



Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS
www.mangrovesforthefuture.org

Investing in Coastal Ecosystems

A Guiding Document for Journalists about
the Role and Importance of Coastal Ecosystems



Coastal area in Binh Dinh Province © IUCN Viet Nam

UNDEF



The United Nations
Democracy Fund

Investing in Coastal Ecosystems

A Guiding Document for Journalists about
the Role and Importance of Coastal Ecosystems

The designation of geographical entities in this book and the presentation of the material do not imply the expression of any opinion whatsoever on the part of International Union for Conservation of Nature (IUCN), or Mangroves for the Future (MFF), Norwegian Agency for Development Cooperation (Norad), Sweden International Development Cooperation Agency (Sida) and United Nations Democracy Fund (UNDEF) concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this publication do not necessarily reflect those of IUCN, MFF, Norad, Sida and UNDEF.

This is a guiding document for journalists on the role and importance of coastal ecosystems under Mangroves for the Future coordinated by IUCN. IUCN and the other participating organizations do not take any responsibility for errors or omissions occurring in the translation into other language of this document whose original version is in English.

This publication has been made by funding from Norad and Sida

Published by: IUCN, Gland, Switzerland and Ha Noi, Viet Nam

Copyright: © 2012 IUCN, International Union for Conservation of Nature and Natural Resources

Reproduction of this publication for educational or other non-commercial purposes is authorized without prior written permission from the copyright holder provided the source is fully acknowledged.

Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission of the copyright holder.

Citation: Nguyen Chu Hoi (2012). *Investing in coastal ecosystems: A Guiding Document for Journalists about the Role and Importance of Coastal Ecosystems*. Gland, Switzerland: IUCN, 27pp.

ISBN: 978-2-8317-1552-0

Cover photo: Bui Thi Thu Hien, IUCN Viet Nam

Layout by: Luck House Graphic Company

Produced by: IUCN Viet Nam

Printed by: Luck House Graphic Company

Available from: IUCN
Publications Services
Add: Rue Mauverney 28
1196 Gland, Switzerland
Tel: +41 22 999 0000
Fax: +41 22 999 0000
www.iucn.org/publications

National Coordination Body (NCB) in Viet Nam

Mangroves for the Future (MFF)
IUCN Viet Nam
Add: 1st Floor, 2A Building
Van Phuc Diplomatic Compound
298 Kim Ma, Ba Dinh
Ha Noi, Viet Nam
Tel: +844 3726 1575
Fax: +844 3726 1561
Info.vietnam@iucn.org
www.iucn.org/vietnam

TABLE OF CONTENTS

ABBREVIATIONS	2
INTRODUCTION	3
1. Initiative on Mangroves for the Future	4
2. Economic values of Coastal areas	6
3. Coastal ecosystem	8
4. Social context in Coastal areas	14
5. Challenges to Coastal areas	15
6. Investment demands for Onshore Ecosystems ecosystems	19
Q&A ABOUT COASTAL ECOSYSTEMS	21
TERMINOLOGY	25

ABBREVIATIONS

BCR	Building coastal resilience to climate change
EBM	Ecosystem based management
GDP	Gross Domestic Product
ICM	Integrated coastal management
IUCN	International Union for Conservation of Nature
LGF	Large grant Facility
MFF	Mangroves for the Future Initiative
NCB	National Coordinating Body
NSAP	National Strategy and Action Plan
PoW	Programme of Work
SGF	Small Grant Facility
TSS	Total suspended solids
CSR	Corporate Social Responsibility

INTRODUCTION

About a third of Vietnam's population lives in coastal districts (in coastal areas and on islands). Over 50% of the population lives in 28 coastal provinces, where around 50% of the country's major urban areas are to be found. It is anticipated that the coastal population will double in the next 30 years. Over-exploitation of coastal resources has been recorded all along the coast (3,260 km from north to south). Overexploitation and unsustainability of coastal resources is a result of pressures from development and population, and inefficient economic activities, resulting in degradation of ecosystems, environmental pollution and the loss of coastal habitats. In developing countries this trend may be aggravated by poverty and unemployment. Therefore, benefit conflicts can arise through multi-use and negative use of coastal resources, or from existing economic activities that have encroached upon coastal space which was formerly managed by local people.

Being bestowed with a richness of natural resources, coastal areas often have a dense concentration of development activities of various sectors, and the local community. As such, the development of one sector is always influenced by other sectors, other users, and the sector itself. These interactions need to be considered and integrated into development planning within coastal areas.

Recently the effects of climate change such sea level rise and the storms have been seen in coastal areas, such as increasing salt-water intrusion, and the changing of ecological conditions in these areas. These have become serious concerns

globally, and specifically in Vietnam. Underground freshwater resources, and people's livelihoods in coastal areas and on inshore islands, are threatened in both the short and long term.

Which solutions should be applied for coastal sustainable development, the mitigation of unexpected impacts, and adaptation to a changing coastal situation, while improving the livelihoods of the coastal population?

Investment in coastal ecosystems is an effective long-term solution which also requires investment in coastal infrastructure.

How important is the role of coastal ecosystems, and why do they need to be invested in? Do local people's livelihoods depend on these coastal ecosystems, and are they ready and willing to conserve the coastal ecosystems upon which their livelihoods rely? Do the coastal ecosystems really contribute to mitigating the impacts of coastal and marine disasters, while facilitating adaptation to climate change?

This media pack was developed to provide journalists with information about the importance of coastal ecosystems in Vietnam. The media pack was developed within the framework of the 2006 "Initiative on Mangroves for the Future" (MFF), with special attention to climate change, potential future sea level rise in Vietnam, and the potential impacts of such events on the environmental and economic well-being of the people of Vietnam, and the UNDEF-funded-project titled "Promoting active participation of civil society in environmental governance".

1- Initiative on Mangroves for the Future

MFF - “Mangroves for the Future” (in Vietnamese “Rừng ngập mặn cho tương lai”) is an initiative that was launched by former US President Bill Clinton in December 2006 in Phuket, Thailand. It is a strategic initiative for investment in the conservation of coastal ecosystems. Initially MFF consisted of 6 South Asian countries who had suffered from the huge Indian Ocean Tsunami of 2004, including the Maldives, Seychelles, India, Indonesia, Thailand and Sri Lanka. From the practical lessons learned implementing MFF activities in these countries, MFF has created a mechanism to expand the scope of its activities to other countries threatened by coastal and marine natural disasters. In addition, the conservation scope of MFF has expanded beyond mangrove ecosystems (a flagship ecosystem which was important in reducing the severity of the impact of the Indian Ocean Tsunami in 2004), to other coastal ecosystems including coral reefs, seagrass beds, lagoons, estuaries, coastal wetlands and sandy beaches.

Vietnam and Pakistan formally entered the MFF initiative in late 2010, after being observers for two years, and are two of the eight current members of the MFF. MFF will be further expanded to other countries which are facing similar difficulties in the region.

MFF is also a policy support and partnership based initiative that focuses on people and investment orientation in the conservation of coastal ecosystems, improvement of the livelihoods of people living in coastal areas, improving resilience to climate change and the impacts of associated sea level rise, and promoting sustainable development of coastal regions.

MFF's mission

MFF aims for a more prosperous and safer future for coastal communities, through the effective conservation and sustainable management of coastal ecosystems. People living in coastal areas are often subject to natural disasters, and are very vulnerable to other effects. Coastal ecosystems are vital in protecting their lives and livelihoods.

MFF's mission is to invest in the protection and management of coastal ecosystems through the cooperation of local people, consistent with

the policies, and investment orientations of the country members. MFF does not seek to change a community. Rather, its role is to provide the necessary support to build capacity within a community; provide technical assistance on how to conserve and manage coastal ecosystems; harmonize the interests of the community and relevant stakeholders; stabilize and protect the lives and livelihoods of people and their families; and improve a community's resilience to the adverse effects of natural disasters that may accompany climate change and sea level rise.

One of MFF's long-term goals is to promote an integrated resource management approach; linking coastal area management and river basin management since. Considering the coastal areas without considering the rivers that flow to it fails to fully address the issue. Therefore, it is essential that MFF help coastal communities understand and use an integrated “reef to ridge” approach to resource management.

About MFF Vietnam

IUCN is the coordinating agency of the MFF in Vietnam. The Ministry of Natural Resources and Environment (MONRE) and Ministry of Agriculture and Rural Development (MARD) are key partners. A National Coordinating Body (NCB) facilitates coordination and monitoring of MFF activities in Vietnam. The NCB is directed by a National Coordinator and includes representatives of government agencies, relevant stakeholders, and international organizations in Vietnam. The NCB conducts activities in close cooperation with IUCN Vietnam, the National Coordinator of MFF Vietnam, and a Regional MFF Secretariat based in Bangkok.

National Strategic Action Plan of MFF Vietnam

The MFF Vietnam National Strategic Action Plan (NSAP) was developed by a group of national and international experts and approved by the NCB Vietnam. NSAP aims to assist MFF Vietnam in identifying, designing and planning activities in Vietnam during the first phase of implementation (2011 - 2013).



MFF National Coordinating Body (NCB) meeting at Can Gio Biosphere Reserve © IUCN Viet Nam

The NSAP is a living document subject to change in response to new opportunities in the conservation, restoration and sustainable management of coastal ecosystems. It aims to provide an initial strategic orientation for MFF in Vietnam and serves as a basis for the NCB's annual work plan development for MFF Vietnam.

In Vietnam, MFF will encompass support for all coastal ecosystems, using mangroves as a flagship ecosystem in recognition of the important range of ecosystem services they provide. MFF Vietnam will operate at two geographical scales: nationally and at pilot sites at the sub-national level. The NSAP does not recommend specific provinces, but presents criteria for consideration in prioritizing site-based activities on different coastal geographical areas.

The NSAP recommends prioritizing programmes over policy initiatives because prioritized programmes are always associated with State budget allocations. Seven Programmes of Work (PoWs) are identified as priorities for Vietnam: three (PoW 1: improved knowledge base; PoW 11: ICM; and PoW 10: sustainable financing) focus on national-level interventions, and a cluster of four interrelated PoWs focuses on sub-national activities (PoW 2: coastal rehabilitation; PoW 8: sustainable livelihoods; PoW 9: community resilience; and PoW 14: adaptive management).

The overriding role for MFF during this initial period is to serve as a learning network and information clearing house. Target audiences for this network are sub-national (particularly provincial) decision makers. Over 50% of the country's major urban areas are distributed along the coasts.

Funding for Local communities

MFF directly invests in coastal ecosystems through practical projects targeted to local community demands. Through monitoring, learning and evaluation process, results of different projects shall be shared on the MFF knowledge forum.

As regulated by the Regional MFF, MFF Vietnam oversees funding for small and medium-sized projects that contribute to regional and sub-regional large-scale projects. Each country member receives funding for implementation of the program. Maximum funding levels for each project is \$ 25,000 and local co-financing for small projects, especially from the private sector, is important. Through project implementation at community level, MFF wishes to facilitate the improvement of community's resilience to the coastal environmental changes caused by climate change and sea level rise.

MFF's message is "for people and by people!"

2- Economic Value of Coastal Area

Is the coastal area an interactive zone?

Coastal zone/area, referred to as the inland and sea, is the transition space between inland and sea. It is always influenced by the interaction between continental process (mainly river) and marine (mainly wave, current and tide); between natural systems and human systems (the center is human activity); between sectors and users of coastal resources in terms of both vertical (central to local levels) and horizontal structure (relevant stakeholders on the same areas); between local communities and other economic sectors. Therefore, coastal areas are also known as interactive zone, and existing ecosystems develop through the close ecological connectivities. But in fact, they (managers and local people) often pay very little attention to the nature of these interactions in coastal management process.

Why are coastal ecosystems important?

In Viet Nam, there is 01 km of land mass (maritime index = 0.01) for every 100 km² of inland, 6 times higher than the world average value and there is one large estuary in every 20 km. Vietnam's coastal line spreads over 3,260 km long (excluding the coast of island) and there are over 2,773 large and small islands which mainly distributed on coastal area with a total area of 1,700 km², including 23 islands covering an area of over 10 km², 82 islands spreading an area of more than 1km². This status brings advantages for our country "sea front" and facilitates international trade while making it challenging in terms of security and defense.

Potential of the coastal resources in Vietnam is considerable and has significant implications for the country development. So far, 35 types of mineral resources of different dimensions, groups and stock volume have been recorded, including: fuel, metals, construction materials, precious and semi-precious gems as well as liquid minerals. In addition to that heavy mineral placers of precious and rare elements have been found along coastal area such as titanium (harvesting volume of 220,000 tons / year), zircon (1,500 tons/year), xerite and 60,000 hectares of sea salt. Recently, some sandy mines under the coastal sea bed have been recorded with total volume of over 100 billion tons. Famous glass sand could be found in Van Hai mine (volume: 7 billion tons), Vinh Thuc (20,000 tons) and a strip of quartz sand on

sea bed along coastal area of Quảng Ninh (Volume: nearly 9 million tons).

Along the coast, there are more than 20 ecosystems, including 3 unique ones as mangroves, coral reefs and seagrass, with about 800,000 hectares of tidal flats, bays and coastal lagoons, which are very convenient for production of high export value aquatic products. Along the coast, there are over 100 locations which are suitable for port establishment and some areas could be eligible for international entreports. Many islands have potential for high economic growth as the logistics for off-shore exploitation. Our country has more than 125 beautiful small and large beaches of which 20 beaches could meet international standards for marine tourism development.

The above mentioned coastal resources are considered large real estate store for the country in which the ecosystem is seen as valuable natural source and important coastal infrastructure for sustainable coastal development.

The coastal resource system is very diverse

The above characteristics of coastal areas have generated diversity in terms of the type and wealth of natural resources - a precondition for multi-sectoral and multi-purpose use. They provide natural resources that greatly benefit the inhabitants of coastal areas.

Box 1: Some typical coastal ecosystems

Mangrove forest, seaweed-seagrass bed, soft bottom, hard bottom, coral reef, coastal embayment/bay, sandy beach, estuary, delta, coastal lagoon, tidal marsh and muddy tidal flat, coastal watershed, upwelling area, saline lake, paddy-field, aquacultural pond/pool.

Coastal areas are important natural systems which comprises ecosystems as "subsystems", but are always subject to human impacts through development activities. Hence, in fact, coastal primary natural systems are no longer existed as they have been exploited. Therefore, the majority of these systems are alternatively distributed with "human

system” to become coastal systems, including coastal ecosystems. That is why, it is crucial to take into account behaviors in choosing appropriate solutions for coastal management and its systems.

In essence, coastal resources could be seen as shared resources and multi-purpose and use resources which does not belong to any single individual or sector but are a prerequisite prerequisite for the development of various economic sectors. Thus, the majority of the coastal systems is for open access (fishing for example) and are managed by sector in the context of prequent competition and conflicts.

Coastal ecosystems have high biological productivity and mostly determine the entire primary productivity of the world’s oceans, for example:

<i>Coastal ecosystems</i>	<i>Primary productivity (gC/m²/year)</i>
Mangrove forest	430 - 5000
Seaweed-seagrass bed	900 - 4650
Coral reef	1800 - 4200
Estuary	200 - 4000
Upwelling area	400 - 3650
Continental shelf	100 - 600
Ocean	400

Development activities in Viet Nam’s coastal areas

Three key economic regions (north, central and south) have been established in Vietnam’s coastal areas with nearly 30 processing and intensive industrial zones including logistics and 80 small and large ports, with a total cargo capacity of nearly 100 million tons / year. Annually, marine tourism industry attracts nearly 15 million times of tourists, including more than 3 million foreign tourists reaching an average growth rate of 13% / year. Oil and gas exploration activities are maintained at six mines in the southern continental shelf.

Coastal areas have contributed significantly to export and earnings, mostly from seafood. About 80% of the annual fish caught from the shallow area near the shore (water depth of 50m toward the inland) and about 90% of farmed shrimp is from brackish coastal waters. According to current figures, during the period from 2000 – 2005, the marine and coastal economic scale (GDP) in Vietnam reached an average level of 47 - 48% of the national GDP, accounting for 30% of the country GDP. Economic sectors that directly relate to coastal areas and the sea, such as ship building and repair, petroleum processing and communications, etc., have initially developed under small scale (only about 2% of the marine economy and 0.4% of the country GDP). This is expected to increase in the future.

During the open-oriented economic development process, initially 15 coastal economic zones were set up as coastal based economic development



Aquatic resources activities conducted by local people in Xuan Thuy National Park © Xuan Thuy National Park

centers (marine based development centers). These areas are compound development centers of various sectors including logistics marine fisheries, industry associated with ports and shipping, marine tourism, urbanization and marine scientific research.

Box 2: Coastal economic zones of Vietnam up to year 2010

1. Van Don (Quang Ninh)
2. Dinh Vu - Cat Hai (Hai Phong)
3. Nghi Son (Thanh Hoa)
4. South-east Nghe An (Nghe An)
5. Vung Ang (Ha Tinh)
6. Hon La (Quang Binh)
7. Chan May-Lang Co (Thua Thien Hue)
8. Chu Lai open economic area (Quang Nam)
9. Dung Quat (Quang Ngai)
10. Nhon Hoi (Binh Dinh)
11. South Phu Yen (Phu Yen)
12. Van Phong (Khanh Hoa)
13. Phu Quoc (Kien Giang)
14. Dinh An (Tra Vinh)
15. Nam Can (Ca Mau)

Source: Decision No.1353/QĐ-TTg dated 23/9/2010

Approximately 13/28 national parks, 22/55 nature reserves and 17/34 historical-cultural & environmental forest are distributed along Vietnam's coastline and islands. Several world recognized biosphere reserves are also located in coastal areas including: Can Gio Mangrove, Cat Ba Archipelago, the Red river and Mekong estuaries. Master planning the Red river and of 16 marine protected areas, including 15 coastal ones was approved in 2010 by the Government. In 1994, Ha Long Bay was recognized as a World Natural Heritage. In addition, Nha Trang Bay and Lang Co Bay were recognised as being two of the most beautiful bays in the world in 2003 and 2009 respectively. In addition, world cultural and natural heritage such as old town of Hoi An, Hue Citadel, My Son Sanctuary and Phong Nha Cave are all located in coastal areas. Diving tourism started developing in Nha Trang on the basis of exploiting coastal ecosystem services values.

In addition to economic efficiency, the coastal development activities have caused considerable pressure on conservation, protection of natural capital and resources. It is concerned that such activities are beyond the "control" of communities, who are vulnerable to the coastal developments and climate change impacts.

3- Coastal infrastructure

Among the above mentioned coastal ecosystems, mangroves, coral reefs and sea-grass beds are the typical ecosystems that represent the hot and humid tropical region.

Mangroves are predominantly distributed in tropical regions and are rarely found in areas outside of the 30° latitudes north and south. They grow best in areas with low impact from sea swell. According to Burke and colleagues (2000), the distribution of mangroves covers over 8% of the world's coastlines and around 1/4 of the tropical coastlines, accounting for as much as 181,000 km². About 112 countries and territories around the world have mangroves within their national jurisdiction.

Coral reef is an ecosystem whose distribution is

limited to tropical regions between latitudes of 30° north and 30° south under shallow marine environments (less than 50m depth) of clean, warm water (above 18°C) with low nutrient and salinity levels. Global coral reefs cover an area of over 600,000 km², of which almost 90% could be seen in the Indian-Pacific region. Particularly, coral reefs in shallow water near the shore occupy about 255,000 km² (CBD, 2001). There are 21 countries in the world with coral reef areas over 1% of the country area, accounting for 62% of the global coral reef area. Of these, Indonesia comprises 17.95% of the total global area, followed by Australia - 17,22%, Philippines - 8,81%, and France - 5,02%. In Southeast Asia, coral reefs cover an area of about 100,000 km², in equivalence to 34% of the total global area with the highest coral biodiversity.

According to Morton and Blackmore (2001) about 40% of all known seagrass species in the world are found in the East Sea. Diversified sea grass often develops on the soft-bottom areas where they can form large-scale lawns. Seagrass is a highly biologically productive ecosystem that significantly contributes to the total primary productivity of coastal waters. It is an important food source for many organisms, especially sea turtles, marine mammals and marine fish. The total global area of distribution is unknown, but Duarte et al. (1999) estimated seaweed spread at an area of about 600,000 km².

Connectivity of the coastal ecosystems

The marine, coastal ecosystems are natural systems in the world's oceans. They differ from ecological nature, resources value, and inland ecosystems. Therefore, they are interactive and connective such as ecological chains. If a link in the chain is affected, it will impact on the remaining links. So far, little, if any recognition has been made of the fact that the destruction of mangroves distributed in the coastal high tide zones (within the average and high tide) will negatively impact seagrass and coral reefs distributed in coastal side and under the deeper sea. About 90% of species living on the continental shelf visit coastal estuaries at least once during their life, for shelter or a temporary migration.

Functions of coastal ecosystems

Typical ecosystems have the following characteristics:

Firstly, they comprise interacting biotic and abiotic components. The latter component includes stones and sediment, water and air/dissolved gasses in seawater. The biotic component may consist of a variety of species.

Secondly, each ecosystem has its own process, including two fundamental processes: energy flow and biogeochemical cycles of chemical elements inside it.

Thirdly, each ecosystem will change over time and may undergo development through a process called ecological succession.

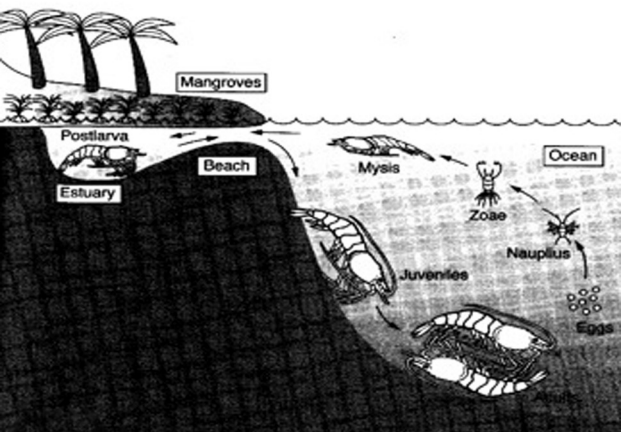


Figure 2: A typical life cycle of shrimp

Function	Mangrove <ul style="list-style-type: none"> - Erosion prevention - Shelter - Food production 	Seagrass - seaweed <ul style="list-style-type: none"> - Accumulation & alluvium - Habitat and breed production - Food production 	Coral reef <ul style="list-style-type: none"> - Natural buffer zone - Habitat, food and breed store - Food production
Interaction	<p>Lagoon</p> <p>Organic food → Carbon and Nitrogen ← Fish and invertebrate larvae</p> <p>Fish and crustaceans mature ← Mature fish → Protection against waves and currents</p>	<p>Seaweed - seagrass</p>	<p>Sea tide</p> <p>The coral reefs</p>

Figure 1: Common benefit & interactive relation among mangrove, seaweed and coral reef ecosystems

Coastal ecosystems are physical entities that exist independently, without being isolated. They include extremely important service values such as climate control, carbon cycle and other biogeochemical cycles, nutrient balancing for adjacent marine areas (such as coral reefs), and offering potential capacity for ecotourism and marine port development. They provide the habitat of marine species and migratory birds. They also contain biodiversity and provide considerable marine resources, medicines and abundant marine energy resources for the social development. Many coastal ecosystems are also seen as on one hand a “wall” that protects the coast from destructive effects of storm waves and erosion and on the other hand a natural “trap” for refining natural pollutants, mainly from continental sources including carbon sequestration, waste dilution and treatment. Coastal ecosystems are also sites for spawning and larval rearing for many aquatic species including coastal and seasonally off-shore species.

The value of the coastal ecosystem services

The coastal ecosystems have 4 fundamental service value groups. Each contains different specific service values. These are, (1) services

provided: food, water, mangrove wood, pharmaceuticals, (2) regulating service: adjusting characteristics of climate, floods, diseases, water quality and carbon, (3) cultural services: bringing benefits in terms of entertainment, art and spirituality, and (4) supporting services: soil characteristic formation, photosynthesis process and transform the material cycle - nutrients such as nitrogen, phosphorus, and sulphur cycle.

Service values of the coastal ecosystems include values of food security, and the fact that nearly 1 billion people worldwide depend on fishing. For example, profits from fishing reefs may be up to \$5.7 billion/year. Mangrove forest are worth about \$170,000. Entertainment values of coral reefs also contribute around \$9.6 billion/year. In Southeast Asia, the value of services from sustainable coastal fishing has helped to create jobs for 55% of the population living in coastal areas. The true economic value of some marine and coastal ecosystems of Vietnam is around 60 million USD/ha/year (ADB, 1999).

There are three characteristics that make the service values of coastal ecosystems so important: (1) irreplaceable (once being vulnerable), (2) irreversible (once being destroyed) and (3) high risk (potential loss of ecosystem indicates a threat to human prosperity).

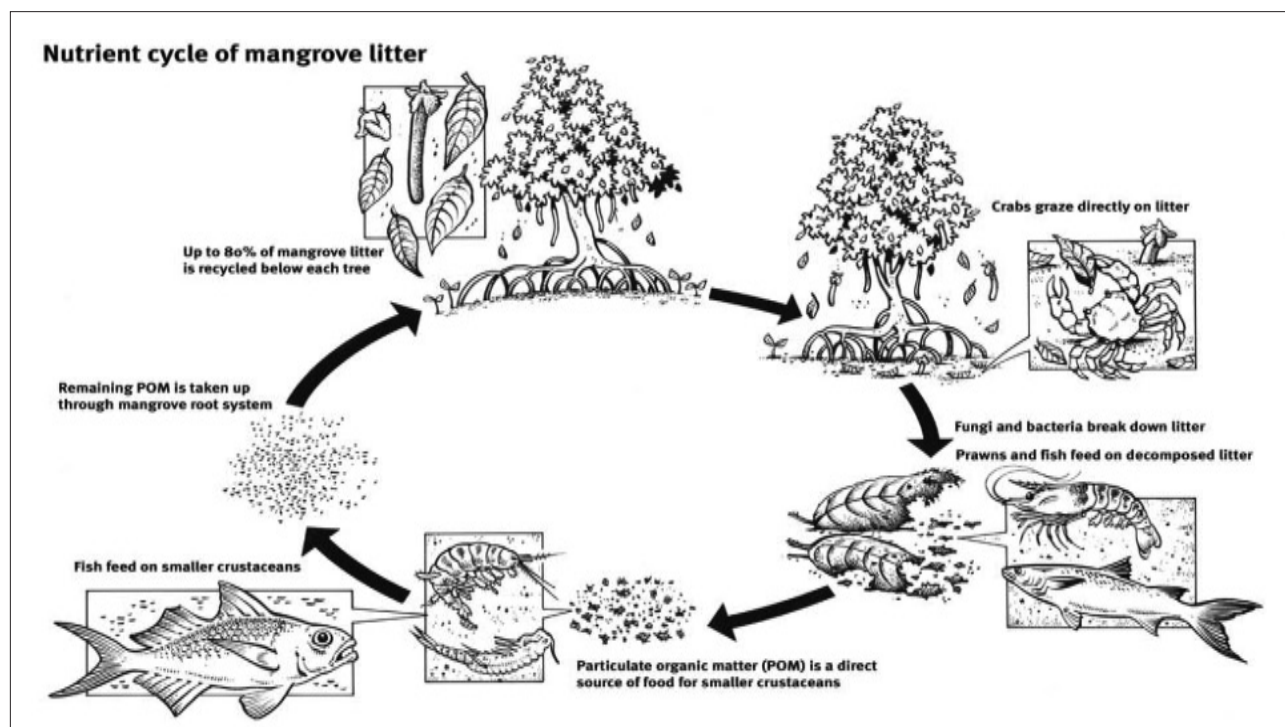
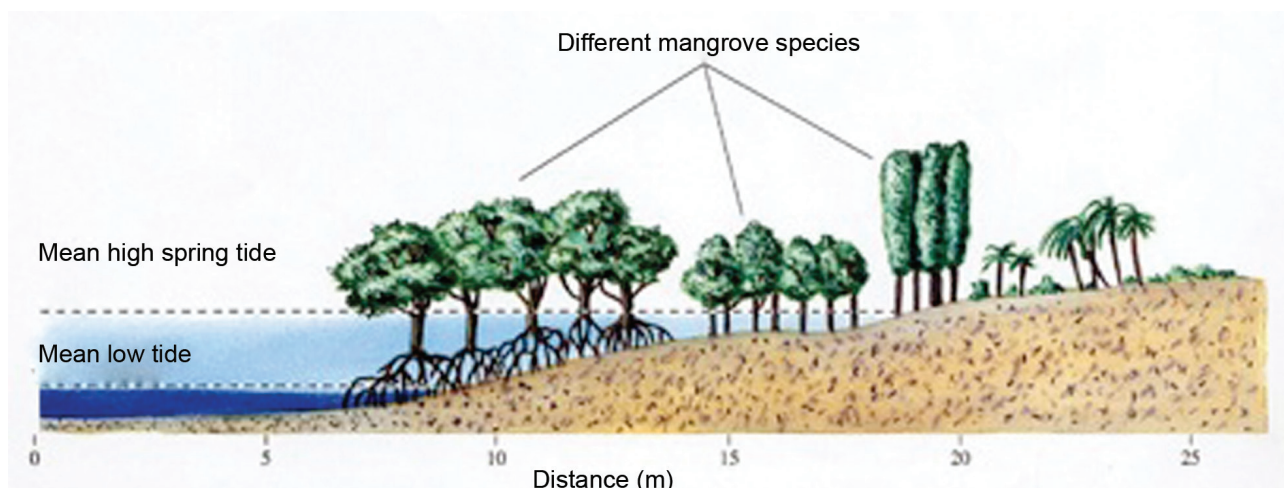


Figure 3: Role of mangrove forest



Mangrove forest – a natural world for coastal area protection

Mangrove forest is a “hybrid” ecosystem of continents and oceans, including the preferred plant species live in or adjacent to tidal areas. Hence, plants often adapt to flooding conditions (salinity, brackish or light). Their roots are at least periodically flooded by the sea.

Biodiversity of the mangrove ecosystem is relatively high, but lower than tropical rain forest on the continent, or coral reefs. Mangrove ecosystems with the highest diversity were found in Southeast Asia. Before 1987 the distribution of mangroves on the coast of Vietnam was about 400,000 ha (250,000 ha in the south of Viet Nam). After 1987, the remaining 252,500 ha (with more than 94 species of mangrove plants), was concentrated at Cuu Long (191,800 ha), the northern coastal estuaries (46,400 ha) and in the central region (14,300 ha).

Mangrove forests have very important ecological functions and economic values including coastal protection from erosion, and protection of seagrass beds, coral reefs, spawning grounds and habitat for many aquatic species (fish, shrimp, muddy crabs); provision of food and maintaining creature species habitat; having the potential for eco-tourism; protection of the marine land reclamation; by the roots, mangrove forest is a natural sediment “trap”, including pollutants from the continent. The economic value derived from fish and mangrove wood in Viet Nam is about 6,000 USD/ha/year. Research also indicates that fishing yields in mangrove forests are directly proportional to the coverage of mangrove vegetation.

In particular, during the 2004 tsunami in Southern Asia, mangroves proved to be a solid natural wall to protect coastal areas, and human life.

Seagrass ecosystem – an important shelter for marine species

The ecosystem including hydrophytes, anthophytes adapted to sea life under high a high saline environment, withstanding wind, waves, tides forces and likely pollinators in water. To date, 58 species of seagrass (in 12 genera and 4 families) have been described globally, down to a depth of 60m. In the shallow coastal water of Indian-western Pacific Ocean, there are about 50 species, including 16 species from Southeast Asia, of which 14 are found in Viet Nam. Australia has 30 species. According to Morton and Blackmore (2001), about 40% of all known seagrass species in the world are found in the East Sea (South China Sea). Diversified seagrass which form large lawn could be found in the soft-bottom areas. Seagrass ecosystem has high biological productivity and is considered an important food source for various organisms, particularly marine turtles, animals and fish.



*Mangroves in Xuan Thuy National Park
© IUCN Viet Nam*

It is calculated that the average productivity of seagrasses is 250g (dry)/1m². Every 1m² of seagrass bed could produce 10 liters of dissolved oxygen/day to help the respiration of sea animals. Thus, seagrass beds are often seen as breeding grounds, and nurseries for many important species in coastal area/coastal island such as fish, dugong, sea turtles and seahorses, etc. The ASEAN region has 318 species belonging to 51 genera. 5 of 7 endemic species of turtles live in or associated with seagrasses. In the Mediterranean, every 400 m² of seagrass provides shelters about 2,000 tons of fish each year. The total number of species residing in seagrass beds is usually higher than that in the outside of about 2-8 times. Seagrass itself can be used as a raw material for applications such as packing materials, carpet padding, making cigars, fuel, roofing, paper, fertilizer, manufacturing sound and heat insulation as well as fertilizer. In Vietnam, we get the value of \$10 million for 1,800 ha of seagrass beds in the Tam Giang lagoon and Cam Ranh Bay (Source: Pham Van Ninh, 2004).

Coral reefs – a “rainforest” under the sea

Coral reefs are of calcium carbonate formation and made up of hard corals of *Scleractinia*. They create different types of reef including fringing reef, barrier reef and Alton ring reef (typically in Truong Sa islands, Khanh Hoa province).



*Coral reefs at Nha Trang Marine Protected Area
© IUCN Viet Nam*

Coral reef ecosystems are one of the ecosystems with highest productivity and richest biodiversity. They may be considered a tropical rainforest under the sea. Although coral reefs only account for 0.25% of the world ocean, they are home to more than 93,000 marine species recorded so far,

and provide services to around 500 million people in the world. (Clive Wilkinson, 2002). The value of such goods and services is estimated to be 375 billion USD. Meanwhile, annual investment in reef research, monitoring and management is only \$100 million, which is less than 0.05% of the above potential value. According to National Oceanic and Atmospheric Administration (NOAA) (2002), annual revenue for 45 million tourists to the coral reefs of the U.S. is 17.5 billion USD.

Southeast Asia seas are of diversified coral reefs. At least 450 species have been found in the reefs surrounding the Philippines, Borneo, Sulawesi and associated islands of Indonesia. Within Vietnam's marine territory, coral reefs are widely distributed from north to south with a total area of about 1,112 km². The Truong Sa archipelago has large coral reef area. Coral reefs in our country are composed of more than 350 species of stone coral. The South Central region has great diversity of corals with over 300 species of 65 genera. The coral reef inside the Hon Mun Marine Protected Areas (Khanh Hoa) is composed of over 350 coral species of corals with different areas. Living with coral reefs in the region are over 3,000 marine bed living species. In Vietnam, over 2,000 species of this type could be found as well. This is a very precious biological resource, which live close to coral reefs and could be used to meet human being's development objective.

How many coastal lagoons are there in Vietnam?

Lagoons are a type of coastal water, separated from the sea by a sand barrier system along the coast and connected with the sea by one or several gates.

Typically, lagoons often develop at the edge of the sandy coastal plain of rich alluvial sand whereby coastal dynamics tend to be leveled in addition to the dominant role of the wave currents along the coastline. In Vietnam, Tam Giang lagoon is the largest in Asia and covers an area of about 210,000 ha with a length of 70km, and spreads along most of the coast of Thua Thien-Hue province. Besides, in scientific literature, we could also see the terminology “lagoon” used for the Alton reef. This is not a typical type of lagoon, surrounded by Alton coral reef and connected to the sea through some gates, which are formed by sandy barrier. For example, some lagoon in Alton reef in Truong Sa.

Apart from Tam Giang lagoon, there are 11 other



Tam Giang Lagoon, Thua Thien Hue © Tran Minh Phuong

lagoons distributed from Hue to Ninh Thuan, and most are locally known as lagoon such as Lang Co, O Loan, Truong Giang, Cu Mong, Nuoc Man, Nuoc Ngot, Tra O, Thuy Trieu, Thi Nai, Dam Nai. It is important to distinguish with some pools which are locally called lagoon such as Nha Phu lagoon. In fact, it is often called a lagoon.

These cited lagoons are shallow (0.5 - 2.5 m) under brackish, saline water (O Loan), connected to the outer sea by 01 or 02 chanel (Tam Giang lagoon) allowing water exchange. This is a typical coastal water ecosystem in central Vietnam and are ideal habitats for aquatic species living and growing. There is high potential for lagoon development and its typicality allows development of economic activities but this development still isn't suitable with its typical characteristic.

The role of coastal bays

Coastal bays are often called bays in Northern Viet Nam. It is a coastal ecosystem formed under submerged & collapsed tectonic conditions of the geological structure. Coastal bays are usually large

pools of great depth, concave on the mainland and are prerequisite for ports development, especially for deep-sea ports. They are also ideal habitats for many aquatic species and are the places for fishing development (fishing and aquaculture production). Coastal bays often have beautiful scenery, clean water with diverse ecosystems and high nature conservation potential. Coastal bays are seen as typical "sharing" resources in coastal area and a potential location for inter-sectoral development such as tourism, nature conservation, fisheries, especially in association with ecological economic development (such as tourism, diving, and recreational fishing).

Vietnam has 52 coastal bays, of which 44 are of national and international value. These include Ha Long, Vung Ang, Chan May, Nha Trang, Vung Tau, Van Phong, and Cam Ranh. These bays have been initially used. Nevertheless, there remain debates on long term exploitation of this important ecosystem under the context of regional and international globalization and climate change.

4- Social Context in Coastal Area

Coastal residents and communities

Around 20% of the world population is living within the shoreline of about 30km and around 40 % of the world population is living in the coastal areas and within the shoreline of 100km. Approximately two thirds of urban with 2.5 million of population and the world large industrial zones are located in on coastal areas and islands in addition to about 220 million people living in coastal urban areas. It is expected that in 20-30 years the population of this area will double (Gommes et al, 1997). Such developments lead to population growth and spontaneous migration, mainly from poor rural areas into industrial zones and large coastal urban. This changes quality of urban residents ("an ruralization of urban life" the trend is taking place); urban increases off-farm labor force and demand for coastal resources; exceeds urban capacity according to the existing planning; creates negative habits on resource consumption; and finally increases pressure on natural resources and coastal environments.

A similar situation can also be found in Vietnam: almost 50% of the national population lives in 28 coastal provinces, cities and about 60% of large urban and industrial zones are located in estuaries and coastal areas. Industrial zones and residential activities are likely to cause chemical pollution. Furthermore, other production activities also take place in these areas, such as ship construction and repair, cement, coal, mining, agriculture and aquaculture. Population growth in coastal areas is higher than in inland areas (2.3% compared to the national average of 1.8%/year), accompanied by increasing coastal resources use and exploitation demands.

Regarding administrative units, in addition to the 28 coastal provinces and cities directly under the Central Government, there are also 12 island districts with 66 populated islands (total 155 thousand people with with an average population average population density density of 95 people/km²). Particularly in Truong Sa island district, there are 21 households and 80 people. These administrative units play a crucial role on economic development, sovereignty and security, and maritime defense. Island districts are also the main areas for implementation of the coastal socio-economic development plan to 2020 which was approved by the Prime Minister in 2010.

Our country's coastal areas are densely populated with an abundant labor supply of over 27 million people, about 30% of the national population and about 18 million laborers. It is anticipated that by end 2010, the coastal population will be 30 million

people with 18 million laborers and this figure will be respectively increased to 30 people and 19 million workers by 2020. This is a very important force contributing to the development of the country's marine economy meanwhile ensuring national security on coastal areas and islands of the country.

Box 3: List of 12 coastal districts in Vietnam

Van Don, Co To - Quang Ninh; Cat Hai, Bach Long Vi - Hai Phong; Con Co - Quang Tri, Hoang Sa - Da Nang; Ly Son - Quang Ngai; Truong Sa - Khanh Hoa; Phu Quy - Binh Dinh; Con Dao - Ba Ria - Vung Tau; Kien Hai, Phu Quoc - Kien Giang.

Livelihood dependence on coastal ecosystems?

Coastal areas have significantly contributed to social-economic development in recent years, and its future also closely depends on the quality of coastal environment and ecosystems. About 20 million people (on the coast and coastal islands) have their livelihoods directly or indirectly depending on marine resources. Their livelihoods and living standards depend largely on coastal and marine resources. It also means that investment in the protection and conservation of coastal ecosystems is to invest for the future of coastal residents, particularly for the poor. However, in many places, local people's awareness on coastal ecosystems is still limited in addition to low living standards, particularly for those living on coastal alluvial area. To date, around 157 communes in coastal areas are in poverty.



Local women collecting clams at Xuan Thuy National Park © Xuan Thuy National Park

The role of the community in coastal ecosystem protection

Among the people engaging in marine and marine economic related activities (among the four main jobs: sailor, petroleum workers, tourists and fishermen), the majority is fishermen which has created “marine culture” with old fishing villages, fishing customary. They are on daily basis on the sea and operate throughout all the country marine area.



Local people preparing mangrove nursery at Lap An Lagoon, Thua Thien Hue © Center on Community and Rural Development (CCRD)

In our nation's coastal areas, there are only 115 districts and 628 coastal communes, towns participating in marine exploitation activities with fishing communities distributing in different areas. Regarding to the distribution of fishing communities, 10% are located in the townships,

towns, 40% in the alluvial areas and the remaining 50% along the two sides of estuaries, creeks. It should be emphasized that 51% of people living in coastal areas are women, who depend on marine resources meanwhile they have less rights to access and control over resources for development as men.

Coastal communities participating in marine activities do not only conserve and protect marine environment but also develop marine resources, economic security and protect national defense on sea. Unlike inland-based communities, marine communities have high level of dependence on marine resources and environment. As such, communities must be the key actor rather than being relevant stakeholder as the way it is now. Their participation in the management of the marine environment is an objective and practical requirement.

In recent years, the involvement of local communities in management processes has been rather passive, without implementing well the principle recipients of science and technology. While they are recipients and inventors of science and technology, marine social and economic promoters, they are also important driving forces to protect marine environment, resources, airspace management, marine and islands.

Coastal resource systems can be compared to “Thach Sanh's cook” - many sectors and communities have the right to tenure and use. If many people eat together but know how to maintain it properly, it could be endless resources.

5- Challenges to Coastal Ecosystems

Changes caused by climate change Impacts

With a coastline of more than 3,260 km and two huge deltas, Vietnam is one of many countries to be impacted by climate change. According to the World Bank (2007), if the sea level additionally rises by 1 meter, the lives of 10.8% of the national population (mainly living in deltas) will be affected as they are concentrated in the delta; if the sea level rises by 5 meters, approximately 16% of coastal land and ecosystem here will be flooded, and about 35% of the national population and 35% of the total gross domestic product (GDP) are anticipated to be at risk. It is obvious that this is an urgent problem in the short and long term in Vietnam. As reported by

the International Agency on Climate Change (2007), climate change causes negative impacts on aquaculture, fisheries and fishing communities. Global warming, sea level rising and rainfall fluctuations might cause vulnerability to ecosystems, fish production, infrastructure, and fishermen's livelihoods. In Vietnam, the emerging concern is abnormal rainfall and higher temperature caused by global warming, especially storms and floods after every frequency of 3-4 years and their impacts on ecosystems (mangroves, coastal line, and deltas), popular fish species, fishing industry and livelihoods.

Sea-level rise has affected Vietnam's coastal wetlands, especially extremely vulnerable mangrove forests in Ca Mau, Ho Chi Minh city, Vung Tau

and Nam Dinh. Coastal biodiversity and marine resources has been declined. Important coastal ecosystems have declined degraded. They have habitats disappeared and areas shrunk. The marine populations tend to move offshore due to changes in structure of coastal circulation of water, in interactions between rivers and seas at coastal estuaries, sweeping away 60% of important natural habitats.

The sea level rise has affected Vietnam's coastal wetlands, especially the extremely vulnerable mangrove forests in Ca Mau, Ho Chi Minh city, Vung Tau and Nam Dinh. Coastal biodiversity and fishery resources have been declined. The important coastal ecosystems have been degraded; their habitats have been disappeared and narrowed respectively. The marine populations tend to move offshore due to changes in structure of coastal waters circulation, in land-ocean interaction in coastal estuarine areas, due to loss of some 60% of important coastal habitats.

When the sea levels rises, about a half of 68 wetlands will be seriously affected. Saltwater will deeply penetrate into coastal lowlands, killing many species of freshwater flora and fauna and influencing the supply of fresh water for domestic consumption and agricultural cultivation in many coastal areas. Then about 36 Protected Areas, including 8 National Parks, 11 Nature Reserves will be flooded.

Mangrove forests are being swallowed

In the last 50 years Vietnam has lost about 80% of its mangrove forests, even more seriously mangrove forests have been completely wiped out in some provinces. The shrimp production and industrial zone and urban development projects have mainly caused the deforestation of mangrove forests. Mekong Delta, Quang Ninh and Hai Phong suffered from the largest loss of mangrove forests. Other causes for the loss of mangrove forests include land conversion (converting forest land into farming land and housing land), destructive war, firewood collection etc...



*Shrimp farming in Quang Nam Province
© IUCN Viet Nam*

Over more than 3 recent decades (1960-1995), a total of approximately 40,000 hectares of mangrove forests have disappeared in Quang Ninh and Hai Phong provinces. These 02 provinces have now only approximately 15,700 ha of mangrove forests. The loss of mangrove forest benefits from aquaculture, forest production and anti-erosion is roughly estimated to be U.S.\$ 10-32 million per year.

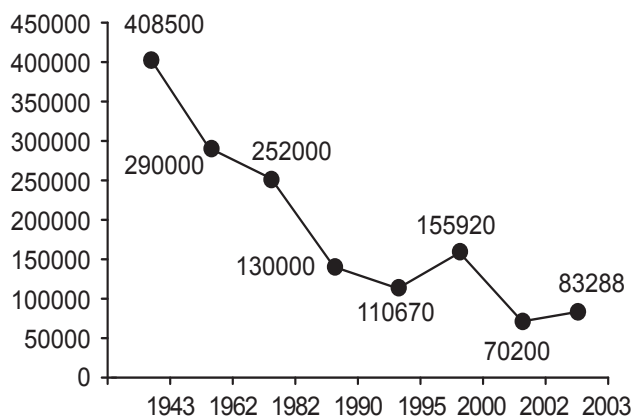


Figure 5: Mangrove deforestation between 1943 and 2003

According to P. Maurand, Vietnam's coastal provinces had around 408,500 hectares of mangrove forests in 1943. As defined by the Forest Inventory and Planning Institute (FIPI) in 1990, there remained an area of 136,000 ha of mangrove forests (about 33% of the area compared to the year 1943) after nearly 30 years, and this figure remained only 83,288 hectares in 2003 (about 20% compared to 1943). Thus, after 60 years (between 1943 and 2003) Vietnam's mangrove forests has dramatically plummeted and lost nearly four-fifths of its area. Between 1985 - 2000, an average proportion of mangrove forest loss caused by production activities was approximately 15,000 ha/year. Due to mangrove forest degradation and deforestation, extensive shrimp production within mangrove forests have been seriously decreased, from about 200 kg/ha/crop (1980) down to only 80kg/ha/crop for the time being, and approximately 800kg of aquatic products per hectare were formerly harvested. However, this figure is now only equal to 1/20 over the previous period the previous one.

Gloomy situation of coral reefs in Vietnam

Nearly 200 coral reefs have recently been surveyed in Vietnam's coastal areas. The survey findings show coral reefs are not in a good condition. In general, the cover of alive coral reef in the North of Vietnam has decreased by 25 - 50%. Based on IUCN assessment criteria, only about 1% of coral reefs studied in southern of Vietnam are in

an excellent condition. The coral reefs in a poor condition account for approximately 31% while the reefs in a very good and good condition occupied by 41% and 26% respectively.



Dead coral reefs at Nha Trang Marine Protected Area © IUCN Viet Nam

Table 3. Quality of coral reef in Vietnam (the World Natural Resource Institute, of 2002)

Type	Cover of alive coral reef	% area
Excellent	>75% alive coral reef	1
Very good	50-75% alive coral reef	26
Good	25-50% alive coral reef	41
Poor	<25% alive coral reef	31

Natural Resource Institute, 2002

According to the warning given by the World Resources Institute (2002), approximately 80% of coral reefs in Vietnam's territorial waters are at risk situation, of which 50% is at a very high risk. Without proactive and effective actions by 2030, Vietnam's sea territories might become "marine deserts" without any reefs and aquatic resources remaining.

What's about other ecosystems?

Sea grass bed ecosystem is also in the same situation. This ecosystem is one of the most sensitive and vulnerable one in case where habitats change. During the period 1996-1997, 39 sea grass covered

an area of 10,768 hectares, and in 2003 the area remained at only nearly 4,000 ha, equivalent to a loss of 60%. The average annual loss was 960 ha, equivalent to 8% of the sea grass beds. Approximately 60-70% of the area of coastal wetland ecosystems, in general, has also disappeared to create more space for human activities.

Approximately 100 aquatic species are differently at risks and more than 100 species have been included in Vietnam's Red list. Marine resources are declining in terms of volume, production and size of caught fish.

Over-exploitation is considered the most serious threat on marine and coastal ecosystems. Over recent years, Vietnam's rapid economic development has increased resource exploitation needs to meet the demands of domestic consumption and export. On the one hand, the number of fishing equipments and facilities has remarkably increased and on the other hand, they have been improved. This leads to a rapid decline in marine resources on marine and coastal ecosystems. The import demand of fresh marine products from China, Hong Kong, etc is putting pressure over the resources of ecosystems. In fact, fishing from ecosystems, even in protected areas, is completely out of control. The same situation happened to marine specialties such as holothurian, lobster, etc and ornamental fish for export. In recent years recent years, the massive expansion of shrimp farms has encroached into ocean ecosystems, causing a significant decrease in both quantity and quality of ocean ecosystems.

More and more waste discharged into riverine and coastal estuaries

The total amount of solid, industrial and medical wastes in coastal areas has dramatically increased over past years and increasingly caused extensive pollution in estuaries and coastal areas, which negatively affects water resources, creatures, economic sectors of the marine industry (aquaculture, fishing, etc. Thousands of tons of solid waste are daily discharged into the sea, especially in coastal areas. The socio-economic development mainly focusing on the coastline and coastal watersheds is a major cause for a huge volume of waste discharged into the sea. Not only waste from industrial activities of ship building and repairing, aquaculture but also waste from coastal industrial zones and domestic waste are also very serious problems. This is a great pressure on environment, ecosystems, and coastal and marine resources.

Box 4: Tonnage of pollutant waste discharged into the sea

The results of preliminary evaluation on contaminants in coastal areas (2010) showed that coastal areas of Hai Phong - Quang Ninh are annually polluted by approximately 206.4 thousand tons of COD; nearly 39 thousand tons of BOD; 38.8 thousand tons of N-T, 20.7 thousand tons of P -T, 17.24 million tons of total suspended solids (TSS), 51.5 tons of insecticides and pesticide and more than 7.8 thousand tons of heavy metals. The total annual amount of pollutants discharged into coastal areas of Da Nang - Quang Nam province are about 92.6 thousand tons of COD; 22.4 thousand tons of BOD; 53.8 thousand tons of N-T; 11.9 thousand tons of P-T; 428.4 thousand tons of TSS; nearly 83 tons of pesticide and insecticide and 430 tons of all kinds of heavy metal. The total annual amount of pollutants discharged into coastal areas of Ba Ria - Vung Tau - Ho Chi Minh City are at least 175.6 tons of COD; 38.9 tons of BOD; 125.9 thousand tons of N - T; 23.3 thousand tons of P - T; 384.2 thousand tons of TSS and more than 3 thousand tons of heavy metal.

As indicated by preliminary calculations, 28 coastal provinces discharge approximately 14.03 million tons each year (about 38,500 tons/day). On average, 1 ha of shrimp production will discharge 5 tons of solid waste and tens of thousands of cubic meters of waste water into the environment. The total 600 thousands hectares of shrimp production area is currently will discharge nearly 3 million tons of solid waste. Most of industrial solid waste are mainly concentrated in the provinces of key economic regions in coastal provinces and this figure will likely increase in the future. In 2009, the statistics show that total volume of solid industrial waste discharged in coastal areas is about 2.42 million tons/year (equivalent to approximately 6,600 tons/day, accounting for 50% of the industrial waste of 13,100 tons/day arising across the country).

In the coastal industry, the marinetime and shipbuilding industries are significant causes of pollution. "Nix dust" which is also known as copper slag is to blame for environmental pollution inside and outside shipbuilding factories. In which, the amount of nix dust waste is mainly concentrated in Hyundai Vinashin Shipbuilding factory in Khanh Hoa Province where nearly 1 million tons of waste emitted between 2000 and 2007 has not yet been treated (Khanh Hoa Environmental Assessment Report, 2010).

Coastal provinces have a quite large number of hospitals and patient beds. According to statistics in 2009, the total amount of solid medical waste discharged is more than 248 tons/day in the coastal provinces (inclusive of general hospital, preventive health care centers, clinics, etc), of which about 20% (equivalent to 40-50 tons/day) of hazardous solid medical waste is required to be treated.

The oil spills usually happen

A high frequency of oil spills and discharges of oil sludge happens. These incidents sometimes widely cause damage. Vietnam's waters are located along the International Maritime Route of Indian Ocean - Pacific Ocean. Approximately 200 million tons are annually transported through Viet Nam with high amount of legal and illegal discharge. Therefore, Vietnam's coastal waters are vulnerable to pollution incidents caused by oil sludge, oil spill etc.

According to statistics, there were more than 100 oil spill incidents caused by shipping during the period between 1989 and 2009. The accidents caused tens to hundreds of tons of oil spills. The oil spill incidents often occur in every March and April in the Central Region and in every May and June in the North Region. In addition, there are offshore oil spills without any clues and illegal oil sludge emissions which are not early detected. These oil spills all move to Vietnam's coastlines because of monsoon direction. For example, the oil spill incident that was detected in Feb 2007 adversely affected 20 provinces/cities along the coast, mainly the Central Region (from Ha Tinh province to the South), with the total more than 1.7 thousand tons of oil spills collected.



A turtle rescued after the oil spill in the Northern of Mexico Gulf © Blair Witherington

Particularly, small old ships with capacity less than 45 horsepower which are not equipped with the device of oil water separator discharge 50% of oil sludge into marine environment, causing pollution to Vietnam's waters. Vietnam's oil and gas exploration offshore has annually promoted, as well as under the context of the South China Sea, it is a certain likelihood that number of so-called illegal "oil and gas activities" involving in Vietnam territorial waters has been increasingly escalated in the South China Sea, leading to risks of oil spills,

oil sludge emission and oil leaks. As reported by the Petroleum Corporation of Vietnam, 7 oil leaks have so far happened at the oil rigs, exclusive of the incidents of other regional countries in the South China Sea. In addition, Vietnam's territorial waters have about 340 oil drilling wells. Apart from a high volume of oil sludge emission, this activity also generates approximately 5,600 tons of solid waste, of which 20-30% is hazardous solid waste without any treatment.

6- Investment Demand for Onshore Ecosystems

With the role and values of ecosystem as well as the strong resilience of mangrove forests against the fierce attack of the tsunami in 2004, experts believe that natural ecosystems are very important element of infrastructure, or even more being a pre-condition for protecting the mainland. Therefore, MFF's decision on investment in natural ecosystem is also considered as their investment decision on infrastructure for sustainable mainland development.

In other words, that's the way how we protect not only the national economy and the entire society but also future generations in terms of values of essential "real estate, conveniences and services". Coastal ecosystems are required to be preserved and improved with the synergy of the entire society, ranging from the Central Government down to grassroots level with aims to maintain their functions and productivity. Losing such valuable natural resources will push the national economy and the entire society to come to a serious deadlock at all levels from the national to the local, even at the global level. The tsunami in South Asia in 2004 and in Japan in 2010 are eye-witnessed experiences.

What is the ecosystem-based approach?

The coastal ecosystems are targets of the ecosystem-based management approach (EBM). They are distributed both in coastal areas and coastal waters; they contain habitats and interactive species while human being is considered a part of the coastal ecosystem. The ecosystem is compared as if it was tree root, and its values that they bring to the mankind are as if they were picked up from the tree. Thus, unless their roots are well cared, "fruits" will be available for the whole year around. The EBM approach is

also a space approach.

Ecosystem-based management is an environmental management approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation. The EBM approach addresses many relationships across spatial, biological, and organizational scales and is a goal-driven approach to restoring and sustaining ecosystems and functions. This ecosystem approach also requires a multi-sectoral collaboration mechanism. It fails to coordinate human interventions in ecosystem exploration and use process if it is based on individual separate policies of individual sectors. The EBM approach considers ranging from species, group of species to the entire ecosystem. It not only puts a premium on premium on short-term physical values of the ecosystem but also preserves functions and linkages of the ecosystems, between natural processes and social systems, between the ocean and coastal wetlands.

There are many ways to specify the ecosystem-based management approach. However, the EMB approach often refers to five basic concepts: (1) Recognizing the inherent links among coastal ecosystems, (2) Applying ecosystem services to strategy development, policy advocacy and planning, (3) Studying and resolving resonant effects among different human interactions, (4) Adopting multi-sector use and management mechanism and resolving interest conflicts arising, (5) Exchange, sharing, learning and adapting. The EMB approach also applies the integrated coastal management (ICM) approach through integrating ecosystems management tasks into the ICM framework with aims to create a background for sustainable development.

Building coastal resilience based on healthy ecosystems

Three elements of the coastal zone which are very vulnerable to natural disasters and human interventions include the natural ecosystem, aquatic resources & biodiversity and local communities. These three elements are interdependent, affecting people's livelihoods and coastal zone sustainability, particularly under the context of climate change. Through Building Coastal Resilience (BCR) against impacts of climate change and sea level rise, priorities are given to not only raising local people's awareness and enhancing the capacity of communities but also keep the existing ecosystems healthy. The healthy ecosystems shall contribute to maintaining aquatic resource and covering biodiversity as well as improving local communities' life quality.

IUCN through MFF and BCR has proceeded with the initiatives in community-based adaptation and piloted them in some coastal provinces of the Mekong Delta through small-scale projects. The main activities are to share national and international lessons learnt, improve people's knowledge and awareness, and build and up-scale demonstration models as well as human resources development.

Mangrove forest rehabilitation

Important coastal ecosystems continue to be degraded and shrunk. Therefore, it is supposed to give priority to rehabilitating them for sustainable coastal zone development.



*Mangrove planting in Thanh Hoa Province
© CARE International Viet Nam*

Afforesting and rehabilitating the depleted mangrove forests, coral reefs and to regenerate and protect spawning areas for marine species, including many species; conserving natural values of ecosystems for the purpose of eco-tourism development and recreational fisheries development, etc. It is advised to make planning for wetland protected areas and protect wetland biodiversity, wild bird habitat. Watershed special-use mangrove forests act as a shield for environmental protection.

The progress of the Project "Restoration and development of coastal mangrove forests for the period 2008-2015" approved by the Prime Minister is to be implemented. During the first phase, an area of 32,800 hectares is targeted to be developed and improved, of which more than 97,500 ha is to be afforested, increasing the total mangrove forest area of the whole country to over 307,200 ha by 2015. Priorities are given to afforesting and protecting mangrove forest belts. More than 18,800 hectares of forests was afforested and rehabilitated in order to protect sea embankments in 2010.

Provinces are required to rapidly increase the cover of watershed coastal mangrove forests; to protect mangrove forests from illegal logging and aquaculture, to supervise the quality of mangrove forest cover to promptly handle the problems causing damage to water, land and biological resources, ensuring the sustainability of ecosystems.

Creation of man-made coral reefs

The global and national scientific institutions have used a number of different measures to restore the degraded coral reefs. The popular measures are either to remove the degraded coral reefs out of their living areas to change the use purpose of marine areas or create man-made cement reefs with different sizes and shapes to replace the depleted reefs. Unlike to mangrove forests, creating man-made reefs are often technically difficult and very costly. Reefs can be created by constructing reef frames on which coral species can live. The reef frames can be made of iron, steel or stainless steel. The taken measure sometimes is to sink old ships like Australia and Viet Nam can apply this method.

Effective management of marine protected areas

Marine Protected Areas (MPA) are an effective tool to conserve marine-coastal ecosystems with aims to maintain fishing practices and marine environment for tourism. In cases where a marine Protected Area is effectively managed, marine resources will be recovered after only 3 years and surrounding territorial waters will be nourished and provided with nutrients and a variety of new breeds, creating an ecological balance for all waters after 5 years.

Aiming for effective management, it is noted that the objective of conservation should be linked to the objective of improving livelihoods for people living in and around the marine protected areas. Also, in 2010, the Prime Minister approved the planning for 16 marine protected areas, mainly located in coastal zones. Therefore, it is advised to adopt the Integrated Coastal Management (ICM) approach and improve multi-sector coordination mechanisms.

State policies on coastal zone administration

Vietnam's policies on coastal zone administration are mainly separately formulated and adopted by individual sectors and under supervision of line relevant ministries and sectors. There have been few multi-sectoral policies, or if any, they have not yet been brought into life. It is suggested to give priority to multi-sectoral policy development in the future.

APPENDIX

QUESTIONS AND ANSWERS ABOUT MFF AND COASTAL ECOSYSTEMS

Question 1: What is natural capital?

Natural capital is divided into 2 important groups of resources: non-renewable resources, such as oil, gas, coal, minerals etc., and renewable resources, such as ecosystems and their services (air filtering, water purification, etc). In other words, natural capital includes physical values and non-physical values (functional values) of the nature that mankind can use directly or indirectly through conversion of values. Coastal ecosystems are real property, conveniences and services for economic development and social security. Therefore, investment in coastal ecosystem is the investment in conserving natural capital.

Question 2: Why does natural capital need to be invested in?

Needs of development and people's instincts "to survive" which are not under an effective control has led to overexploitation and depletion of natural resources, especially natural ecosystems. Many types of natural resources have been exhausted, which are unrecoverable or very slowly recoverable. And then, "when man bites a piece of the nature, the nature returns them hundreds of bites" This paradox makes people's "means of existence" threatened and the mankind's future becomes unsustainable. That's why we shall have to change our behavior to preserve natural capital with an orientation towards sustainable development.

Question 3: What is sustainable development?

The term "sustainable development" was first initiated in 1980 in the World Conservation Strategy (released by IUCN) with a simple message, i.e. "mankind's development not only focuses on economic development but also considers essential needs of society and impacts on ecological environment". However, the concept of sustainable development was officially popularized in 1987 in the "Our common future" report and gradually confirmed in U.N.Conferences

on Environment and Development held in Rio de Janeiro, Brazil (1992) and Johannesburg, South Africa (2002). Then, sustainable development is understood as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

In nature, sustainable development must first be a development process in which the spatial relation among 3 components of environment, society and economy is always optimally adjusted, as well as to ensure equity among generations (political responsibility). So to say, it is not easy to achieve sustainable development in practice since elements of development always change, even very rapidly compared to the ability to adjust. Therefore, the sustainable development is the expected goal in terms of social aspect, but it is also the need and inevitable trend in the evolution of the human society, development of all economic sectors, regions and localities. The sustainable development emphasizes three key issues:

- Economic development aims to improve the quality of human life: health and well-being life in a harmony with the nature.
- Appropriate development in terms of environmental aspect: natural resources shall be sustainably used, or are sometimes not used if they are sensitive to the environment in an attempt to protect important ecological processes, human supporting systems (ecosystems, etc) and conserve biodiversity.
- Development with equitable benefit-sharing mechanism: in the society, among generations, and among countries (obligations with other countries, integration into the international community, etc.).

Therefore, sustainable development requires all socio-economic sectors, leaders, social organizations etc. to take actions together. It is objectively and practically required to integrate views, activities and solutions of sustainable development into development projects for the sake of the mankind's social development.

Question 4: How about sustainable development in coastal zones?

Based on the aforesaid concept of sustainable development, the sustainable development of coastal zones can be considered as a process of change in which natural resource exploitation, investment, technological development and institutional change are consistently conducted for a given period of time. The goals of sustainable development of coastal zones are:

- Accept multi-sector development in coastal zones;
- Minimize threats/risks of natural disasters to coastal zones;
- Conserve important ecological processes, supporting systems for living species (including humans) and biodiversity;
- Improve livelihoods, contributing to poverty reduction for communities living in coastal zones and onshore islands;
- Promote and maintain investment in natural capital, which is considered as a prerequisite for sustainable development of coastal zones.

Question 5: What is MFF's new approach?

MFF is clearly aware that the coastal ecosystem contains valuable natural assets which are necessary for the development of human society. They need to be protected, preserved, restored and re-invested. MFF applies a new approach to re-orient incomplete perspectives on sustainable investment in coastal zones.

This approach has shifted from passive responses to natural disasters into proactive actions to meet the needs of long-term management and sustainable development. MFF does not prioritize to address circumstances/incidents or follow up specific actions, but it focuses on capacity building for the community's preparedness to respond to natural disasters and improve the adaptability under context of new climate conditions. This new approach also supports economic development by means of promoting sustainable investment opportunities and ensures an effective evaluation and protection of coastal ecosystem products and services.

MFF promotes further cooperation and takes common actions within the region to strengthen the capacity of leaders and coastal communities to optimize positive socio-economic and ecological changes.

Question 6: Why does MFF consider mangrove forests as a pioneer ecosystem?

Fighting against natural disasters to save people's lives and properties in coastal areas, mangrove forests play a pioneer role in minimizing damage caused by tsunami. As indicated by catastrophic tsunami experiences that South Asian and Southeast Asian underwent in December, 2004, The more mangrove forests are kept intact, the less damage will be caused. Many reports by victim countries showed that mangrove forests play an important and significant role in protecting coastal communities and mitigating damage caused by disasters.

Mangrove forests perform their function of protection in many different ways: either by resisting against the power of the tsunami or by keeping stuffs from sweeping away along the water flow. In some cases, mangrove forest is a "savior" when it becomes the barrier to stop people from being swept away into oceans (IUCN 2005 a; Gayathri Srikanthan, 2006). Mangrove forests mitigate impacts of the tsunami in two ways: (i) reduce the speed of water flows or the force of waves and (ii) natural channels and canals within the mangrove forest contribute to scattering water volume and thereby reducing the impacts on residential clusters located inside Mangrove forests.

Therefore, it is necessary to join the MFF initiative, actively rehabilitate, plant and protect mangrove forests as well as conserve and maintain coral reefs, sea-weed vegetation and other coastal ecosystems. This is also considered to be an effective investment in ecosystems: for the future and for future generations!

Question 7: Which additional issues related to coastal ecosystems are concerned by MFF?

The question of how effective different ecosystems are to protect coastal zones needs to be answered. The question how "healthy" ecosystems needed to be kept and maintained to ensure the protection functions of the ecosystem? How can policy makers quantify the important role and services of the ecosystem? How are appropriate budget decisions made?

The lessons learned from the tsunami disaster further clearly reflect the role and values of coastal ecosystem services. For instance, coral reefs, sea grass beds, mangrove forests and sand dunes play an important role in reducing the force of waves and protect citizens as well as critical infrastructure in coastal zones (IUCN 2005 a; IUCN 2009), etc.

Therefore, MFF is also studying other coastal ecosystems in conjunction with coastal mangrove forests, for instance, coral reefs, estuaries, lagoons, sea sand, sea grass beds and other wetlands.

Question 8: Mangrove forest and the possibility of emission reduction?

Mangrove forests can sequester a quite large amount of carbon to reduce emissions causing the greenhouse effect. Carbon sequestration is affected by factors such as tree density, species, tree age, and decomposition of soil organic matter and the extent of tide flooding. Of which, extent of tide flooding and extent of decomposition of organic matters in anaerobic environments is key factors enabling mangrove forests become CO₂ sinks.

Globally, mangroves provide more than 10% dissolved organic carbon that the continent provides to the ocean whilst only a very small area (less than 1%) of mangroves in the world are effectively protected. Recently, it was found that mangroves store large amounts of carbon, both in trunks and roots of trees. Since they live on carbon rich peat land, vegetation cover of mangroves really sequesters larger amounts of carbon per 1 hectare of mangrove forest than 1 hectare of terrestrial tropical forest. That's the reason why we should have to protect such huge "carbon sinks" in mangroves and on peat wetlands in Vietnam and Asian. If not, the loss of more mangroves will further increase carbon emissions, which generates carbon dioxide and methane - greenhouse gases, contributing to climate change

Question 9: What are MFF organization and main activities?

MFF is working in 4 key areas: regional cooperation, support programs at national level, participation in private sector and community activities. The Programs of Work are to be implemented through a series of projects covering the prioritized geographical zones along the coastlines based on national and regional priorities. During the implementation process, MFF focused on integrating cross-cutting themes, such as gender, climate change, communication and capacity building. Private sectors are encouraged to take part in implementing MFF activities at national level.

It should be emphasized that gender issue may affect personal perspectives, from which it affects the use of resources. Gender equity is mainstreamed into design, implementation process and monitoring and evaluation of MFF projects with aims to ensure that equality of outcomes for both men and women is achieved in the management of coastal natural resources.

Knowledge management and communication create as basic background for knowledge-sharing and collaboration among MFF stakeholders. Knowledge management and communication among regional, national and project levels is more important as it helps achieving MFF objectives as well as ensuring results, lessons and best practices are shared widely.

Developing national technical capacity to manage coastal ecosystems is a strong priority for MFF. This is directly supported by MFF Secretariat through either study tours or regional and international consultancy for individual countries.

MFF promotes environmentally sustainable business practices in coastal areas based on Corporate Social Responsibility (CSR) initiatives taken by existing companies. MFF enhances opportunities for doing sustainable business practices and developing new "environment markets".

Question 10: What is MFF's priority during the period 2011 - 2013?

Aiming to address present and future risks, as well as to preserve and restore coastal ecosystems, MFF has designed 15 Programs of work (PoW) covering 3 cross-cutting themes: i.e knowledge management, higher decentralization and capacity development.

The priority actions have been designed for the period of 2011-2013 in Vietnam. Stakeholders have been also well informed through a learning and information-sharing network. Vietnam has launched Small Grant Facility (SGF). MFF Secretariat has allocated \$100,000 to SGF to support demonstration projects of one or two Programs of Work out of a series of PoWs as priorities in Vietnam, i.e. PoW 2-8-9-14. After completed successfully the first round selection of SGF projects, there might be Large Grant Facility starting in 2012 at the regional level. LGF projects are required to merge all 4 PoWs at the provincial levels into an integrated program which is ended with a policy advocacy component connecting with activities of the learning networks at the national level. MFF shall take initiative in drawing out lesson learnt through the provincial and national implementation, contributing to MFF's research activities at the regional level.

Question 11: Which ocean energy potential does Vietnam have?

Wind and solar energies are considered resources (in terms of benefits) in Vietnam coastal areas, especially wind energy (wind power) in coastal areas and on islands. Aside from wind energy and

solar energy, Vietnam has the potential of ocean energy (waves, currents and tides) - a renewable clean energy in the future. Having an open coast being strongly influenced by seasonal winds, accompanied by two seasons of waves and strong currents toward the northeast and southeast, it is important to take the advantage of energy of waves and currents in the long run, especially in coastal areas of the Central Region. The potential tidal energy in Vietnam might be the tidal power in coastal areas of Quang Ninh - Hai Phong provinces. However, its scale is small because the tidal amplitude is only approximately 4-5m.

Ocean energy development is a priority to mitigate global climate change impacts.

Question 12: Did climate change happen in the past?

Global climate change happened in the past from several hundred years to several million years ago. For instance, volcanic eruptions decreased solar radiation while changes in ocean currents led to changes in temperature and rainfall distribution, and especially glaciating and thawing alternately. The world has undergone through about 4 ice ages, alternating periods of thawing, causing the Earth's temperature to fluctuate, ranging between 5-7°C, especially up to 10-15°C in the northern hemisphere. This was the phenomenon of "shifting continents", equivalent to the periods of "transgression" caused by melting or icing. The last Frandrian transgression took place approximately 20,000 years ago and the last ice age happened 6,000 years ago. The Vietnamese legend "Son Tinh, Thuy Tinh" is an interesting legend which illustrated the phenomena of transgression caused by the global climate change over the past in Vietnam. One-meter sea level rise together with storms will cause unpredictable consequences which are serious enough to destroy many either embankments or natural coastal barriers in the world.

The latest research findings of U.S. scientists discovered that huge ice blocks in the west of Antarctica which are as large as the total aggregated of the 2 U.S. States of Texas and Colorado (932,000 km²) are now melting at the speed of 5 cm/year and they are forecasted to entirely disappear in the next 7000 years. By that time, the sea level worldwide will rise by 4.8 meters compared to today. This is high enough to submerge a number of islands and coastal lowlands, including capitals and largest cities of many coastal countries, including Vietnam. The soil measurements show that the ice blocks began to melt continuously from 10,000 years ago to date while the global warming caused by greenhouse effects just began recently in parallel with the

world's industrialization. Thus, the global warming might accelerate the melting of the aforesaid ice blocks.

Question 13: Impacts of sea rise level on coastal zones?

The sea level rise will cause salt penetration to fresh water in riverine areas and estuaries. Under the worst scenarios, sea level rise and its impacts are very serious. Coral reefs will be destroyed since they usually grow at the maximum speed of 10 mm/year, meaning that it is nearly equal to the predicted sea level rise.

The sea level rise also made many coastal lowland inundated, it also caused saltwater intrusion into deeper inland. It increases the frequency of floods which would have formerly occurred frequently and did harm to coastal zones due to deforestation of watershed forests, etc. As a consequence, it resulted in the "great ecological crisis in coastal zones", paralyzing existing infrastructure, deteriorating the irrigation capacity of rivers, submerging low and small islands in territorial waters and oceans, causing coastal erosion, polluting environment including potential contamination of "slowly-explosive chemical bombs" buried in alluvial coastal land areas... It will eventually immeasurably threaten ecological security, food security, social security, economic growth through obstacles to the development of a number of economic sectors such as agricultural production, tourism, etc as well as to the survival of poor countries.

Question 14: Is possible to reduce CO₂ emission?

Human activities shall discharge about an additional 7,000 billion tons of carbon into the atmosphere each year. The oceans themselves are anticipated to store 25-30% of greenhouse gases. The marine Phytoplankton is able to sequester about 35-50 trillion tons of carbon, therefore it can have relatively significant impacts on the global carbon cycle, especially compared to the amount of carbon that people emitted. In cases organic carbon particles are sunk beneath the ocean, CO₂ and greenhouse gases will be reduced.

Maintaining and improving the health of coastal ecosystems will contribute to an increase in the ability to participate in the campaign to store redundant carbon amount causing greenhouse effects at all levels.

TERMINOLOGY

Coastal zone

The coastal zone is the transitional environment between land and ocean which are always influenced by hydrosphere, atmosphere, biosphere and humans. The coastal zone includes 2 parts, i.e. landmass adjacent to ocean (hereafter called coastal area) and nearshore water bodies (hereafter called nearshore area).

Ecosystem

An ecosystem is complex set of relationships among the living resources, habitats and residents of an area which are always interacting with one another.

Coastal ecosystem

Coastal ecosystems are the ones located in coastal and nearshore zones. For instance, mangrove forest ecosystem is a coastal ecosystem while sea grass ecosystem and lagoons are a nearshore ecosystems. However, both of them are coastal eco-systems. Conditional on specific cases, proper terms are to be used.

Ecosystem services

Ecosystem services are humankind benefits from a multitude of resources and processes that are supplied by natural ecosystems. For instance, mangrove forests provide food, forest products, flood control, carbon storage, alluvial sedimentation as well as act as a natural wall against natural disasters (tsunami etc.) and anti-coastal erosion, etc.

Ecosystem approach

The ecosystem approach is a strategy for integrated resource management that promotes conservation and sustainable use in an equitable manner. This approach is underpinned by 12 principles and 5 steps of actions. In other words, the ecosystem approach orientates people and their use of natural resources directly into their decision making. The ecosystem approach is applied to seek the appropriate balance between, and integration of, conservation and use of biological diversity in the areas where there are important natural resources and a plenty of resource users, for instance, in oceans.

Shared resource

Coastal resources exist in the form of natural systems – in a space containing a series of different specific natural resources, providing prerequisites for multi-use and multi-sector development and the use of natural resources is of competitiveness. They are coastal ecosystems (lagoons, bays, marshes, mangrove forest etc.). This requires new management approaches: i.e. integrated coastal management (ICM) and ecosystem-based management (EBM).

Climate change

Climate change is a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

Mitigation

Climate change mitigation is action to decrease the concentrations of greenhouse gases and increase the carbon sequestration and storage etc. in order to relieve negative climate change impacts.

Adaptation

Adaptation refers to means of adjusting natural or man-made systems (natural ecosystems) with aims to minimize consequences caused by climate change and sea level rise or take advantages of the opportunities that climate change provides.

Response

Climate change response means actions and measures in preventing, mitigating and adapting to natural disasters and climate change.

Interest conflicts

Interest conflicts are disputes over interests of resource users (organizations and individuals), as well as over consequences and damage that one sector/person caused to other sector/person in their exploitation and use of natural resources in coastal zones. It is also known as a conflict of interests in multi-use of coastal natural resource.

Types of interest conflicts

It is divided into 12 types of interest conflicts based on the following: different forms of conflicts (conflicts of space, conflicts of investment, etc), different types of contradictions (one-way contradictions, two-way contradiction, etc), time scale and different levels of contradictions (temporary contradictions, antagonistic contradictions, conflict of interests, etc), relations and causes of conflicts (internal conflicts within a sector, or conflicts among different sectors, etc).

Humansphere

Humansphere is the sphere where humans and their behaviors are a center of impacts which are normally negative impacts on surrounding environment (other spheres).

Community-based participation

Community-based participation is participating in common activities. The participation of the community and stakeholders is a synergy of contributions made by a number of interest-common groups and beneficiaries in a specific

area. Participation is not only the process of communication but also “empowerment”, fulfilling rights and obligations “people know, people discuss, people do and people check”.

Participation approaches

Participation approaches are the different ways that the community can be involved in coastal resource management and protection: passive participation, involvement in providing information, consulting services, in-kind contribution, functional participation, interactive participation and self-mobilization.

Mobilization of participation

Mobilization of participation is an approach that encourages communities being willing to participate. For example, encouragement and motivation are preferable, rather than inflexible rules. The rules are not always highly effective to control the development, creating opportunities for people to realize the benefits of their participation. Then, they take part in voluntarily rather than compulsorily.



Mangroves for the Future (MFF) is a partnership-based initiative promoting investments in coastal ecosystems that support sustainable development. MFF provides a collaborative platform for the many countries, sectors and agencies tackling the challenges to coastal ecosystem conservation and livelihood sustainability and is helping them to work towards a common goal.

MFF builds on a history of co-astal management efforts before and after the 2004 Indian Ocean tsunami, especially the call to sustain the momentum and partnerships generated by the immediate post-tsunami response. After focusing initially on the countries worst - affected by the tsunami - India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand - MFF has now expanded to include Pakistan and Viet Nam. MFF will also continue to reach out to other countries in the region facing similar challenges, with the overall aim of promoting an integrated, ocean-wide approach to coastal area management.

MFF seeks to achieve demonstrable results through regional cooperation, national programme support, private sector engagement and community action. This is being realized through concerted actions and projects to generate and share knowledge more effectively, empower institutions and communities, and enhance the governance of coastal ecosystems.

Although MFF has chosen mangroves as its flagship ecosystem, the initiative embraces all coastal ecosystems, including coral reefs, estuaries, lagoons, wetlands, beaches and seagrass beds. Its management strategy is based on specific national and regional needs for long-term sustainable management of coastal ecosystems. These priorities, as well as newly emerging issues, are reviewed regularly by the MFF Regional Steering Committee to ensure that MFF continues to be a highly relevant and responsive initiative.

Learn more at: www.mangrovesforthefuture.org

