ocean countries. GINI index

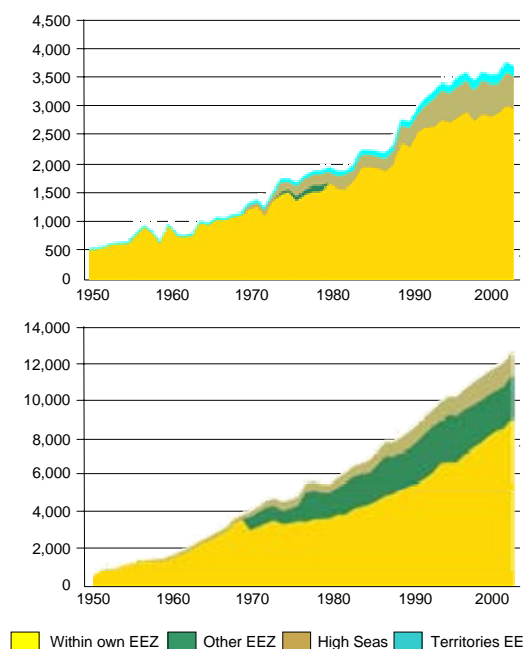


Figure 3. Fish catches by SAARC and ASEAN countries (tonnes)

Source: UBC Sea Around Us project

measures (indicating the distribution of income or consumption among individuals) all fall below 50%, and according to UNDP's Human Development Index all of the Asian countries participating in Mangroves for the Future are classified in the medium human development category, while the two mainland African countries fall within the low human development bracket (Figure 4).

While some sectors of the coastal population enjoy a high standard of living, the incidence of poverty remains high. Large stretches of the coastline are relatively isolated from mainstream economic activity,

infrastructure and services, and the livelihoods of many residents are subsistence-based. National poverty estimates in the participating countries suggest that as many as 230 million people are living in coastal areas on less than the equivalent of US\$1 per day. These poor people often reside in marginal areas, where health conditions and sanitation facilities are bad, and access to safe drinking water and other essential services is unreliable.

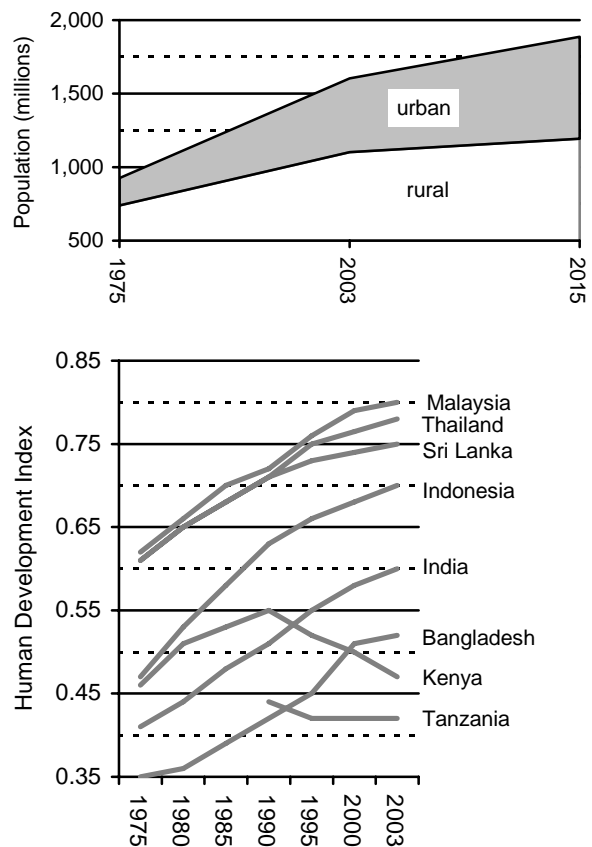
Side by side with these trends of increasing urbanisation, industry and integration with the market and global economy, poverty in coastal areas remains widespread, and in some cases is worsening. Although some progress has undoubtedly been made over the last decades in improving basic welfare (at least in South and Southeast Asian countries), progress towards the Millennium Development Goals, agreed by governments in 2000, has been patchy (Table 1). There is ample evidence that many coastal residents still face glaring inequities in terms of their access to income, employment and the basic services required for an adequate standard of life.

Box 2. Indian Ocean livelihoods and well-being: key data

	Per capita GDP (US\$, PPP)	Human Development Index (ranking among 177 countries)	Gini index of inequality of wealth distribution	Population below national poverty line (%)	Coastal population (% of total)	Coastal population (millions)	Persons engaged in fisheries ('000)
Bangladesh	1,770	139	31.8	51	55	75.7	1,321
India	2,892	127	32.5	36	26	279.9	5,959
Indonesia	3,361	110	34.3	36	96	205.9	5,119
Kenya	1,037	154	42.5	52	8	2.5	60
Malaysia	9,512	61	49.2	16	98	24.3	101
Maldives	n/d	96	n/d	15	100	0.2	19
Seychelles	n/d	51	n/d	n/d	100	0.1	1
Sri Lanka	3,778	93	33.2	25	32	6.1	146
Tanzania	621	164	38.2	36	21	7.6	93
Thailand	7,595	73	43.2	13	39	24.0	355
TOTAL				36	39	626.2	13,171

Source: World Bank (2005) World Development Indicators; UNDP (2005) Human Development Report; World Resources Institute www.earthtrends.wri.org/

Figure 4. Population and human development trends in Indian Ocean countries



Source: UNDP (2005) Human Development Report

Table 1. South and Southeast Asia: Progress towards the MDGs

Goal 1: Eradicate extreme poverty and hunger	Progress in both regions. The main driver has been the economies of China and India.
	Progress has been made in Southeast Asia on decreasing hunger but in South Asia the number of hungry people has increased by tens of millions
	Conflict and extreme events such as the tsunami were identified as exacerbating the situation for poverty and hunger in South Asia
Goal 2: Achieve universal primary education	Four out of ten children not attending school live in South and Southeast Asia
Goal 3: Promote gender equality and empower women	While Southeast Asia has nearly achieved this goal, South Asia is the region with the poorest performance in its implementation.
Goal 4: Reduce child mortality	While Southeast Asia is making good progress, more than a third of all deaths in children under 5 occur in South Asia and a drastic reduction in mortality will need to occur
Goal 5: Improve maternal health	
Goal 6: Combat HIV/AIDS, malaria and other diseases	HIV/AIDS prevalence has increased in both South and Southeast Asia and significantly so in South Asia. Malaria cases show a downward trend in most countries in the region.
Goal 7: Ensure environmental sustainability	The proportion of land covered by forests in Southeast Asia is decreasing (down to 49%) while that in South Asia is stable but only 13% of land area
	The amount of protected areas has increased slightly, but remains below the 10% target set by IUCN
	Good progress is being made in both regions with respect to access to water and sanitation
	The number of urban dwellers living in slums is increasing in both regions
Goal 8: Develop a Global Partnership for Development	Youth unemployment is increasing in both regions with a doubling in Southeast Asia between 1993 and 2003.

Source: UN (2005)

Vulnerability and resilience after the tsunami

It is against this backdrop of widespread poverty and high dependence on a fragile coastal resource base that the earthquake and subsequent tsunamis of 26 December 2004 took place.

Some quarter of a million people lost their lives, and almost 1.75 million were displaced. More than 1.8 million people's homes were destroyed, between five and six million needed food, water and medical supplies, and it is estimated that the livelihoods of one million people were eliminated²³. For the five countries worst affected by the tsunami — India, Indonesia, Maldives, Sri Lanka and Thailand — the cost of tsunami-related damages and losses is estimated at almost US\$10 billion²⁴ (Box 3). The tsunami left a coastal population that was severely weakened and disrupted in social, economic and livelihood terms.

Box 3. The Indian Ocean tsunami: key data

	Number of people dead or missing	Damages and losses (% of GDP)	Damages and losses (US\$ millions)	International funding (% of total)	International funding (US\$ million)
India	16,269	0.2%	1,224	13.2%	1,857
Indonesia	167,540	2.0%	4,451	37.2%	5,233
Maldives	108	83.6%	603	2.5%	352
Sri Lanka	35,322	7.6%	1,454	23.5%	3,306
Thailand	8,212	1.4%	2,198	0.7%	98
TOTAL	227,451		9,930	77.1%	10,846

Source: Telford J and Cosgrove J (2006) Synthesis Report. Tsunami Evaluation Coalition, London

The Indian Ocean tsunami was an extreme event, which had devastating consequences. It however demonstrates the vulnerability of the Indian Ocean's coastal populations to both natural and man-made disasters and hazards. History shows that the countries participating in Mangroves for the Future face recurrent risks from natural forces (such as cyclones, typhoons,

earthquakes, fires, tidal surges and floods) and as a result of human-induced disasters and shocks (such as climate change, oil spills, marine pollution and coastal erosion).

A recent study shows that disasters have risen in frequency from fewer than 100 in 1975 to more than 400 in 2005. Though the number of earthquakes has remained relatively constant, the number severe weather events and flooding has risen sharply. Approximately 2.6 billion people were affected by disasters over the past 10 years, compared to 1.6 billion in the previous decade²⁵. Tropical storms are forecast to become even more frequent and intense²⁶, and sea levels and surface temperatures are both rising²⁷. Seismological and geological evidence shows that the fault off the coast of Sumatra and Java is likely to experience further earthquakes in the relatively near future²⁸. All of these forces will have major impacts on coastal ecosystems and communities in Indian Ocean countries.

The majority of coastal dwellers remain extremely vulnerable to such events. As was illustrated so graphically in the case of the 2004 tsunami, pre-existing economic, social, political and environmental vulnerabilities compound and exacerbate the impact of disasters, prolong their effects, and undermine the capacity of people to survive and recover from disasters. In particular, poorer groups, women and children tend to suffer disproportionate effects from disasters.

Vulnerability is created by factors including poverty, weak governance, political instability, unsustainable livelihoods, conflict and environmental degradation. These factors also determine the extent to which people can protect themselves and recover. In addition to the worrying trends in these root causes of vulnerability among the countries participating in *Mangroves for the Future*, recent studies²⁹ suggest that since the 2004 tsunami local preparedness for disaster has not been enhanced, and little progress has been made in reducing the longer-term vulnerability of coastal populations. High density and poorly planned developments and infrastructure located in close proximity to the shoreline typically suffered greater impacts as a result of the tsunami and other disasters. The poor, living in already marginalised conditions, lacking a robust livelihood base, and having weak access to basic services, tend to be hit especially hard by — and find it particularly hard to recover from — such shocks and disruptions.

A general consensus has emerged, post-tsunami, that unless development and reconstruction efforts address the broader — and continuing — conditions of poverty and needs for continuing development support, coastal populations will remain weak, and the long-term returns from this huge inflow of funding for post-tsunami reconstruction may fail to reach their targets and full potential. After the tsunami, despite the massive efforts to reconstruct and rebuild affected communities and infrastructure, a large proportion of the coastal population in South and Southeast Asia and the Western Indian Ocean regions remain highly vulnerable and ill-equipped to withstand the effects of further shocks and disasters.

Mechanisms for coastal management

Government approaches to integrated coastal management

For countries participating in *Mangroves for the Future*, the overall mandate for directing, regulating and coordinating both development and conservation activities in coastal areas lies with national government, often implemented through a decentralised administrative structure. A complex institutional, legal and policy framework guides activities in coastal zones, with specific instruments directing the various ministries and line agencies (at both national and sub-national levels) who have jurisdiction over different sectors, resources or activities (for example agriculture, water, fisheries, aquaculture, urban, forests, tourism and wildlife). In many cases this gives rise to competing, and even conflicting, mandates and goals in coastal management.

In order to minimise competition and conflict, and to introduce some form of coordination between the actions of different sectors and managing authorities, most governments have adopted an integrated approach to coastal management (Table 2). An umbrella institution,

policy and legislation which is specifically concerned with coastal areas has often been established. The large number of sectors involved in the coastal zone however means that institutional arrangements for integrated and effective management are often difficult and in many countries are still at an experimental stage, with regular restructuring taking place.

Table 2. National frameworks for integrated coastal management

	Principal agency and legal instrument	Other agencies	Key features
India	Ministry of Environment and Forests (MoEF). The Environment (Protection) Act, 1986, amended 1991. Coastal Regulation Zone Notification, 1991. The Indian Forest Act, 1927. The Indian Wildlife (Protection) Act, 1972, amended 1991	State Government Departments of Forests – responsible for mangroves and Protected Areas. National Committee on Mangroves (established by MoEF). State Government Fisheries Departments. Department of Environments of State Governments.	Each State has a conditionally approved Coastal Zone Management Plan, but has to prepare revised versions. A national and 13 state level Coastal Zone Management Authorities have been established.
Indonesia	Ministry of Marine Affairs and Fisheries.	Forest Dept (and National Mangrove Working Group); BAPPENAS – National Development Planning Board	National Integrated Coastal Management legislation in preparation; implementation decentralised to Provincial and District levels; Draft National Strategy for Mangrove System Management awaiting approval
Maldives	No focal agency or co-ordinating body; Fisheries Law 5/87	Ministry of Environment, Energy and Water (mangroves and protected areas); Ministry of Fisheries, Agriculture and Marine Resources. Coastal developments on inhabited islands are controlled by the Environment Ministry and the Atolls Ministry. Coastal developments in resorts are controlled by the Tourism Ministry	No coastal zone management programme or plan at present, although there have been programmes in the past aimed at building capacity for this. Integrated Coastal Management not practiced, except to the extent that it applies to Fisheries under the Fisheries Law 5/87
Seychelles	Department of Environment. The coastal zone is legally recognised as a management unit under the Environment Protection Act (1994).	Port and Marine Services, Seychelles Fishing Authority, Marine Parks Authority, Ministry of Tourism and Civil Aviation, Seychelles Housing Authority, and inter-ministerial committees and institutions including the Town and Country Planning Authority, the Natural Resource Committee and the Climate Change Committee	Environmental Engineering Section in the Department of Environment tasked with implementing and coordinating coastal zone management activities
Sri Lanka	Coast Conservation Dept (CCD), Ministry of Fisheries and Aquatic Resources; Coast Conservation Act no 57 of 1981 mandates the CCD to periodically revise and update the national Coastal Zone Management Plan	Ministry of Environment is the leading policy making institution responsible for protection and improvement of the environment of the country; Ministry of Fisheries and Aquatic Resources: responsible for fisheries	Coastal Zone Management Plan now in third revision; Special Area Management (SAM) concept is now a key component of Sri Lanka's coastal zone management policy. 23 priority SAMs identified but only a few at present are being implemented.
Thailand	Dept of Marine and Coastal Resources, Ministry of Natural Resources and Environment (MoNRE) (est. 2002) – responsible for mangroves, and for conservation of marine resources. At least 20 existing laws apply in the coastal zone, but there is no framework legislation or mechanism for coordinating implementation.	Royal Forest Dept, MoNRE; Fisheries, Ministry of Agriculture and Cooperatives; Dept of National Parks, MoNRE; Office of Environmental Planning and Policy	Draft Promotion of Marine and Coastal Resources Management Act completed in July 2006 and submitted for consideration; National Coastal and Marine Policy completed in 2004, but not yet adopted

There is wide variation in the interpretation of the concept and application of integrated coastal management³⁰, reflecting differing national conditions, needs and administrative, legislative and institutional set-ups. Sri Lanka has one of the most long-established integrated coastal management planning, legal and institutional frameworks in the region. India is currently

revising coastal zone legislation, with a view to determining coastal area according to a vulnerability line, and to promoting a more participatory approach to decision making and planning. Both Indonesia and Thailand are in the process of developing institutional and legal frameworks for integrated coastal management. In the Seychelles, a coastal zone management unit was created in the Department of Environment in 2002 to implement and coordinate coastal zone management activities. In 2006, this unit was upgraded to the Environmental Engineering Section, tasked with addressing the main issues with coastal degradation and better management of the coastal environment, including addressing post-tsunami rehabilitation and restoration. As yet, the Maldives has no single agency responsible for coastal management, and there is no co-ordinating body.

Regional cooperation

The countries of the Indian Ocean are inextricably linked to each other by the fluid nature of the marine environment, both physically and ecologically. Coastal conservation and development activities that take place in one country have direct effects on the status of ecosystems and livelihoods in neighbouring countries. In addition to the national coastal zone management frameworks which govern policy, planning and practice in each country, a number of inter-governmental bodies and agreements link the efforts of different countries and provide for regional collaboration in coastal management. Most of these mechanisms for cooperation are based around the four regional groupings that the countries participating in Mangroves for the Future are members of: the Association of Southeast Asian Nations (ASEAN), the South Asian Association for Regional Co-operation (SAARC), the Indian Ocean Commission (COI), and the East African Community (EAC) (Table 3, next page).

Actions by non-governmental organisations and international agencies

A large number of bilateral and multilateral international agencies provide funding to, and in many cases exert a strong influence over, coastal zone development processes in Indian Ocean countries. This ranges from grant and loan support to infrastructure and large-scale developments (the Asian Development Bank, World Bank and various bilateral donors are particularly active in this area), through initiatives aimed at strengthening agriculture, fisheries and poverty reduction initiatives (for example from UNDP, IFAD and FAO), to activities concerned with disaster preparedness and risk reduction (such as by the member organisations of the Inter-Agency Task Force on Disaster Reduction).

Numerous national NGOs and Community Based Organisations are involved throughout the region in coastal management, providing a long-term source of capacity and support for ecosystem conservation and sustainable livelihood development. In many cases they play an important role in helping to address the gaps in capacity, coordination and participation which exist in the public sector. Various international non-governmental organisations also support coastal management in the region. For many decades, projects and programmes have been implemented to support the conservation and sustainable use of natural resources (for example by Conservation International, Fauna and Flora International, The Nature Conservancy, Wetlands International (leading the Green Coast Initiative), WWF, and by the World Conservation Union (IUCN)), as well as to strengthen sustainable livelihood development in coastal areas (such as through the work of CARE International, International Federation of Red Cross and Red Crescent Societies and Oxfam).

Post-tsunami challenges in coastal management

After the 2004 tsunami, many of the actors in coastal management quickly became involved in the reconstruction process, in many cases re-orienting their long-term programmes of work to meet immediate needs. They were joined by various organisations which were new to the region or to coastal management issues, or which had been formed specifically in response to the tsunami and to the large inflow of funding associated with it. Approximately US\$14 billion was given in international aid to the post-tsunami reconstruction effort, plus significant cash and in-kind contributions from the national governments of affected countries, NGOs and members of the general public³¹.

Table 3. Indian Ocean countries: intergovernmental bodies and regional cooperative agreements for development, conservation and coastal management

	Agreement	Countries	Goals
South Asia	South Asian Association for Regional Co-operation (SAARC)	Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka, Pakistan	Established 1985 as an intergovernmental body to accelerate the process of economic and social development in Member States. Includes coastal zone management centre (based in Maldives)
	South Asia Co-operative Environmental Programme (SACEP)	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka, Pakistan	Inter-governmental organization, established in 1982 to promote and support protection, management and enhancement of the environment.
	South Asian Seas Action Plan	Bangladesh, Maldives, Pakistan, Sri Lanka, India	Adopted March 1995 under the UNEP Regional Seas Programme. No related convention.
Southeast Asia	Association of South East Asian Nations (ASEAN)	Cambodia, Indonesia, Malaysia, Singapore, Thailand, Philippines, Vietnam	Established 1967 as an intergovernmental body for the promotion of regional economic growth, social progress, cultural development, peace and stability. Includes working group on coastal and marine environment.
	East Asian Seas Action Plan	Indonesia, Malaysia, Singapore, Thailand, Philippines	Adopted in 1981 under the UNEP Regional Seas Program; as yet there is no related convention.
	Partnerships in Environmental Management for the Seas of East Asia	Cambodia, Thailand, Indonesia, Malaysia, Singapore, Philippines, Vietnam	Established in 1999 to help implement the East Asian Seas Action Plan.
	Putrajaya Declaration	12 countries of the East Asian region, plus Japan and Dem Rep Korea	Signed 2003, commits countries to fulfilling their obligations under the WSSD, for marine biodiversity
Western Indian Ocean	Indian Ocean Commission (COI)	Comores, Madagascar, Mauritius, Mayotte, Réunion, Seychelles	Established 1984 as an intergovernmental organisation to encourage regional cooperation in diplomacy, economic and commercial affairs, agriculture, maritime fishing, conservation of resources and ecosystems, cultural, scientific, technical, educational and judicial fields.
	East African Community (EAC)	Kenya, Tanzania, Uganda	Re-established via a treaty signed 1999, involving programmes of co-operation in political, economic, social and cultural fields, research and technology, defence, security, legal and judicial affairs.
	Nairobi Convention and East African Action Plan	Comores, Kenya, Mauritius, Madagascar, Mozambique, Réunion, Seychelles, Somalia, South Africa, Tanzania	UNEP Regional Seas Programme and Convention adopted 1985, with an active programme on coastal management and marine biodiversity protection

Although only a small proportion of total funding raised was allocated to addressing environmental concerns, a number of new or continuing initiatives specifically targeted ecosystem aspects (both dealing with tsunami-related damage, as well as with the environmental impacts of reconstruction itself). A recent review³² has, for example, registered more than 60 projects and agencies dealing with post-tsunami mangrove restoration activities. Due to the immediate needs of post-tsunami reconstruction, many of these efforts at environmental restoration and rehabilitation were guided by a short-term planning perspective. Currently, many remain incomplete, unfinished, or have failed to achieve their intended impacts. The valuable work and progress in incorporating environmental concerns into coastal planning and development, that had been sparked off by the immediate needs of post-tsunami reconstruction, may be lost — while the pressures and threats that they addressed would continue unabated..

There have been concerns about both the immediate and continuing impacts of some of the activities undertaken as part of the post-tsunami recovery effort. As well as leading to short-term distortions in employment, price and market conditions, major apprehensions have been raised about the targeting and sustainability of some of the relief provided — and the extent to which it will actually lead to long-term improvements in the welfare of coastal populations. There is widespread criticism that governments and international agencies failed to ensure that funding was needs-based, that significant imbalances exist in the allocation and distribution of funds to affected communities, and that certain “livelihood support” activities may have been misplaced. In many cases, reconstruction efforts were also carried out without due attention to environmental issues.

Ecosystem issues that were targeted in the aftermath of the tsunami — such as restoring sustainable livelihoods, reducing pressures on the natural resource base, and minimising the negative environmental impacts of settlement and infrastructure — are long-term in nature. They existed before the tsunami, intensified during the course of post-tsunami reconstruction, and will continue well into the future. At the same time, problems in capacity, coordination and information-sharing which were faced in the course of addressing post-tsunami environmental concerns are indicative of broader constraints to integrated coastal management.

THE NEED:

Investment in coastal ecosystem conservation

Identifying priorities through consultation

Particularly since the 1980s, much attention has been paid to the management of coastal development in Indian Ocean countries. There is a long history of efforts, by various countries and agencies, to address the needs and tensions which arise in the course of managing and using the region's coastal resources. The December 2004 tsunami, and the subsequent reconstruction process, brought many of these issues in coastal management to the foreground.

The demand for an initiative such as Mangroves for the Future emerged one year after the tsunami. Over the course of 2005 the region had seen an unprecedented injection of investment and projects into coastal areas, prompted by the urgent need to rebuild settlements and infrastructure, and restore livelihoods. At the same time, there was a greatly increased recognition of the importance of natural ecosystems in coastal areas. New partnerships were formed to deal with environmental aspects of post-tsunami reconstruction, and fresh programmes of work were initiated.

As the post-tsunami reconstruction effort winds down, coordination between the actors involved in environmental aspects of coastal zone management remains weak. There is little sharing of lessons learned or insights gained into coastal management (including lessons learned before the tsunami, as well as in the course of the reconstruction process), and there is scant evidence that funds (including the massive injection of resources for post-tsunami reconstruction) are being directed to where they are most needed, and can have the most positive impact.

An initial meeting to communicate these regional messages and needs to senior decision-makers, donors and international agencies was convened jointly by IUCN and the UN Office of the Special Envoy for Tsunami Recovery on April 24 2006, in New York. About 25 representatives from the governments of tsunami-affected countries and from international agencies endorsed the initiative, and expressed their eagerness to participate and collaborate in its further development.

Having received this high-level support, between May and August 2006 a process of detailed consultation and dialogue was conducted to develop the Initiative. Mangroves for the Future was designed in consultation with the many different agencies, sector and countries engaged in coastal management and post-tsunami reconstruction. It aims to build a common platform for action. IUCN and UNDP, as two institutions who have long been working in the region, are bringing together different stakeholders in the development and conservation arena to facilitate a process of turning the needs into a concrete strategy and plan for action.

Consultations involved several hundred stakeholders from coastal areas and capital cities of Bangladesh, India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand, as well as international and regional experts and agencies. This dialogue identified ongoing programmes of work, experiences and lessons learned, perceptions of needs and priorities for coastal ecosystem and livelihood support, and specific interests in participating in Mangroves for the Future. These consultations resulted in the development of this strategy.

Issues and challenges to be addressed

The regional consultation and dialogue, and the review of the status and trends in ecosystems, livelihoods and coastal management in Indian Ocean countries, highlight a situation of high human dependence on a rich natural resource base. Yet, despite comprehensive institutional, policy and legal frameworks for coastal management and development in many countries, these benefits are being threatened by growing social, economic and political pressures. Human needs and aspirations continue to intensify, and coastal areas are increasingly subject to national, regional and even global demands on resources.

A development imperative which largely bypasses environmental concerns, combined with weak governance and widespread poverty, has resulted in ecosystem loss and degradation — which in turn has undermined economic and social stability, and increased the vulnerability of coastal populations. The tsunami did not create these problems, but brought them sharply into focus.

Long-term action is needed to address and overcome the high incidence of poverty and livelihood insecurity in coastal areas, as well as the threats to coastal ecosystems, which include:

- Unsustainable development processes and policies (at local, national and global levels) causing conversion, degradation and depletion of the natural environment.
- Poor coordination, overlapping jurisdictions and often conflicting interests in coastal management, resulting in development processes which impact negatively on ecosystems and livelihoods, and accord a low priority to ecosystem conservation policies and budgets.
- Weak governance at the national level, resulting in a failure to enforce or implement environmental policies and laws effectively.
- Unequal participation and benefit among civil society groups in coastal conservation and development decision-making causing increasing inequity among coastal populations.
- Inadequate regional collaboration in environmental matters, resulting in a lack of effective action to address common concerns and sensitive issues, or to promote joint action on matters of shared interest.
- Gaps in capacity, knowledge and empowerment among coastal ecosystem managers and users, resulting in conservation and development efforts which fail to maximise positive social, economic and ecological impacts.

Sharing responsibility for the state of coastal ecosystems and livelihoods in Indian Ocean countries

Mangroves for the Future is founded on a regional approach, strengthening efforts at sustainable coastal management across countries, sectors, agencies and levels of scale. It also provides an important mechanism for supporting the implementation of activities to assist countries to meet their national commitments to coastal ecosystem conservation and livelihood development. The initiative however recognises that many of the threats and issues concerning Indian Ocean ecosystems and livelihoods are not just local, national or regional in terms of their causes and effects, but also arise from (and impact on) global processes and actions.

The pressures and unsustainable demands on coastal resources and ecosystems are in part driven by markets and mandates which originate outside the region. These threats arise from forces such as consumer demands for particular products and services, unsustainable and inequitable patterns of trade and investment, industrial and commercial development, and climate change.

There are considerable global benefits from ensuring that coastal areas are conserved and managed sustainably. The natural resource base in Indian Ocean countries underpins substantial commerce and exports which benefit the international economy and residents of other countries: for example through fisheries production and tourism activities. The region's biodiversity is of global significance, and includes large and relatively pristine ecosystems, rare, endangered and threatened species. Their degradation is an issue of global concern: both in terms of the loss of valuable natural resources (which in some cases are found nowhere else on earth), and also due to increased vulnerability, disasters and shocks which are also felt by the international community.

Global responsibilities and obligations to conserve coastal ecosystems and strengthen sustainable livelihoods in Indian Ocean countries are reflected in the multilateral agreements

and targets that governments across the world have committed themselves to achieving. Instruments such as the 2000 Millennium Development Goals, 1992 Convention on Biological Diversity (and the 2010 Biodiversity Target), 1992 UN Framework Convention on Climate Change and 2005 Hyogo Framework for Action all require parties to take action, and make investments, in conserving ecosystems, supporting livelihoods, and reducing risk and vulnerability across the globe.

These shared interests and responsibilities for addressing threats to coastal ecosystems and livelihoods in Indian Ocean countries requires a commitment at all levels — including from the international community. Mangroves for the Future aims to sustain the global interest in supporting environmental aspects of coastal management that was shown immediately after the tsunami. The region saw an unprecedented injection of investment and projects into coastal areas, prompted by the urgent need to rebuild settlements and infrastructure, and restore livelihoods. Despite the generosity of these contributions, concerns still remain about their long-term impacts and effectiveness, and about the adequacy of investment in ecosystem management. Many of these activities are now winding down — often without having achieved their intended goals, and having raised serious concern about long-term impacts.

The need, and responsibility, to invest in coastal ecosystems as development “infrastructure” continues far beyond the aftermath of the tsunami. It requires a long-term perspective, and commitment, at the global level. Mangroves for the Future provides a mechanism to sustain the investments in coastal management that are so urgently needed in Indian Ocean countries, and to fulfil global commitments to supporting sustainable, equitable and beneficial development in the region. The initiative aims to match funding and other resources to the locations, actions and agencies where they are needed most, and can have the most positive impact and effectiveness.

Applying a new paradigm: ecosystems as essential “infrastructure” for coastal development

Successfully addressing these challenges requires a new approach – one that brings conservation actions effectively into development agendas, and that engages all sectors in coastal ecosystem management. Although the links between ecosystem services and human wellbeing are becoming more widely understood, there remain wide gaps in understanding between “conservation” and “development” sectors. Given the long history of interventions in the region’s coastal areas, it is clear that any new initiative has to be founded on an innovative approach which will build, and improve, on those actions that had gone before.

For these reasons, and in the light of recent experiences that have emerged in the context of post-tsunami reconstruction, Mangroves for the Future adopts a new paradigm for conservation that recognises ecosystem services as an essential, and productive, part of coastal development “infrastructure”.

Infrastructure is “the stock of facilities,

Box 4. Defining coastal ecosystems and livelihoods

Infrastructure is the stock of facilities, services and equipment that are needed for the economy and society to function properly.

The coastal zone is defined as both the area of the land subject to marine influences, and the area of the sea subject to land influences. This includes the sea and sea-bed, the beach and inter-tidal zone, and the land above the high-tide line.

Coastal ecosystems are taken to include mangroves and other coastal forests and wetlands, estuaries, lagoons, sandy beaches, sand dunes, coral reefs and seagrass communities.

Ecosystem services are the benefits people obtain from ecosystems. As defined by the Millennium Ecosystem Assessment, these include provisioning services (such as food, water, timber, and fibres), regulating services (that affect climate, floods, disease, wastes, and water quality), cultural services (that provide recreational, aesthetic, and spiritual benefits), and supporting services (such as soil formation, photosynthesis, and nutrient cycling).

Coastal communities are those people who live in close proximity to the coastline, and who depend on its resources for their livelihoods; they include rural and urban dwellers, and range from subsistence producers to large industries.

Livelihoods are understood as the capabilities, assets and activities required for a means of living among coastal communities. They are considered to be *sustainable* when they can cope with and recover from stresses and shocks and maintain and enhance their capabilities and assets, both now and in the future, while not undermining the natural resource base.

services and equipment that are needed for the economy and society to function properly". Traditionally, it has been seen only as man-made capital, such as roads, buildings, bridges, ports, water supplies and so on. This conceptualisation is however fundamentally incomplete, because it ignores natural ecosystems, and underestimates the vital role they play in underpinning and enabling economic and social activity. It also overlooks the human, social and financial capital that is required to sustain them (and which they, in turn, sustain).

Mangroves for the Future sees ecosystems as assets which yield a flow of services that are required for the economy and society to function properly. In order to ensure their productivity and continued support to human development, they need to be maintained and improved to meet both today's needs as well as intensifying demands and pressures in the future — just like any other component of infrastructure. Running down this valuable stock of natural capital puts a serious strain on economy and society, as has become all too apparent in the aftermath of the tsunami

Mangroves for the Future, by including ecosystems as part of development infrastructure, will promote "environmental mainstreaming". This will necessitate changes in behaviour among all actors in coastal management, from both "conservation" and "development" sectors. Neither a strictly preservationist approach, nor one which treats the environment as a stock of free resources which can be used indiscriminately and degraded at no cost, will achieve long term improvements in coastal ecosystems and livelihoods, or reduce vulnerability.

This new paradigm will be promoted in light of what has already been undertaken in the region in the realm of coastal zone management. Mangroves for the Future learns from the past and builds on a long history of policies, partnerships and actions to address ecosystem and livelihoods issues in coastal areas of Indian Ocean countries, both before and after the 2004 tsunami disaster. These valuable lessons and experiences have consciously been incorporated into this new initiative, which attempts to add value to existing activities and to introduce new dimensions and ways of working into coastal zone management in the region. Most basically, Mangroves for the Future aims to improve the way in which all sectors carry out their business in coastal areas.

THE RESPONSE: Mangroves for the Future

The initiative

Mangroves for the Future is an initiative that brings together different countries, sectors, agencies and organisations to address the critical state of coastal ecosystems and livelihoods in Indian Ocean countries. It promotes investments and actions to conserve natural ecosystems as essential “infrastructure” for coastal development.

Mangroves for the Future targets countries that are recovering from the Indian Ocean tsunami. Its “focal countries” are some of the worst-affected nations: India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand. The initiative will also initiate a dialogue and sharing of information and experiences with other tsunami-affected countries in the region that face critical ecosystems and livelihood issues, including Bangladesh, Kenya, Malaysia, and Tanzania. Additional countries within the Indian Ocean region will also at a later stage be brought into these dialogues, such as Cambodia, China, Pakistan, the Philippines and Vietnam. Lessons learned will be shared, and an ocean-wide approach will be promoted, with these “regional dialogue” countries.

The initiative is entitled “Mangroves for the Future” because it addresses the need to conserve coastal ecosystems in order to secure the well-being of generations to come, as well as to meet current needs. Although mangroves have been selected as the flagship, the initiative will work in all types of natural coastal ecosystems.

While the 2004 Indian Ocean tsunami has provided both a stimulus and momentum for joint action, there is clearly a need to look to the future and to influence long-term coastal development and conservation processes. As many post-tsunami reconstruction activities wind down, Mangroves for the Future aims to reorient the current focus of coastal development and conservation business from disaster response to one which targets long-term trends and threats in coastal areas. The initiative therefore intends to maintain the momentum of the valuable and productive partnerships, investments and actions that emerged post-tsunami, and which already existed pre-tsunami, with a view to supporting long-term sustainable coastal development.

By adopting a novel approach (investing in coastal ecosystems as development “infrastructure”), and a more inclusive level of partnership (one that links different countries, sectors, agencies and stakeholder groups), the initiative intends to improve substantially the way in which coastal conservation and development business is carried out. Mangroves for the Future responds to the critical state of coastal ecosystems and livelihoods in Indian Ocean countries, and builds a collaborative platform to work towards reducing vulnerability, increasing resilience and sustaining future coastal development processes in the region. The initiative aims to improve on past development and conservation actions, and to build better actions for the future.

Mangroves for the Future specifies additional actions, and seeks funding, to maximise the impact of past investments in ecosystem and livelihoods, and to continue and improve this work in the future. By establishing a regional platform of collaboration, the initiative will link the multiple players who are working on coastal conservation and development in Indian Ocean countries, encouraging and enabling them to network and share best practices and lessons learned, and to act together to ensure the long-term security and wellbeing of the region’s populations. We intend that Mangroves for the Future will make a substantial contribution to long-term sustainable development processes across tsunami-affected countries.

Goal and objectives

Mangroves for the Future is based on a vision of a more healthy, prosperous and secure future for all sections of coastal populations in Indian Ocean countries, where all ecosystems are conserved and managed sustainably.

The goal of Mangroves for the Future is to conserve and restore coastal ecosystems as key assets which support human well-being and security in the Indian Ocean Region.

Mangroves for the Future has two objectives: to strengthen the environmental sustainability of coastal development, and to promote the investment of funds and effort in coastal ecosystem management.

Both objectives contribute towards the conservation and restoration of coastal ecosystem as an essential part of coastal development infrastructure. The first works at the level of the direct actions and interventions that are required to manage coastal ecosystems sustainably, equitably and effectively. It involves ensuring that coastal conservation and development business are implemented better. The second objective works to strengthen the broader frameworks that influence people's investments and actions, and which enable or hinder environmentally sustainable coastal development. Together, these objectives tackle both the direct and the underlying causes of ecosystem degradation, unsustainable livelihoods and persistent vulnerability in coastal areas.

Towards this goal and objectives Mangroves for the Future intends to undertake actions organised around three cross-cutting themes (Knowledge, Empowerment and Governance), which will achieve results through effecting demonstrable changes across four key areas of influence (Regional, National, Private Sector and Community) (see Figure 1).

Influencing Change

Mangroves for the Future intends to effect demonstrable changes and results across four key areas:

Regional cooperation,

Strengthening regional dialogue, action and collaboration in the conservation and restoration of coastal ecosystems for long-term human well-being and security.

National programme support,

Influencing, supporting and strengthening national actions and support mechanisms that are required to achieve the conservation and restoration of coastal ecosystems for long-term human well-being and security.

Private sector engagement

Engaging with business, commerce and industry to maximize their positive influence on the conservation and restoration of coastal ecosystems for long-term human well-being and security. It will also seek to minimise the private sector's negative environmental footprint.

Community action.

Promoting coastal residents' support for, participation in, and benefit from, the conservation and restoration of coastal ecosystems for long-term human well-being and security. The role of women requires particular emphasis, especially in South Asia where progress on MDG 3 (Gender Equity) has been slow.

Together these represent the levels of scale, and involve the main stakeholder groups, where support and action is required to address the current and future threats to ecosystems and livelihoods, and to conserve and restore coastal ecosystems for long-term human well-being and security.

Table 4. Mangroves for the Future: intended results

	Results that will strengthen the environmental sustainability of coastal development	Results that will promote the investment of funds and effort in coastal ecosystem management
REGIONAL COOPERATION	More effective institutions and mechanisms for cooperation in coastal ecosystem management	Increased prioritisation of coastal ecosystem management in the development agendas of regional institutions
	Safe space and constructive dialogue for discussing sensitive issues	More efficient and effective impact and use of resources to support environmentally sustainable coastal development
	Stronger regional voice in global dialogues and decisions	
NATIONAL PROGRAMME SUPPORT	More effective policy, legal and institutional mechanisms for inter-sectoral coordination in environmental aspects of coastal management	Increased prioritisation of coastal ecosystem management across development agendas, policies and budgets
	Strengthened alliances and procedures to improve environmental law enforcement and compliance	More aware, engaged and empowered civil society supporting coastal ecosystem conservation
	More inclusive development planning, appraisal, approval and monitoring processes which reflect ecosystem needs	Increased and more effective investment of funds in coastal ecosystem management
	More sustainable, equitable and effective protection, and where necessary rehabilitation, of coastal ecosystems	
PRIVATE SECTOR ENGAGEMENT	Enhanced action in coastal conservation through partnership with the private sector	Greener business plans which recognise and reflect ecosystem services
	More environmentally sustainable business, industry and commerce in coastal area	Enhanced investment in ecosystems as infrastructure, and fair payment for the benefits of ecosystem services
COMMUNITY ACTION	More environmentally sustainable coastal livelihoods	Improved participation in, support for, and benefit from, ecosystem conservation among coastal dwellers, especially women.
	More integrated development and conservation actions which serve to reduce vulnerability and increase resilience among coastal communities	

Building knowledge, strengthening empowerment, enhancing governance

Mangroves for the Future is founded on a strategy of making knowledge available, empowering institutions and people to use that knowledge, and thereby enabling them to participate more effectively in decision-making and in promoting good governance in coastal areas.

Building Knowledge

The knowledge required to influence long-term coastal development and conservation processes comes from many different sources, and in a variety of forms: it consists of traditional practices and know-how as well as “modern” science and management approaches.

1. Improve the social science and natural science knowledge base for effective and informed coastal planning, policy and management
2. Support science-based and ecologically sound coastal ecosystem rehabilitation
3. Support the ‘reef-to-ridge’ approach to management

4. Increase knowledge and awareness of the economic value of coastal ecosystems
5. Regular evaluation of progress and impacts of coastal ecosystem management interventions

Strengthening Empowerment

Empowerment includes the process of building capacity and understanding, as well as instilling a sense of responsibility and motivation that enables people and institutions to plan and manage coastal ecosystems sustainably and equitably.

6. Strengthen the awareness and participation of civil society in understanding the role of ecosystems as development “infrastructure”
7. Develop of a cadre of professional coastal managers in the region
8. Support sustainable coastal livelihood activities
9. Improve the resilience of coastal communities to disasters
10. Develop sustainable financial mechanisms for coastal ecosystem and livelihood activities

Enhancing Governance

Governance is seen as more than just being the responsibility of national governments: it is understood to require active partnerships among all sections of civil society. Poor governance at any level, or among any group, will undermine results.

11. Establish effective, participatory national ICM programmes
12. Support land use planning which recognises both ecosystem and community needs, and is based on the effective enforcement of environmental regulations
13. Establish national systems of effectively managed coastal and marine protected areas that contribute to a regional network
14. Use ecological and socio-economic impact assessment and adaptive management
15. Promote environmentally sustainable business practices

A wide range of actions is required to move towards the common goal and objectives that are outlined in this strategy, and to generate the intended results. The consultation and dialogue that informed the development of Mangroves for the Future has identified a number of Programmes of Work which will conserve and restore coastal ecosystems as key assets which support human well-being and security in the Indian Ocean Region, through strengthening the environmental sustainability of coastal development and increasing the investment of funds and effort in coastal ecosystem management.

Programmes of Work will be implemented through a series of individual projects that are linked by a common goal and strategy, but are spread out geographically, temporally, and in terms of management and implementation responsibility. They include the continuation of activities which are already underway (including those initiated post-tsunami) as well as new activities to fill identified gaps.

These actions cross-cut countries, sectors and implementing agencies, and are organised around the key themes which are vital to effecting concrete changes in the environmental sustainability of coastal development, and the investment of funds and effort in coastal ecosystem management: building knowledge and capacity, strengthening empowerment, and enhancing governance. They aim to support and strengthen knowledge, empowerment and governance at all four areas of influence: regional cooperation, national programme support, private sector engagement and community action.

THE FRAMEWORK FOR IMPLEMENTATION: partnership and financing

Implementation through partnership

Mangroves for the Future is designed to provide a platform for collaboration among stakeholders at regional, national and local community levels to facilitate the integration, coordination and sustainability of interventions to support long-term coastal ecosystem management and livelihood improvements.

One of the most commonly expressed needs during the country consultations was the need for regional coordination and knowledge sharing with respect to conservation and development interventions in coastal areas, especially in the post-tsunami context. Mangroves for the Future attempts to establish lasting partnerships that will contribute to the effective integration of environment and development agendas regionally and, above all, nationally to ensure environment issues are taken into account in the mainstream of development planning and programmes. Rather than responding to symptoms or mitigating impacts, the initiative aspires to engage stakeholders in government, non-government and private sectors as well as local communities in addressing the key drivers behind environmental degradation along the coastlines of the Indian Ocean region.

The work of Mangroves for the Future will be implemented through a series of individual projects that are linked by a common goal and strategy, but undertaken by a wide range of agencies and groups, working alone or in partnership with others. Mechanisms will be set in place at both national and regional levels to ensure coordination of the efforts of these different partners within the framework of Mangroves for the Future. There will be promotion of dialogue, collaboration, sharing of information and lessons learned at all levels.

Coordinating national and regional efforts

A Regional Steering Committee will oversee the implementation of Mangroves for the Future. Governments of the six focal countries of Mangroves for the Future (India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand) will be represented on the Committee, which will be co-chaired by IUCN and UNDP. It will also bring in other UN Agencies and non-governmental organisations with a regional mandate that have experience in dealing with coastal ecosystem and livelihood issues. UNEP, CARE International and Wetlands International have committed to be a part of this governance structure, and invitations have also been extended to FAO and WWF.

The primary role of the Regional Steering Committee will be to:

- Provide strategic oversight and guidance to the implementation of Mangroves for the Future.
- Mobilise resources for Mangroves for the Future and facilitate allocation of resources to areas of greatest need.
- Promote regionally harmonised monitoring and management of coastal ecosystems.
- Promote regional dialogues, dissemination, exchanges and sharing of lessons learned about coastal ecosystems and livelihoods.
- Support national capacity building.

Initially, IUCN and UNDP Regional Offices in Bangkok will act as a secretariat to the Regional Steering Committee. Activities will include the facilitation of an initial, detailed in-country needs assessment and development of work programmes, the provision and synthesis of information for the Regional Steering Committee, and the development monitoring and learning processes for Mangroves for the Future interventions. The Secretariat will also function as the communications node for the Initiative.

At the national level, Mangroves for the Future will be coordinated and steered through strengthening the existing mechanisms for coastal management which bring together different agencies, sectors and civil society groups.

Financing mechanisms

The unprecedented mobilisation of efforts and funds in support of post-tsunami recovery and restoration was the largest and most immediate response to a natural disaster ever recorded. Much of this funding was not earmarked for a specific sector or agency. The massive injection of funding however quickly exceeded the absorptive capacity of recipients in tsunami-affected countries, and in many cases there was no proper plan to utilise the donations received. This resulted in inefficiencies, inadequate monitoring, poor end-user traceability and an inability of both governments and international agencies to ensure funding was needs-based³³.

Today, a high proportion of the commitments made in the aftermath of the tsunami remain unspent. Overall, of the US\$14.5 billion pledged by the international community, only US\$8.25 billion (57%) has been committed and just US\$4.25 billion (29%) disbursed as of mid 2006³⁴. Of the projects registered for Indonesia, Maldives, Sri Lanka and Thailand, less than 18% of the total funds committed had been spent by August 2006, 18 months after the tsunami³⁵. Perhaps more importantly, only a fraction of 1% of funding was allocated to addressing environmental concerns in these four tsunami-affected countries.

As a collaborative platform, the Mangroves for the Future Regional Steering Committee will seek to develop sustainable financing mechanisms to support long term coastal ecosystem management in the Indian Ocean Region. As part of its programme of work, Mangroves for the Future will also guide the allocation of financial resources to the areas of greatest need. To achieve this, the Steering Committee may explore options including development of trust fund(s) and acting as a “matchmaker” to assist the donor community in making environmentally sustainable investments in coastal development that actively involving a wide range of stakeholders in implementation. In addition, Mangroves for the Future will include parallel financed programmes and projects that will operate as stand-alone activities, but that will support the overall objectives and long-term strategy of Mangroves for the Future.

Phased approach

Mangroves for the Future adopts a phased approach, first of all undertaking the immediate actions that are needed to prepare for and set in place a regional initiative of this magnitude and level of collaboration, and then moving into a full implementation phase to commence the long-term programmes of work that will be implemented by partners in the initiative.

Roll-out preparatory phase

An initial one year roll-out or preparatory phase will start in January 2007. This will include a detailed in-country needs assessment in the six focal countries of Mangroves for the Future, to further elaborate priority areas and activities, develop regional and country implementation structures, refine Programmes of Work, and consolidate lessons learned from both post-tsunami efforts and previous activities in coastal zone management. This preparatory phase will also conduct a feasibility study for the establishment of a regional trust fund as a sustainable financing and grant disbursement mechanism and match funding pledges to the different agencies and actions involved in Mangroves for the Future. During this period, collaboration partnerships will be signed with parallel funded projects and programmes. The indicative budget for this preparatory phase of the core component is US\$2 million.

Full implementation phase

The first programming cycle of Mangroves for the Future will run between 2008 and 2012. This will employ a collaborative approach to deliver a range of interventions at both regional and country levels to bring about a positive change in the way coastal ecosystems are being managed. The indicative budget for the Mangroves for the Future implementation phase is USUS\$60 million, including parallel financing.

Indicative budget

Mangroves for the Future is based on using the best available knowledge to empower governments and civil society organisations for better coastal zone governance in the Indian Ocean Region. Based on the consultations to date, the following Programme of Work have been identified, with indicative budgets assigned to each component:

	Indicative Budget (USUS\$ million)
Roll-out preparatory phase (2007)	2.0
Full implementation phase (2008-2012)	60.0
Building Knowledge	15.0
1. Improve the social science and natural science knowledge base for effective and informed coastal planning, policy and management.	5.0
2. Support science-based and ecologically sound coastal ecosystem rehabilitation.	2.0
3. Support the 'reef-to-ridge' approach to management, to reduce threats from land-based sources of pollution, sedimentation and alteration of the hydrological cycle.	2.0
4. Increase awareness of the economic value of coastal ecosystems and use this to prioritise, promote and improve coastal conservation and development actions.	3.0
5. Share information, lessons learned and experience through the regular evaluation of progress and impacts of coastal management interventions.	3.0
Strengthening Empowerment	23.0
6. Strengthen the awareness and participation of civil society in understanding and acting on the role of ecosystems as development "infrastructure".	5.0
7. Contribute to the development of a cadre of professional coastal managers in the region	2.0
8. Support coastal livelihood activities that are both sustainable and help to maintain natural ecosystems.	8.0
9. Improve the resilience of coastal communities through coastal ecosystem management.	3.0
10. Develop sustainable financial mechanisms that will provide long-term sources of funding, at all levels, for coastal ecosystem and livelihood activities.	5.0
Enhancing Governance	22.0
11. Establish effective, participatory national integrated coastal management programmes.	10.0
12. Support land use planning which recognises both ecosystem and community needs, and is based on the effective enforcement of environmental regulations.	2.0
13. Establish national systems of effectively managed coastal and marine protected areas that contribute to a regional network.	5.0
14. Use ecological and socio-economic impact assessment and adaptive management to ensure effective coastal ecosystem management.	3.0
15. Influence investors and developers in the coastal zone to reduce damage to coastal ecosystems, and promote environmentally sustainable business practices.	2.0
TOTAL	62.0

THE CONSULTATION: organisations who contributed to MFF development

Bangladesh

Bangladesh Centre for Advanced Studies
Bangladesh Environmental Lawyers Association
Bangladesh Poush
Bangladesh Rural Advancement Committee
Centre for Coastal Environment Conservation
Centre for Natural Resource Studies
Centre for Sustainable Development
Coastal Area Resource Development and Management
Development of Biotechnology and Environmental Conservation Centre
Environment and Social Development Organization
Forest Department
Forum of Environmental Journalists of Bangladesh
IUCN Bangladesh National Committee
Ministry of Environment and Forests
Nature Conservation Management
Shushilan
Wildlife and Nature Conservation Society of Bangladesh

India

Ashoka Trust for Research in Ecology & Environment
CARE India
Department of Environment, Tamil Nadu
Dhan Foundation (Development of Humane Action)
Indo-Canadian Environment Facility
Ministry of Environment and Forests
MS Swaminathan Research Foundation
Tamil Nadu Forest Department
The Energy and Resources Institute
Tsunami Rehabilitation Information Network
United Nations Development Programme India Country Office
United Nations Development Programme/United Nations Team for Recovery Support, Chennai
Wetlands International
Winrock International India
WWF India

Indonesia

Asian Development Bank Earthquake and Tsunami Emergency Support Project, Aceh
Asian Development Bank Indonesia Resident Mission
BAPPENAS, National Development Planning Agency
BPN, National Land Use Agency
BPPT, Badan Pengkajian dan Penerapan Teknologi
BRR, Aceh and Nias Rehabilitation and Reconstruction Agency
Canadian International Development Agency, Aceh
Canadian Red Cross, Aceh
Conservation International, Indonesia Office
Deutsche Gesellschaft für Technische Zusammenarbeit, Aceh
European Union, Aceh
Fauna and Flora International, Aceh, Indonesia

Food and Agriculture Organisation of the United Nations Emergency Operation and Rehabilitation Co-ordination Unit — Aceh
Forest Department, Aceh
Forest Directorate, Jakarta
Ministry of Marine Affairs and Fisheries
Office of the United Nations Recovery Coordinator
United Nations Development Programme Indonesia Country Office
United Nations Educational, Scientific and Cultural Organisation
United Nations Environment Programme Disaster Management Branch, Indonesia
United States Agency for International Development
Wetlands International
Wildlife Conservation Society
WWF Indonesia
WWF Relief Sector Partnerships, Aceh

Maldives

Environment Research Centre
Environment Section, Ministry of Environment, Energy and Water
Food and Agriculture Organisation of the United Nations Forestry Programme for Early Rehabilitation in Asian Tsunami-Affected Countries
Marine Research Centre
Ministry of Fisheries, Agriculture and Marine Resources
Ministry of Planning and National Development
United Nations Development Programme Maldives Country Office
United States Agency for International Development Indian Ocean Tsunami Warning System Program

Seychelles

Ministry of Environment
Nature Seychelles
Risk and Disaster Management Secretariat, President's Office
Seychelles Centre for Marine Research and Technology
Seychelles Fishing Authority
Wildlife Clubs of Seychelles

Sri Lanka

CARE Sri Lanka
Coast Conservation Department
Coastal Resources Management Project
Department of Wildlife Conservation
Environmental Foundation Ltd.
Federation of Wildlife Conservation
Forest Department
Green Movement of Sri Lanka
Ministry of Environment
Rainforest Rescue International
Sewalanka Foundation
Sri Lanka Wildlife Conservation Society
Turtle Conservation Project
United Nations Development Programme Sri Lanka Country Office
United Nations Environment Programme Sri Lanka Country Office
University of Kelaniya, Department of Botany
Wildlife and Nature Protection Society of Sri Lanka

Thailand

Asian Institute of Technology
CARE Thailand/Rak Thai Foundation
Chulalongkorn University, Department of Marine Science
Coastal Habitats and Resources Management Project (CHARM)
Danish International Development Agency (DANIDA)
Department of Fisheries
Department of Marine and Coastal Resources
Department of National Parks
Food and Agriculture Organisation of the United Nations Forestry Programme for Early Rehabilitation in Asian Tsunami-Affected Countries
Good Governance for Social Development and the Environment Institute
Kasetsart University
Ministry of Natural Resources and Environment
Population & Community Development Association
Sustainable Development Foundation
Thailand Environment Institute
United Nations Development Programme Thailand Country Office
United States Agency for International Development (USAID)
Wildlife Fund Thailand
WWF Thailand

Regional and international

Birdlife International
Blue Moon Fund, USA
Canadian International Development Agency (CIDA), Canada
CARE International
CARE Regional Office for Asia
Coastal Resource Center, University of Rhode Island
Commission on Ecosystem Management
Commission on Education and Communications
Commission on Environmental Law
Commission on Environmental, Economic and Social Policy
Department for International Development (DFID), UK
Food and Agriculture Organisation of the United Nations Regional Office for Asia and the Pacific
Global Environment Centre
Global Environment Facility (GEF)
International Society for Mangrove Ecosystems, Thailand and Japan
International Water Management Institute
Japan National Committee
Land Ocean Interface in the Coastal Zone Programme South Asia Office
Mangrove Action Project, USA and Asia offices
Ministère des Affaires Etrangères, France
Ministry of Foreign Affairs (DANIDA), Denmark
Ministry of Foreign Affairs (DGCS), Italy
Ministry of Foreign Affairs (DGCS), Netherlands
Ministry of Foreign Affairs, Japan
Ministry for Foreign Affairs, Finland
Netherlands Committee
Norwegian Agency for Development Cooperation (NORAD), Norway
Packard Foundation, USA
Permanent Mission of Japan to the United Nations in Geneva
South Asia Cooperative Environment Programme

South Asian Association for Regional Co-operation Coastal Zone Management Centre
Species Survival Commission
Swedish International Development Cooperation Agency (SIDA), Sweden
Swiss Agency for Development and Cooperation (SDC), Switzerland
The Nature Conservancy, USA
Tokio Marine Nichido, Japan
United Nations Development Programme Headquarters
United Nations Development Programme Regional Centre in Bangkok
United Nations Environment Programme Disaster Management Branch
United Nations Environment Programme Regional Office for Asia and Pacific
United Nations Environment Programme World Conservation Monitoring Centre
United Nations Foundation
United Nations International Strategy for Disaster Reduction, Thailand and USA
United Nations Office of the Special Envoy for Tsunami Recovery
United States Agency for International Development (USAID), USA
United States Agency for International Development Asia Bureau and Environmental Policy
Office
United States Agency for International Development Indian Ocean Tsunami Warning System
Program
United States Forest Service
United States National Oceanic and Atmospheric Administration
United States State Department Ecology Office
Wetlands International
Wildlife Conservation Society, USA
World Agroforestry Centre
World Bank Environment Department
World Commission on Protected Areas
WWF International
WWF US Relief Sector Partnerships

-
- ¹ CNPS (1997) Seychelles Biodiversity: Economic Assessment. Report prepared for National Biodiversity Strategy and Action Plan, Conservation and National Parks Section, Division of Environment, Victoria
- ² Ruitenbeek HJ (1992) Mangrove management: an economic analysis of management options with a focus on Bintuni Bay, Irian Jaya. EMDI Environmental Reports 8, Jakarta
- ³ Sathirathai S (1998) Economic valuation of mangroves and the roles of local communities in the conservation of natural resources: case study of Surat Thani, South of Thailand. EEPSEA Research Report, Environment and Economics Program for South East Asia, International Development Research Centre, Ottawa
- ⁴ Seneviratne C (2005) Coastal Zone Management in Sri Lanka: Current Issues and Management Strategies. Central Environment Authority paper
- ⁵ BBC News (22 March 2005) At-a-glance: Tsunami economic impact
- ⁶ World Travel & Tourism Council (April 8 2005) Media and Resource Centre
- ⁷ Gunawardena M and Rowan JS (2005) Economic Valuation of a Mangrove Ecosystem Threatened by Shrimp Aquaculture in Sri Lanka. *Environmental Management* 36(4): 535–550
- ⁸ Bann C (1999) A Contingent Valuation of the Mangroves of Benut, Johor State, Malaysia. Johor State Forestry Department/DANCED/Darudec: Preparation of an Integrated Management Plan for the Sustainable Use of the Johor Mangrove Forest
- ⁹ Tri N, Adger W and Kelly P (1988) Natural resource management in mitigating climate impacts: the example of mangrove restoration in Vietnam. *Global Environmental Change*, 8(1):49-61
- ¹⁰ Emerton L and Kekulandala LDCB (2003) Assessment of the Economic Value of Muthurajawela Wetland. Occasional Paper No 4, IUCN Sri Lanka Country Office, Colombo
- ¹¹ World Resources Institute (cited 10 August 2006) www.earthtrends.wri.org/
- ¹² Spalding MD, Ravilious C, Green EP (2001) *World Atlas of Coral Reefs*. University of California Press, Berkeley
- ¹³ Spalding et al., 1997; 2001 Spalding M, Blasco F, and Field C eds (1997) *World Mangrove Atlas*. The International Society for Mangrove Ecosystems, Okinawa
- ¹⁴ Roberts CM, McClean CJ, Veron JEN, Hawkins JP, Allen GR, McAllister DE, Mittermeier CG, Schueler FW, Spalding M, Wells F, Vynne C, Werner TB (2002) Marine Biodiversity Hotspots and Conservation Priorities for Tropical Reefs. *Science* 295: 1280-1284
- ¹⁵ Spalding *et al op. cit.*; World Resources Institute *op. cit.*
- ¹⁶ Kathiresan K (2006) Conservation and management of mangroves in South Asia. Paper presented at the International Conference and Exhibition on Mangroves of Indian and Western Pacific Oceans, Kuala Lumpur
- ¹⁷ Valiela I, Bowen JL and York JK (2001) Mangrove forests: one of the world's threatened major tropical environments. *Bioscience* 51(10): 807-815
- ¹⁸ Wilkie M and Fortuna S (2003) Status and Trends in Mangrove Area Extent Worldwide. Forest Resources Development Service, FAO, Rome
- ¹⁹ Stevenson NJ (1997) Disused shrimp ponds: options for development of mangroves. *Coastal Management* 25(40): 425-435
- ²⁰ Rajasuriya A, Zahir H, Venkataraman K, Islam Z and Tamelander J (2004). Status of coral reefs in South Asia: Bangladesh, Chagos, India, Maldives and Sri Lanka. In: Wilkinson C (ed) *Status of Coral Reefs of the World: 2004*. Vol.1, Global Coral Reef Monitoring Network, Australian Institute of Marine Science
- ²¹ UNEP (2006) *Challenges to International Waters – Regional Assessments in a Global Perspective*. United Nations Environment Programme, Nairobi
- ²² Gilman EH, Van Lavieren J, Ellison V, Jungblut L, Wilson F, Areki G, Brighthouse J, Bungitak E, Dus M, Henry I, Sauni M, Kilman E, Matthews N, Teariki-Ruatu S, Tukia K, Yuknavage (2006) *Pacific Island Mangroves in a Changing Climate and Rising Sea*. UNEP Regional Seas Reports and Studies No. 179. United Nations Environment Programme, Regional Seas Programme, Nairobi
- ²³ Telford J and Cosgrove J (2006) *Synthesis Report, Tsunami Evaluation Coalition*, London
- ²⁴ Telford and Cosgrove *op. cit.*
- ²⁵ World Bank (2006) *Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters*. World Bank Independent Evaluation Group, Washington DC
- ²⁶ Trenberth K (2005) Uncertainty in hurricanes and global warming. *Science* 308: 1753-1754
- ²⁷ IPCC (2001) *Climate Change 2001: Third Assessment Report*. Intergovernmental Panel on Climate Change, Geneva
- ²⁸ Jackson J (2006). *Surviving earthquakes: vulnerability in the modern world*. Darwin Lecture, University of Cambridge, 2006
- ²⁹ Telford and Cosgrove *op. cit.*
- ³⁰ Various referred to as Integrated Coastal Zone Management (ICZM), Integrated Coastal Management (ICM), Integrated Coastal Area Management (ICAM) and Coastal Zone Management (CZM). Integrated Coastal Management is generally considered to be the framework that “by combining participatory democracy with reliable knowledge, can advance societies towards the goal of sustainable development in coastal ecosystems”.
- ³¹ Flint M and Goyder H (2006) *Funding Response Report*, Tsunami Evaluation Coalition, London
- ³² IUCN (cited 10 August 2006) *Asia Regional Information Hub for Coastal Information Management*
- ³³ Flint M and Goyder H *op. cit.*
- ³⁴ Flint M and Goyder H *op. cit.*
- ³⁵ UNDP (cited 10 August 2006) www.tsunamitracking.org/ranacehnias/; www.dad.finance.gov.mv/; www.dad.tafren.gov.lk/; www.dadthailand.mfa.go.th/

IUCN
The World Conservation Union



**The United Nations Development
Programme (UNDP)**

Regional Centre in Bangkok
United Nations Service Building (3rd Fl.)
Rajdamnern Nok Avenue
Bangkok 10501, Thailand
Phone: +662 288 2129
Fax: +662 288 3032

<http://regionalcentrebangkok.undp.or.th/>

**The World Conservation Union
(IUCN)**

Asia Regional Office
63, Sukhumvit Soi 39
Klongtan Nuae, Wattana
Bangkok 10110, Thailand
Phone: +662 662 4061
Fax: +662 662 4387

<http://www.iucn.org/mff/>