National Strategy and Action Plan: Indonesia 2012 – 2015

Executive Summary

Mangroves for the Future (MFF) is a regional initiative to strengthen the environmental sustainability of coastal development and promote the investment of funds and efforts in coastal ecosystem management for sustainable development. This initiative is supported by various countries and organizations.

MFF targets countries are the countries that recovering from the Indian Ocean tsunami such as India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand, but the initiative will also share the information and experiences with other countries in the region. The MFF member countries have established a Regional Steering Committee, and each member country also set up a National Coordinating Body (NCB). The National Development Planning Agency (BAPPENAS) is the chairman of NCB Indonesia. Indonesia's NCB consisted of Ministry of Fisheries and Marine Affair (KKP), Ministry of Environment, Ministry of Forestry, Ministry of Home Affair, Wetland International Indonesia Programme (WIIP), LPP-Mangrove, and Mangrove Expert as individual expert. The membership of NCB will be reviewed every 2 years.

In achieving its objectives, MFF Program has set 15 Programs of Work (PoW), which are categorized as three frameworks, including building knowledge, strengthening empowerment and enhancing governance. In addition to PoW, there are cross cutting issues for gender equity, disaster management, and climate change issues.

It is inevitable that Indonesia will make greater use of the coastal resources in a rational manner as defined by BAPPENAS in the national program of work. In the face of rapidly rising demands for raw materials, energy and impacts of climate changes, all those issues will force Indonesia to seek alternative sources, which one of them is mangroves ecosystem. There are many programs developed by GOI and other societies (NGO) e.g. National Strategy for Mangrove Ecosystem Management in Indonesia to support services and functions of mangrove ecosystems such as mitigations (sea level rise, temperatures, climate change), carbon sink, nutrients, food resources security, coastal ecological stability, etc. Such kinds of program are becoming more and more urgent for the future life and investment.

The values of mangroves also depend upon its locations and state or condition. However, it must be remembered that economics is not the only one criterion by which decisions for resource development are made Thus, Indonesia must be imaginative in attempting to visualize the future importance of the mangroves and coastal ecosystems to mankind.

Indonesia is blessed with the wide range of coastal ecosystems and mega-biodiversity of living resources that supportthe livelihoods. Therefore, the sustainability of the roles of ecosystems is required to be considered. In terms of legal and institutional frameworks, laws and regulation have been issued. The governance issue is also addressed. However, there are still some problems in the management including the ecological and socio-economic considerations.

The multi-complex issues (problems and opportunities) that bear on the country's sustainable coastal development emanate from a number of sources sector-ally or may result from future

socio-economic activities at local level. The existing and potential issues need to be coordinated among the GOI agencies concern with coastal development may be broadly categorized into the following major concerns: ecological, socio-economic, legal and institutional concern.

Nationally, Indonesia has been set up a general principle for the coastal resources management and utilization, and implemented sectorally with solid coordination. For a principle and selected PoWs to successful it must based upon a sound logical frame work which begins at the national level and then iterates down through the provincial and local government levels to the site implementation plan. It has been agreed to focus on district/local level management of coastal ecosystems, and especially to (a) support coastal livelihoods initiatives that are both sustainable and help to maintain natural ecosystems, (b) improve the resilience of coastal communities through coastal ecosystem management, (c) increase awareness of the economic value of coastal ecosystems and use this to prioritize, promote and support coastal conservation and development actions, and (d) develop mitigate and adaptive measures to climate change.

The MFF Program in Indonesia will include Small Grant Facility (SGF), MSP/LGF schemes in encouraging local community action in the restoration and management of coastal ecosystems and their services as a basis for sustainable development. The sustainability of coastal ecosystems is also required to support the livelihoods. The selected project event MSP/LGF and SGF, will have a connection with local (Provincial – district/sub district) development policy. Also, the projects embrace the general principles of income generating, that local people participation is the key words.

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List of Acronyms

BAPPEDA: Regional Development Planning Agency

BAPPENAS: National Development Planning Agency

BIG: Geospatial Information Agency (Former: National Coordination for Survey and Mapping or Bakosurtanal)

BUMN: State-Owened Enterprices

CRMP: Coastal Resources Manajement Project

CSR: Corporate Social Responsibility

ETM+: Enhanced Thematic Mapper Plus

FGD: Focus Group Discussion

GOI: Government of Indonesia

ICZM: Integrated Coastal Zone Management

IPCC: Intergovernmental Panel on Climate Change

IOTWS: Indian Ocean Tsunami Warning System

ISC: Indonesian Seagrass Commission

IUCN: International Union for Conservation of Nature

KKMD: Regional Working Group on Mangroves

KKMN: National Working Group on Mangroves

LGF: Large Grant Facility

LIPI: Indonesian Intitute of Sciences

LPP: Research and Development Institute for Mangrove

MCC: Millenium Challenge Corporation

MCRMP: Marine Coastal Resources Manajement Project

MFF: Mangroves For the Future

MOE/SMOE: State Ministry of the Environment

MOF: Ministry of Forestry

MOHA: Ministry of Home Affairs

MOMAF: Ministry of Marine Affairs and Fisheries

MPA: Marine Protected Areas

MSP: Medium Size Project

NCB: National Coordinating Body

NGO:	Non Government Organization
NSAP:	National Strategic Action Plan
OSE:	Office of the Special Envoy
PCM:	Project Cycle Management
PEMSEA:	Partnerships in Environmental Management for the Seas of East Asia
PoW:	Programmes of Work
RSC:	Regional Steering Committee
SGF:	Small Grant Facility
SNPEM:	National Strategic on Management of Mangrove Ecosystem
SST:	Sea Surface Temperature
UN:	United Nation
UNCLOS:	United Nations Convention on the Law of the Sea
UNDP:	United Nation Development Programme
USAID:	United States Agency for International Development
UU:	Act
UUD45:	Constitution of Indonesia
WIIP:	Wetlands International Indonesia Programme

1. Introduction

The Mangroves for the Future (MFF) is a regional platform for action to maintain the momentum and partnerships generated by the immediate response to the Indian Ocean Tsunami and to promote investment in coastal ecosystems; as the result of a consultative process started on April 2006, was initiated by IUCN, UNDP and then the United Nations Office of the Special Envoy for Tsunami Recovery (OSE), President Bill Clinton. The initiative uses mangroves as its flagship ecosystem in recognition of the important role mangroves played in reducing the damage caused by the tsunami, and the severe impact on coastal livelihoods caused by mangrove forest destruction. However MFF is inclusive of all coastal ecosystems, including coral reefs, estuaries, lagoons, sandy beaches, seagrasses and wetlands. This is illustrated by the "ridge-to-reef", or linked ecosystems-based, approach that MFF applies to coastal resources management.

The MFF focal countries are among the worst-affected and those recovering from the Indian Ocean tsunami in 2004, namely India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand. However, latter on the idea evolved from the MFF Regional for helping other countries that faced threat of the damages of their coastal areas by offering them to become an observer. If they meet the criteria such as to produce their own NSAP and then they are able to apply for a full membership. Following those procedures, Pakistan and Vietnam were accepted become MFF member, while Cambodia and Bangladesh are still as observers.

All ecosystems are subject to a variety of disturbances both natural and anthropogenic that vary in their duration, frequency, size, and intensity, and play a crucial role in facilitating adaptive change. For example, the largest earthquake on 26 December 2004 produced the most devastating tsunami in recorded history, with succeeding waves reaching height of up to 30 m, killing more than 283,000 people throughout the Indian Ocean region. Along with vast number of people, man-made and natural structures and habitats were destroyed or damaged, including coral reefs, mangroves, beaches, seagrass beds, and other coastal vegetation.

Other than tsunami, there are so many degradation of ecosystems in the coastal areas of Indonesia. Abrasion along the north coast of Java and other places destroying mangroves, seagrass and coral reefs ecosystems, as well as conversion mangroves to brackish water or tambak. Heavy sedimentation due to clear cut in the upper land of Ambon Island damaging the mangrove, seagrass bed and coral reed ecosystems in Ambon Bay [1]. Eutrophication in the Jakarta Bay indicated by lowering the average of water transparency from 12 m in 1972 to 4.5 m in 2010 [2,3] for instance, had dramatically decreasing the percentages of living coral from 35 %, to 15 % and to < 5 % in 1985, 1995 and 2005, respectively [4]. Anomaly of high increase in sea surface temperature (SST) ranging from 1^{o}C to 2 ^{o}C in 2010 compared to long years SST of 2000-2010 in many places of Indonesian waters [5] caused widely coral bleaching events [6]. Sand mining have been reported causing damages to seagrass ecosystems in the Bintan Island.

Sukarjo, S. based on his observational evidence as a mangrove ecologist presumed that mangroves offer significant protection, but the service system of mangrove has rarely been empirically tested or adequately assessed. The concept that determining the extent of protection from tsunami offered by mangroves includes: width of forest, slope of forest floor, tree density, tree diameter, proportion of above-ground biomass vested in the roots, tree height, soil texture,

forest location (open coast vs. lagoon), type of adjacent lowland vegetation and cover, presence of foreshore habitats (seagrass meadows, coral reef, dunes), size and speed of tsunami, distance from tectonic event and angle of tsunami incursion relative to the coastline.

Mangroves For the Future (MFF) seeks to build and formalize a collaborative platform to bring together governments, international agencies, academia/universities, NGOs, private sectors and local communities to work towards main objectives, (1) to strengthen the environmental sustainability of coastal development, and (2) to promote the investment of funds and efforts in coastal ecosystem management for sustainable development. The MFF uses mangroves as the flagship species but works to conserve and improve all types of natural coastal ecosystems including coral reefs, seagrass bed, estuaries, lagoon, and wetlands.

Indonesia is in the range of fire, dense population; conflict interest of resource usage, coastal zones uncertainty etc, and mangroves may therefore exhibit a high degree of ecological stability. The term stability has been variously used to refer to environmental constancy, community persistence and community or ecosystem response to disturbance. Most of today's mangroves rests upon the remains of their past – a reflection of the ebb and flow of Indonesian earth's history, is a legacy of natural sciences. Mangrove conservation becomes a priority of GOI policy to overcome the coastal degradation, mitigation efforts and poverty up to food resources security. Most priority programs relate to mangroves revealed an international interest, and therefore sounding regional – multi nation cooperation's.

In managing its wide coastal ecosystems, Indonesia has developed the legal foundation and institutional framework. Basic legislation with respect to the coastal environment (including mangroves) in Indonesia is already in place in the form of statutes concerning maritime jurisdiction, environmental protection, and the conservation of living natural resources. In addition, aspects of environmental protection and natural resource management are increasingly being incorporated into GOI policy, including legislation. The elements of official policy and laws related to coastal resources management arise from several sources. At the highest levels are the fundamental principles contained in the 1945 Constitution (UUD 45), the State Philosophy (Pancasila).

As an archipelagic nation based on UNCLOS or Act No 17/1985, Indonesia has a wide area of coastal ecosystems where MFF project can be conducted in complementing the on-going activities in coastal development. In terms of MFF Programme of Work, Indonesia focuses on economic valuation awareness, supporting coastal livelihoods, coastal community resilience, and climate change. It is hoped that MFF initiatives will provide the opportunity for improving the coastal ecosystem management in support the livelihoods.

2. Indonesian Coastal Management

2.1 The potency and problems of coastal ecosystems

Indonesia is the biggest tropical archipelago country in the world, that comprising approximately 13,466 islands (based on the latest data [7]) with 95,181 km of coastline, which is the forth longest coastline after Canada [8, 9]. So obviously, Indonesia has coastal and marine areas far larger (70%), than its land areas (30%). Generally, the coastal area is defined as the junction between land and sea, where to the land direction, this area includes flooded or not flooded areas that are still influenced by ocean processes, such as tides, ocean breezes, salt intrusion, while this borders on the sea includes areas affected by natural processes on land such as the flow of fresh water into the sea through the river, and the influence of a variety of human activities on land that can still be felt, such as sedimentation and pollution and other forms.

The coastal regions in the world inhabited by very dense population. According to the UN, more than half of the world's populations live within about 40 miles of shoreline, while around 40 % of the world's major cities are also located in the coastal region. The coastal area is a very dynamic ecosystem that is constantly changing from time to time. The natural changes caused by big energy of wind and waves as well as changes on the water level due to tidal phenomena can decay rocks and deposited its sediment to the coastal areas. Other changes such as anthropogenic caused by big population pressure interference coastal environments repeatedly. For example logging, residential development, land conversion, intensive agricultural activities and other industries ultimately reduce the quality of the coastal areas, and this can even reach far to the sea. Thus, the coastal region is a region of conflict of interest.

Coastal areas of Indonesia in general have three unique tropical ecosystems, namely mangroves, seagrasses and coral reefs. Those ecosystems serves as a refuge ground, spawning, nursery and feeding ground for a wide-variety of marine life, including protected animals, such as turtles and dugongs [10,11], Seagrass ecosystems are known as effective nutrient recyclers [12,13]. Mangrove and seagrass are able to trap the sediments, which can cause water to be clear, where it is an essential requirement for the life of coral reefs [14]. On the other hand, coral reefs can withstand the big waves, so it can help maintain the shoreline and abrasion, while the mangroves can protect the area behind them from strong winds and tsunami hazards. Thus mangrove, seagrass and coral reef ecosystems provide valuable goods and services to the local communities.

The ocean’s vegetated habitats, in particular mangroves, salt marshes and seagrasses, cover less than 5% of the sea bed, however, recently, those ecosystems are able to capture carbon (known as the "Blue Carbon") 55% more effective than the carbon captured by land forests (known as "Green Carbon"). Carbon captured by ecosystems is stored in the form of sediment around the mangroves, brackish marshes and seagrass beds. Carbon is locked in sediments that are not only in the range of tens or hundreds of years, but can be in the range of thousands of years. Each year, approximately 235-450 Tg (Tera gram = 10^6 tons) of blue carbon sinks and captured by the estuary. This amount is close to half of the world's carbon emissions resulting from the transport sector (known as the Black/brown carbon) that ranging 1000 Tg C/year. So mangrove, brackish marshes and seagrass ecosystems are the most effective carbon sinkers on the planet [15].

The ecosystems of mangrove, seagrass and coral reefs are known to have high productivity (Fig. 1), even higher than the productivity of tropical rain forests [16]. So, it is not be surprised those ecosystems support the coastal areas of Indonesia rich with biodiversity of flora and fauna, both which have commercial and non-commercial values or still unknown its values. Therefore, this makes Indonesia is also well known called as "the center of mega-biodiversity" of marine flora and fauna of the world.

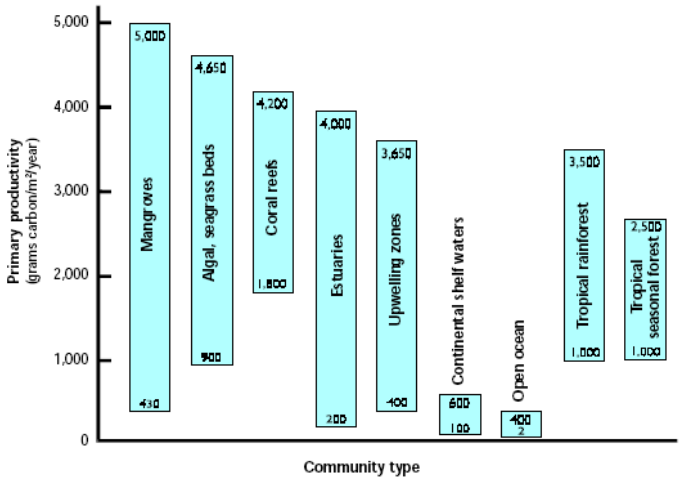


Fig. 1. The range values of primary productivity in various major marine communities (cited from[16]).

Mangrove ecosystems in the Kayeli Bay, Buru Island (photo: by Sam Wouthuyzen)

Indonesia has the world's largest mangrove, i.e. 27% of the world's total mangroves or 75% of the total area of mangroves in Southeast Asia [17]. The areas of mangroves in Indonesia vary from year to year. In 1978, it is estimated the extent of about 3.6-3.7 million ha [18,19,20]; in 1982-1984, the mangrove areas ranging from 4.250-4.350 million ha [21,22,23]; In 1993 and 1996 the extent of approximately 2.40 million ha [24,25], in 2000 the mangroves areas was 2.24 million ha [26], In 2009, BIG estimates of 3.244 million ha using 199 scenes of satellite images Landsat-7 ETM+ [27]. The diversity of mangrove in Indonesia is also very varied, there are about 75 species representing 24 family and 41 genera, but others report 157 species [17], and another report at least 202 species of mangrove consists of 43 true mangrove

species and the rest are associated mangroves [28]. The latest information of 2012, the true mangrove consisted of 92 species [29].

Economic valuation of mangrove ecosystems based on the benefits and functions such as production, ecological, and socio-economy functions show that mangroves provided high economic benefits. The average of total economic values of mangrove ecosystems from various regions in Indonesia (Batu Ampar West Kalimantan, Segara Anakan in Cilacap, North coast of Subang district, Bintuni Bay in Papua dan and Malacca Strait) is around Rp. 29.2 million/ha/year [30] (Table 1). Economic valuation of mangroves in the Kotania Bay, west Seram Island, Maluku Province is Rp. 60.9 million/ha based on 1999 prices [31].

Table 1. Estimation of economic valuation mangrove ecosystem from various places in Indonesia [30].

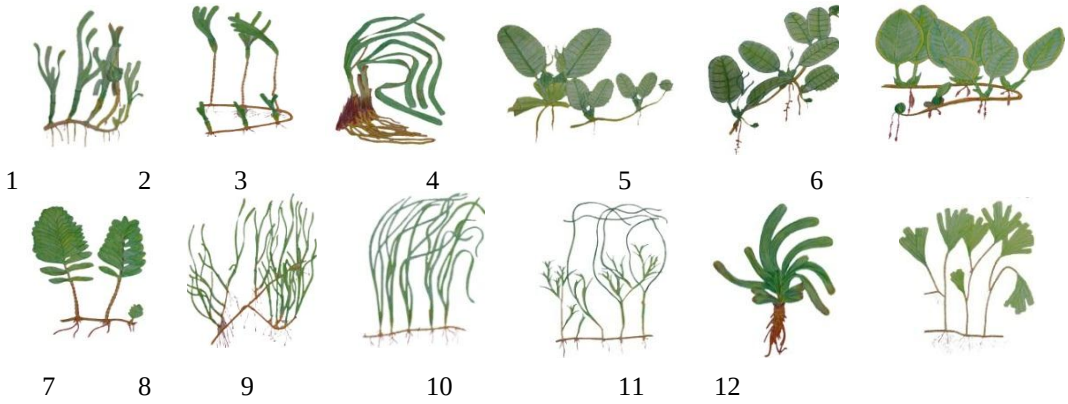
No	Types of benefits	Average value of actual benefits (Rp/ha/year)	(%)	Average value of potential benefits (Rp/ha/year)	(%)	Total benefits (Rp/ha/year)	(%)
1	*Direct benefits*	8.103.695	46,1	294.244	2,5	8.397.939	28,8
2	*Indirect benefits*	3.367.394	19,2	4.953.941	42,8	8.321.335	28,0
3	*Biodiversity benefits:*	58.688	0,3	36.000	0,3	94.688	0,4
4	*Habitat benefits:*	6.047.263	34,4	6.291.007	54,4	12.338.270	42,3
Total Economic Values (Rp/ha/year)		17.577.040	100,0	11.575.192	100,0	29.152.232	100.0

Seagrass bed in the Pari Island (photo by: Sam Wouthuyzen and Muhammad Abrar)

Seagrasses are flowering plants which can grow fully submerged and rooted in estuarine and marine environments [32]. Indonesia has extensive seagrass about 31,000 km^2 [33]. The diversity are not so much, only 12 species (Figs. 2), namely *Halophila spinulosa, H. decipiens, H. minor, H. Ovalis, Enhalus acoroide, Thalassia hemprichii, Cymodocea serrulata, C. rotundata, Halodule pinifolia, H. uninervis, Syringodium isoetifolium* and *Thalassodendron ciliatum* were found [30]. There are 2 other species, *Halophila beccarii* and *Ruppia maritimam*, but these species were not been discovered any more in the Indonesian waters. However, the specimens are stored in Bogor Herbarium, Research Center for Biology-LIPI [34]. Recently, a

new species of *Halophila sulawesii* was found in the Spermonde Islands by foreign researcher Dr. Iohn Kuo [35**].**

Based on the analysis of [36], the total economic value of seagrass ecosystems in three selected villages in East Bintan Island is US$3,634,796 /year or US$ 2,287 /year/ha. Marine tourism is one of the largest contributors to the economic gain of seagrass ecosystems in that area. This sector has contributed to the economic gain of seagrass of US$2,447,640 per year. It is followed by fishery industry and aesthetic function of seagrass of US$1,131,600 and US$55,556/year, respectively.



Figs. 2. Diversity of seagrass in Indonesian waters (cited from Indonesian Seagrass Commission/ISC : 1. *Cymodocea rotundata,* 2. *Cymodocea serrulata,* 3. *Enhalus Acoroides,* 4. *Halophila decipiens,* 5. *Halophila minor,* 6. *Halophila ovalis,* 7. *Halophila spinulosa*, 8. *Halodule uninervis,* 9. *Halodule pinifolia,* 10 *Syringodium isoetifolium,* 11. *Thalasia hemprichii,* and 12, *Thalassodendron ciliatum*)

Coral reefs are an important marine ecosystem and habitat. Like mangroves and seagrass beds, coral reefs provide nursery and breeding grounds for coral reef associated species and other marine life such as pelagic and migratory species. Indonesia's coral reefs based on their types can be grouped into four major groups, namely fringing reef, barrier reef, patch reef (coral reefs that have not reached the surface) and ring reef (atoll). Generally, the type of Indonesia's coral reefs is fringing reef [37]. Indonesia also has the third largest atoll in the world, the atoll Takabonerate in South Sulawesi [37]. The same as mangroves, that there are difficulties in determining the exact areas of coral reef. Indonesia's coral reefs allegedly extensive range 51.000 km^2 or 51% of the total area of coral reefs in Southeast Asia [38,39]. According to other data coral reefs cover about 75,000 km^2 [40], some other sources report around 85.000 km^2 [41], but the smallest one as 17,500 km^2 reports by [42]. The diversity of Indonesia's coral reefs are very high, i.e., 590 species of stony corals which represents 82 genera and 210 species of soft corals and 350 species of gorgonian [40,43]. Raja Ampat Island in Papua is one area in the eastern Indonesia that is remarkable and outstanding in coral species diversity in the world. At least 553 species of scleractinian corals have been reported [44].

Underwater scenery of coral ecosystems in Biak Island (Photo by Loudik Dimara)

Potential sustainable economic net benefits per year of coral reefs in Indonesia from fisheries, shoreline protection, tourism, and aesthetic value have been estimated at $1.6 billion per year or $31,373/km^2. The Total Economic Value of coral reefs in Indonesia's Wakatobi National Park in Southeast Sulawesi was estimated to be $308,000 or $12,100/km²(Fisheries produced: $10,340 per km², Eco-tourist revenues provided: $1,320 per km², and coastal protection estimated to be worth: $473/km²). The quantifiable net benefits of managing Taka Bone Rate Marine Protected Area (MPA), Indonesia as a protected area was estimated to be between $3.5 and $5.0 million [45].

As already mentioned that mangroves, seagrass beds and coral reefs provide goods and services including valuable fisheries resources while protecting the coastal areas. In many places of eastern Indonesia, particularly in the small islands, those 3 ecosystems are living side by side with harmony. There are strong linkages between mangroves, seagrass and coral reef ecosystems as can be seen in Figs.3.

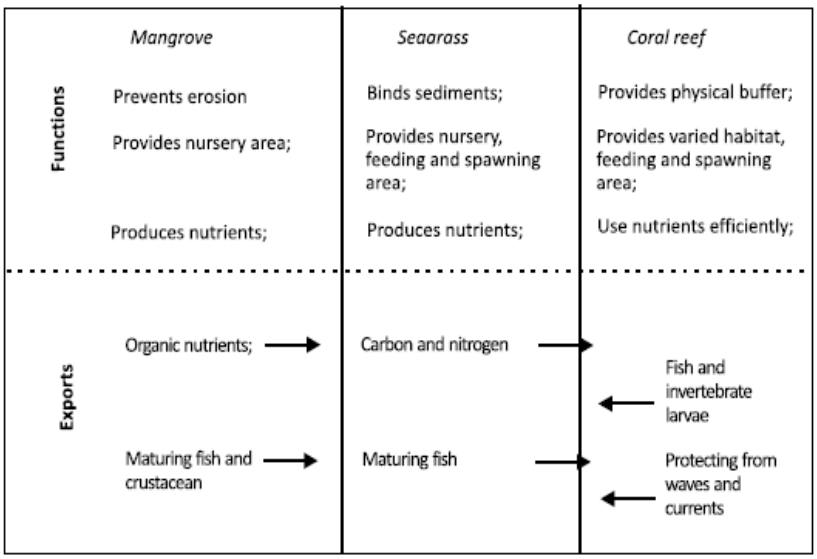


Fig. 3. Linkages between mangroves, seagrasses and coralreefs ecosystems (cited from[46]).

The coastal and marine living resources in mangrove, seagrass and coral reef ecosystems are very diverse; it was summarized in the paper of [40]. Indonesia has the greatest diversity of coral reef fishes in the world with about 2057 species, among them, 97 species are endemic in Indonesian waters [47]. From crustacean group, there are about 112 species stomatopods and 1400 species of brachyurans. From the mollusks group, about 1500 species of gastropods (snails) and 1000 species of bivalves (clams) are recorded. In echinoderms group there are 91 species of crinoids (sea lilies), 87 asteroids (starfish), 142 species of ophiuroids (brittle star), 284 species of echinoids (sea urchins), and 141 species holothurians (trepang). The sponge

(demospongia) consisted of 830 species, where this group has the potential to have active anti-cancer and or anti-bacterial agents. Groups of marine mammals comprising whales, dolphins and dugong consisted of 30 species, while the marine reptiles such as turtles and crocodiles are 7 species. The seaweed (macro alga) group consists of 196 species of green alga, 134 brown algae, and 452 red algae. There is still a lot of flora and fauna are missing from the record. So it is clearly evident that the coastal ecosystems of Indonesia provide various environmental services and products that are valuable to the local communities [40].

Although ecosystems in coastal areas have proven to provide excellent services and products as well as livelihoods to the local community, but various threats that degrade the quality of the coastal zone occur almost anywhere in Indonesia. Furthermore, approximately 65% of Indonesia's population lives within 50 km of the coast [48], because in many cases, the coastal zone provides the best, or the only, available land for urban development, agriculture, commerce, industry, transport, and other economic activities. Given this growing coastal population, it is inevitable that human-induced pressures on the coastal system will occur, such as the disruption of the physical coastal system, through the mining of sediments for construction purposes or agriculture and the dredging of sediments from harbors to maintain navigation, the destruction of habitats and genetic diversity through urban and industrial development, pollution, overfishing, introduction of exotic species, and a host of other activities [49]. Besides that, the situations in coastal zone are further exacerbated by the effects of climate change which has recently become a hot topic discussed.

Traditionally, the mangrove forest has been utilized for various necessities; its trees, water habitat, as well as its dry or land habitat. Trees are utilized for wood production, construction, fire-wood, industrial materials as well as material for charcoal, tannin, dyeing substances, food, drinks and medicines. *Rhizophora*, *Bruguiera*, *Ceriops*, *Avicennia*, *Nypa* are the mangroves most used. Commercial wood production usually is for charcoal, dolok wood and chipwood, and is carried out in Kalimantan, Papua and Sulawesi. Mangrove wood is often utilized as a material for charcoal production. *Rhizophora apiculata* and *R. mucronata* produce heavy, dense, hard charcoal with a high calorific content, which result in an almost smokeless fuel product with very little amount of soot, are usually preferred. *Avicennia* spp., *Ceriops* spp., *Xylocarpus* spp., *Excoecaria* spp., *Bruguiera* spp. and *Lumnitzera* spp. are the rest of mangrove species that are most commonly utilized for charcoal or fire wood. Chip-wood products made of *Rhizophora* spp. mangrove is raw material in the processing of rayon thread. Mangrove wood, especially *Avicennia* spp. and *Bruguiera* spp., is also the raw material for pulp paper. Habitat utilization for community settlements is common. Many traditional fishermen settlements have houses supported by *Rhizophora* spp. and *Bruguiera* spp. mangrove poles.

Large scales of mangrove areas have been converted to brackish water fishpond (tambak). The loss of mangrove due to this conversion is estimated at 1.6 million ha. Approximately 90% of the mangroves on Java and Sumatera have been lost since the 1940s and more than half the mangrove forests in Papua have been lost since the 1980s. According to [50], conversion mangroves area in 1980s was 155,081 ha, and most of them were distributed mainly in Java, Sumatra and Sulawesi. In 1990s, the areas increased to 285,500 ha. The change of land function from mangroves to farms has given many impacts to eco-biophysical processes, such as accelerated erosion, the loss of a green belt that acts as a natural buffer to protect land from large

waves, degraded water quality, reduced natural diversity, disappearance of habitats, spawning grounds, nursery and feeding grounds for many fish, shrimps and other marine biota. Fig.4. show an examples of mangroves conversion to fishpond monitored using Landsat satellite imageries in 1972, 2002 and 2012 along the north cost of West Java (Banten to Cirebon). In some places, mangrove areas are locations for oil drilling, iron-sand deposit excavation, oil refineries and gas plants.

Like other coastal ecosystems, seagrass is now experiencing human induced stress that lead to habitat loss and degradation. The stress takes the form of human activities both on land and marine area, as well as over exploitation of marine and coastal resources [46]. The world-wide decline and lostof seagrass bed have been widely reported in last decade. Between 1879 and 2006 the global seagrass loss was estimated about 27 $km^2.year^{-1}$[51]. Indonesia lost about 30-40% of its seagrass beds [52]. However, seagrass degradation in Indonesia is not well documented. Most of the Indonesian seagrasses are severely threatened by coastal construction, coastal reclamation, sand and mineral mining activities, marine pollution, run-off and land based activities, human settlement, industrial and urban development, logging and land clearing [46]. Seagrass decline and its causes in some places in Indonesia have been reviewed by [53]. Acoording to them about 26% seagrass beds lost in Banten Bay caused mainly by reclamation for port and industrial estate. In the Grenyeng Bay and Bojonegara, the seagrass degradation is caused by land reclamation for harbors. Seagrass loss is evidently happen in Gusung Tallang, South Sulawesi between 1993 and 2004. In Derawan Islands, East Kalimantan, there is evidence the decline of seagrass bed, but the reason is still remains unknown [54]. In the Manado Bay reclamation project caused the loss of seagrass beds in the Manado Bay area [55]. In Ambon Bay, the lost of both areas and species of seagrass are due to heavy sedimentation coming from the clear cut of vegetation for developing resident in the upper land of Ambon Island**[1]**. In the east coast of Bintan Island damages of seagrass beds are due to sand mining in the sea, though now is already stopped, but still face other threats coming from the big tourism development [55, 56].

Although Indonesia has the largest area of coral reefs of any country [57], only 6.5% of Indonesia coral reefs are considered in excellent condition and 22.5% in good condition. The remainder is considered to be in either fair to poor condition [58]. The heavy reliance on marine resources across Indonesia has resulted in the overexploitation and degradation of many coral reefs, particularly those near major population centers. The main threats include destructive fishing practices such as bombing and cyanide fishing, overfishing, sedimentation, pollution, coral mining and coastal development. Human activities now threaten Indonesia's coral reefs, jeopardizing their biological and economic value to society [1, 46]. Accoarding to "Reefs at Risk in Southeast Asia" [38], Indonesia has the highest risk in this region. For about 50 percent of these reefs, the level of threat is "high" or "very high." Only about 12 percent of reefs are at low risk. Coral reefs in Indonesia are also stressed by bleaching events. The bleaching events that occurred in some areas of Indonesian were due to the El Nino event that occurred in 1983 and repeated in 1998 resulted in the mass mortality of corals and various marine organisms [46]. Bleaching events also occurred in 2010, due to anomaly increase of SST [5,6].Coral reefs may also be damaged by coral predators. Acanthaster was a major coral predator in the Indo-West-Pacific area in the 1960s and 1970s. Before the 1990s, the crown-of-thorn-starfish was rarely reported in Indonesia. Outbreaks of acanthaster have been reported in Ambon in 1990s; and some other places [46].

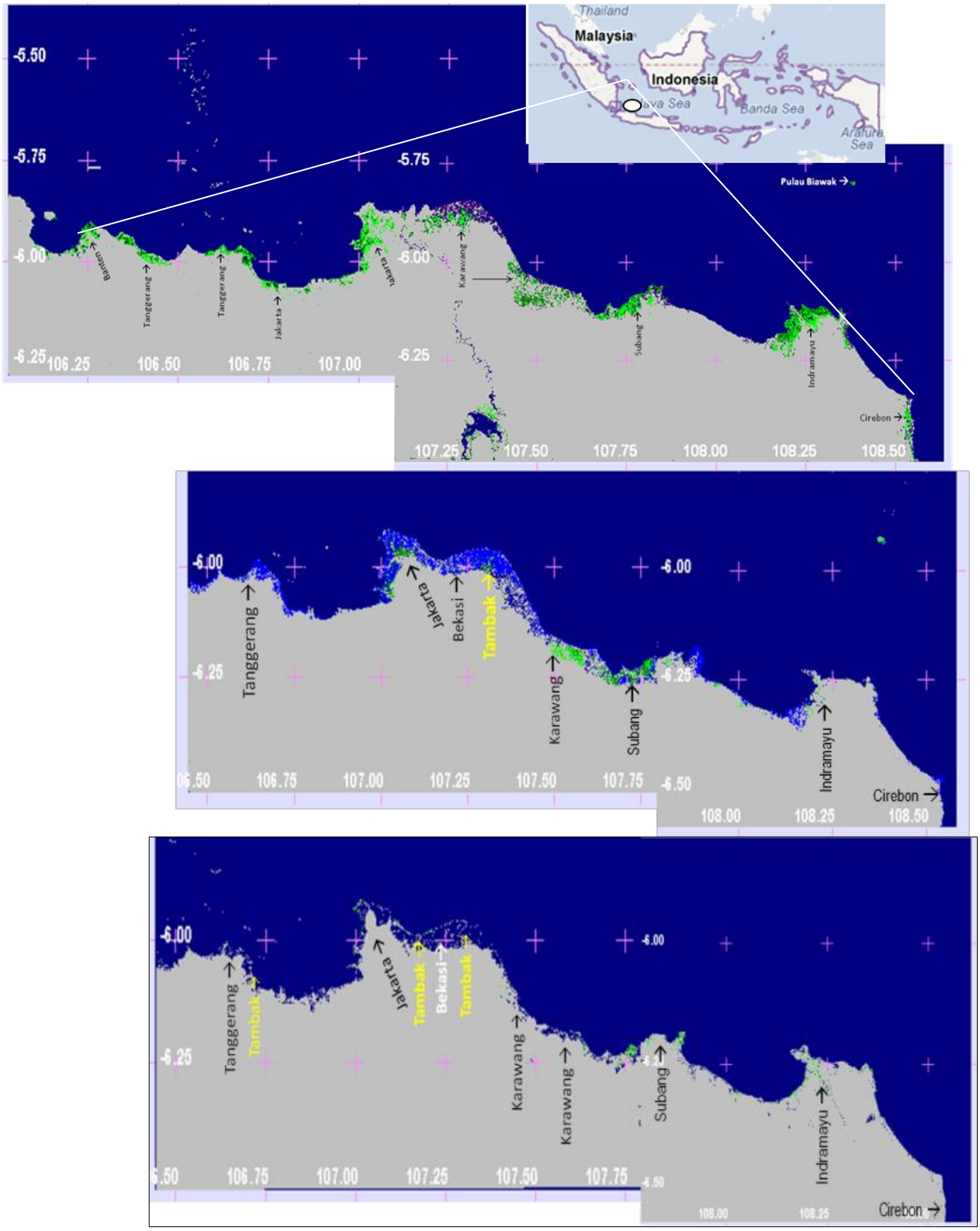
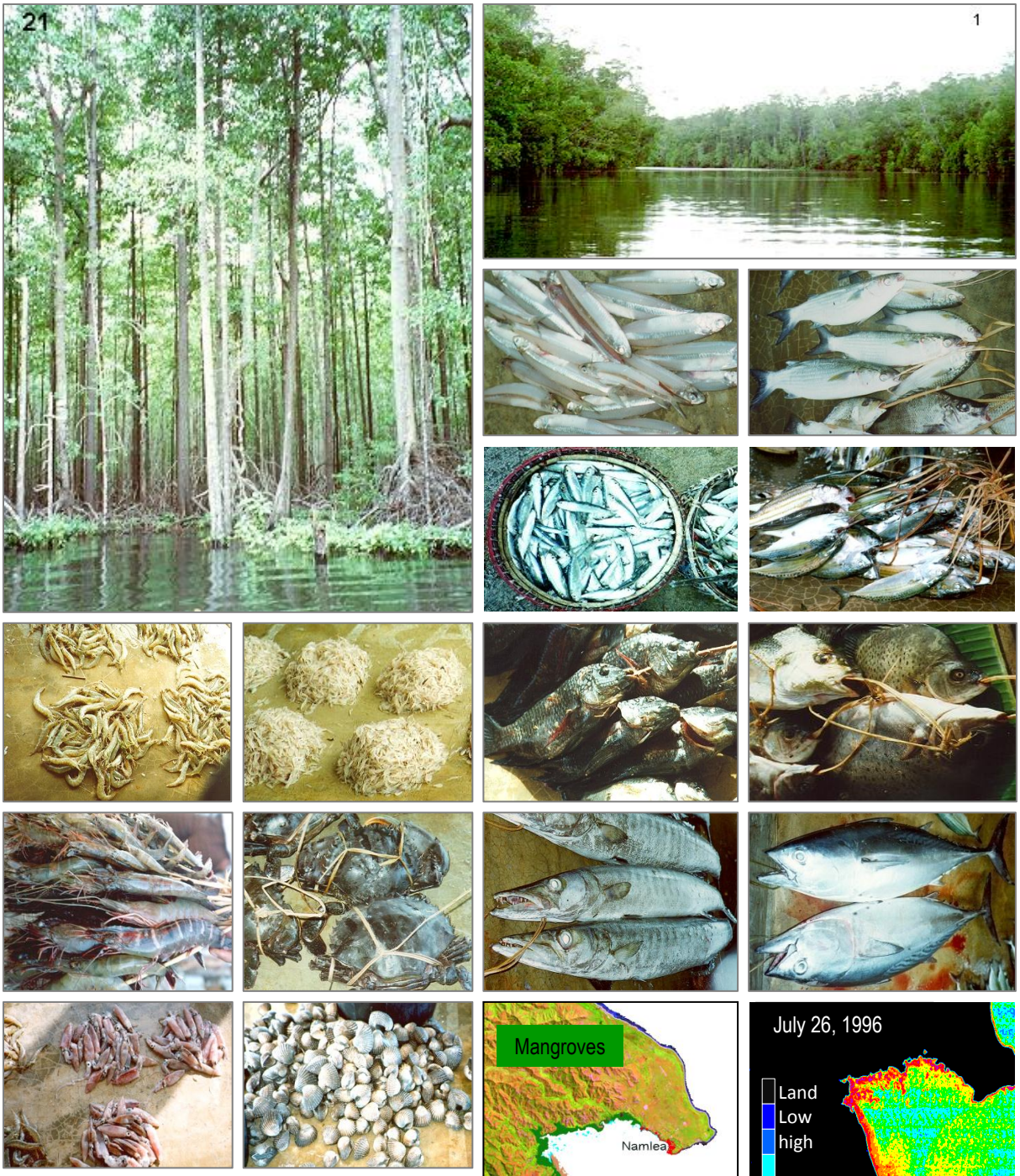


Fig.4. Multi-temporal changes of mangroves (green color) and brackhish fishpond areas (light blue) in 1972 (top), 2002 (middle) and 2012 (bottom).Analyzed and produced by: Sam Wouthuyzen.



Box-1: Mangrove ecosystem and its living resources

With an area of 3,500 ha, the mangrove forest in the Kayeli Bay, Buru Island produces 26,100 tons/year leaf litter or equivalent to 1.175 x 10^{11} Kcal energy. Through the food web, this huge of energy is converted to high productivity of the coastal waters of this bay (indicated by yellow-orange-red color in the satellite image), then to coastal fisheries products (fishes, mollusks, crustaceans, etc) that also attracted big oceanic fishes such as tunas and barracudas to enter the coastal waters of Kayeli Bay for feeding.

Indonesia is highly vulnerable to coastal hazards, given its extensive coastline, and especially from tsunamis. Inappropriate shorefront development has been blamed for a large loss of human life and property from frequent tsunamis. For instance, between 1961 and 2005, Indonesia has been struck by 21 tsunamis, each causing scores to hundreds of deaths and injuries, with the Dec 2004 tsunami causing deaths in excess of 300,000 persons and with economic losses estimated at over US$ 4.5 billion. Indonesian coral reefs are also adversely affected by several natural phenomena (tsunami), such to thousands of kilometres of coastline in Aceh and North Sumatra Provinces and the western islands. The initial damage assessment estimated 30% loss of coral reefs, approximately 97,250 hectares, a net loss of US$332.4 million (US$1,1599/ha (estimated value) [46].

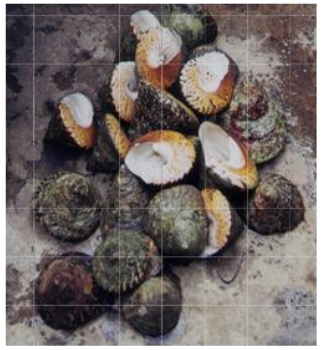
The impacts of pollution contribute to changes the ecological behaviors. At the ecosystem level, impacts of pollution may come into the trophic level, such as eutrophication phenomena. The word eutrophic implies excess nutrients (well nourished) of phosphates, nitrates and silicates that enter into aquatic ecosystems (lakes, coastal waters and marine) [59, 60, 61]. The Impacts of eutrophication include: (i). Phytoplankton population bloom known as algal bloom or Harmful algal Bloom (HAB) [62, 63, 64, 65], (ii). Low dissolved oxygen (O2) of waters (< 2 ml/l: O2 depletion; or close to 0 ml/l: hypoxic condition) [66, 67]; (iii). Species diversity of biota (seagrass, coral reefs, fishes) decreased or lost, because of low water transparency [62, 68]; often followed by mass mortality of fish and other biota that harm the fisheries sector [62, 69, 70]. E.g., the biodiversity of fish in Jakarta Bay was decreased from 198 species 1n 1974 to only 88 species in 2003 [71]; (iv). Composition phytoplankton species shifted from harmless types (diatoms) to dangerous one (dinoflagelate) that have strong biological toxins/bio-toxin [72]; (v). Lost of economic values of tourism or declined the recreational areas due to low water transparency, increased mucus production, and the stench [73]; and (vi) Social impacts for fishermen due to the lost of their livelihoods [74, 75].

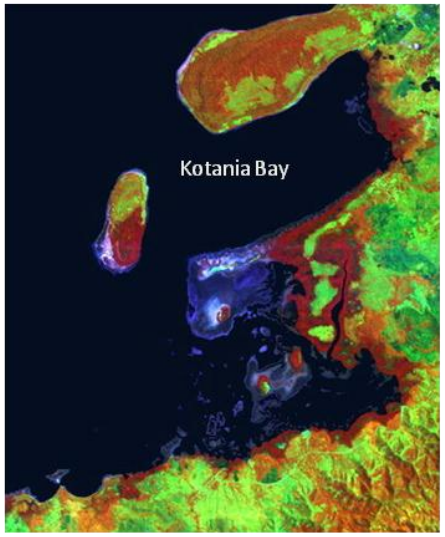
The coastal zones have a variety of habitats and often represent fragile ecosystems, and they are therefore considered potential conflict area both naturally and administratively among the GOI agencies and/or between developers. Therefore, Indonesia faces many problems concerning the sustainable use and management of its coastal and marine resources. Along with the rapid exploitation of the coastal resources that was not based on any integrated planning and sustainable principles, there also came serious degradation of environmental quality due to coastal resources and ecosystem exploitation and conversion.

Climate change impacts are another serious threat to coastal resources. The intensity of large scale coral bleaching events has increased during the last two decades, primarily due to increased SST which causes mass coral bleaching. Global warming and sea level rise in particular, is a serious threat to the majority of Indonesian coasts. Indonesia has committed to effective action against global warming, for example coastal planting program. Coastal ecosystems play significant roles in mitigating and adapting to climate change.

2.2 Institutional and legal frame-work

The coastal and marine environment (mangroves, seagrasses, coral reefs including living and non-living resources) and their management in Indonesia are through a very extensive, complex regulatory framework. The foundation for this is laid down in Section 33, Para 3 of the 1945





Box-2. Mangrove, Seagrass and coral reef ecosystems live in harmony

In many small Islands of Indonesia, such as in the Kotania Bay, west Seram Island, Maluku Province (as see in satellite imagery) mangrove, seagrass and coral reef ecosystems are live close each other with harmony. This makes the productivity of coastal areas are high and rich with marine living resources that valuable for the local communities. During low tides peoples collected sea cucumbers, clams, cockles, set the bamboo trap (bubu) for catching mangrove crabs (*scylla serata*). Due to high productivity of the bay waters, the kotania Bay was also used as productive pearl culture that famous one in Maluku.

Basic Constitution which reads: "Land and water and natural resources therein shall be controlled by the State and shall be utilized for the greatest benefit of or welfare of the people." Since its independence in 1945, Indonesia has had a very complex hierarchical legal system. According to [41] The hierarchical legal system of Indonesia is "one of the most formidable legislative frameworks in the world"**.**

The Indonesian legal framework for coastal and marine resources management comprises two groups of laws. The first is the laws that address management of national or internal issues. The second is the national laws to implement international obligations as a consequence of the GOI ratifying international convention**.** Moreover, there is no one Indonesian law or regulation that specifically addresses the use and management of mangrove, seagrass and coral reef resources. Conservation and management of coastal and marine resources are regulated by a group of natural resource laws and regulations[46].

According to [73] paper, there are about 26 acts or laws, 12 government regulation, 6 ministerial decrees relate to the management of coastal resources. However, [46] states that there may be hundreds of other regulations and ministerial decrees, but only 17 laws on natural resources management relate to coastal and marine resources management. These include 15laws on natural resources management and ocean activities, and 2 national laws for the ratification of international conventions. Those laws are listed in Table 2, where the 15 national laws are grouped into six broad categories.

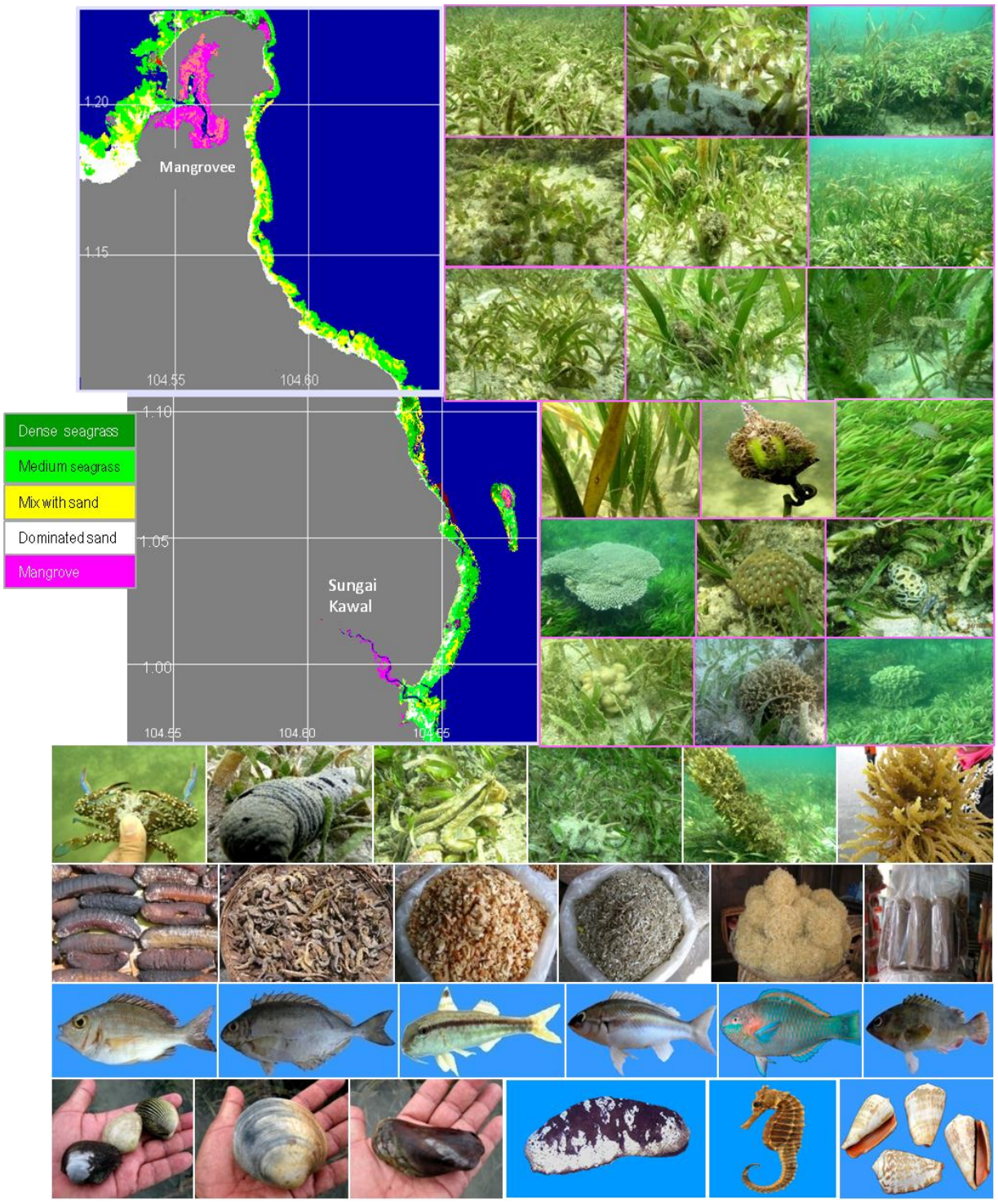
Coastal and ocean resources governance in Indonesia is the primary responsibility of the state. At the national level, the authority for coastal and ocean resources management is under the responsibility of state ministries. However, this responsibility is shared among various agencies. At least there are 18 agencies involved in coastal management at the national level (see Table 3.4 of [46] publication). Those consisted of 9 line department, 3 state ministries, 1 coordinating ministry, 4 non-departmental government agencies and 1 inter-ministerial council.

Although each agency has defined role, the definition is often unclear and is frequently see in isolation from roles and responsibilities of other agencies. There is much overlap between the responsibilities of various government agencies and their roles are duplicated. The effect of this duplication and lack of coordination is a confusing fragmentation of policies and costly duplication of manpower, equipment and administrative efforts, which the nation can ill afford [73]. Several new laws were enacted by the government after the reforms era, such as the autonomy law and financial balancing between central and regional governments has also contributed to the complicated problem in marine resource management in Indonesia**[**46**].**

Therefore, in order NSAP MFF Indonesia workable in more simple way, from out of 26 acts in which 17 among them listed in Table 2, only 4 acts are emphasized as legal framework, namely (i) act No. 27/2007 about Coastal and Small Islands Management, (ii) act No. Act. No. 41/1999 and added or revised by Act No 19 of 2004, about forestry, (iii) act No. 32/2009 concerning Environmental Protection and Management, (iv) Act No. 32/2004 about local government. For mangrove, specially, there is also a President Decree no.73/2012 concerning national strategic on management of mangrove ecosystem (SNPEM). Unfortunately, there are no such decrees that applicable for seegrass and mangrove ecosystems.

Table 2. Legislations Affecting Marine Resources Management (Adopted from [46] with slight modification)

No	Regulations	Subject	Applicable for:		
			Mangrove	Seagrass	Coral reef
I. National Level					
A. Ocean Jurisdiction Claims					
1.	Act No. 6/1996	Indonesian Waters	+	+	+
2.	Act No. 5/1983	Indonesian Exclusive Economic Zone	-	-	-
3.	Act No. 1/1973 Indonesian Continental	Indonesian Continental Shelf	+	+	+
B . Ocean Resources and Activities on the Sea					
4.	Act No. 4/2009	Minerals and Coal Mining	+	+	+
5.	Act No. 17/2008	Shipping	-	-	+
C. Terrestrial Spatial and General Planning Laws					
6.	Act No. 26/2007	Spatial Use Management	+	+	+
7.	Act No. 9/1990	Tourism	+	+	+
D. Coastal and Marine Resources Management					
8.	Act No. 31/2004 and added or revised by Act No 45 of 2009	Fisheries	+	+	+
9.	Act No. 27/2007	Coastal and Small Islands Management	+	+	+
10.	Act. No. 41/1999 and added or revised by Act No 19 of 2004	Forestry	+	+	+
11.	Act No. 16/1992	Quarantine of Agriculture, Cattle, and Fish	+	+	+
E. General Legislation of Environmental Management					
12.	Act No. 32/2009	Environmental Protection and Management	+	+	+
13.	Act No. 5/1990	Conservation of Biological Resources and Their Ecosystems	+	+	+
F. Legislation of Decentralization					
14.	Act No. 22/1999	Regional Government	+	+	+
15.	Act No. 25/1999	Financial Balancing between Central and Regional Government	+	+	+
II International Level					
16.	Act No. 5/1994	Ratification of United Nations Convention on Biological Diversity	+	+	+
17.	Act No. 17/1985	Ratification of United Nations Convention on the Law of these	+	+	+



Box-3. Seagrass ecosystems and its living resources

Seagrass is one of productive coastal ecosystem. In east coast of Bintan , there are 10 species of seagrass, out of 13 species found in Indonesia, which is one place of high seagrass diversity in Indonesia with the large areas of 2,600 ha (as seen in satellite images). The large areas and high diversity of seagrass correlate with the rich of coastal living resources, such as fishes, mollusks, crustaceans, seaweeds and many others. Some of them have highly economical values such as dried sea cucumber and dried sea horses (Rp. 2 million/kg). In the week end, many Malaysian and Singaporean do shopping those products in Bintan. (Photo: SamWouthuyzen, Muin Sinaga)

The aims of Act No. 27/2007 is to protect, conserve, rehabilitate and utilize the resources of coastal and small islands in sustainable manner; The aims of Act. No. 41/1999 and added or revised by Act No 19 of 2004 is for protecting forest and natural conservation, while Act No. 32 of 2004 and added or revised by Act No. 12 of 2008 concerning Regional Government (Autonomy Act) that grants authority to the regional governments to manage their own natural resources. The aims of Act No.32/2009 that concerning on Environmental Protection and Management is to create environmentally sustainable development through planning policies and rational exploitation, development, maintenance, restoration, supervision and control. The Environmental Management Act is a comprehensive act on environmental management in Indonesia. It adopts a holistic approach based on the archipelagic concept of the essential unity of the living space of the Indonesian people, which covers the land, air space and sea under Indonesian sovereignty. Additionally, the President Decree no.73/2012 aims to coordinate the implementation of mangrove ecosystem management program including ecological, socio-economic, institutional, and legislation fields to guarantee the functionality and benefits of mangrove ecosystems in a sustainable manner for the welfare of the society.

Although it seems simple to use only those acts and decree as legal aspect in NSAP MFF Indonesia, however, the Indonesian bureaucratic system is more complicated that it appears. Gap and sectoral egoisms among institution are still high possibly happened. Fortunately, with the president decree no.73 of 2012 it is hope that it can support the coordination and implementation in the field among the lead agencies either in the central or regional/local governments. In connection with NSAP MFF Indonesia, it should be noted that NSAP MFF Indonesia is a supplement of the SNPEM work plans. Thus, there are no gaps and no sectoral egoisms.

Indonesia prepared very well the national development program (immediate, mid-term, and long-term) along with all acts, decree and other regulations concern with it. MFF Plan of Action can be put in the line of coordination systems with partners such as national or regional working groups on mangroves (KKMN or KKMD). In regards with coastal zone management, there is MOMAF will be a lead agency and responsible for building a paramount coordination because coastal zone is a complex matter, too many to be discussed and conflict interests. MOE/SOME can involve in controlling environment degradation and the impact of climate change, especially in the coastal areas. MOF can take a role in managing the watershed from upstream to downstream including coastal areas both in inside or outside of the regions, while BAPPENAS will coordinate development planning in national level, including coastal and marine planning. There many projects and programs (e.g., CRMP, MCRMP, PEMSEA, MITRA BAHARI, RANTAI EMAS program etc.) with different achievements that can be used for consideration in the implementation of MFF Plan of Action. Also, to develop a tool systems in regard to accommodate all previous achievements that are benefit for all stakeholder participations.

Coastal environmental problems exerting the most severe impact in Southeast Asia (including Indonesia) during the past decade reports entitles: Reports of the Fourth Meeting of Experts on the East Asian Seas Action Plan are given in 1990 by the UNEP (OCA)/EAS WG 4/6/PAC Nairobi). Those are ranked in order of priority (1 to 12) and classified according to urgency i.e. immediate, short-term (within the next 5 years) and long-term, (within the next 10 years or more). The report was adopted for the placement of inputs and gaps. Interestingly, the current priority coastal environmental problems in Indonesia remain basically the same and are projected

to remain so until the year 2020 (See also for example Indonesian Biodiversity Strategy and Action Plan 2003-2020 and National Strategy for Mangrove Ecosystem Management in Indonesia). Such scenario is reflected in the results of a recent consultation under MFF PoWs.

For a strategy and action plan to be successful it must be based upon a sound logical framework which begins at the national level (KKMN) and iterates down through the provincial and local government levels (KKMD) to the site of implementation plan. Such a framework provides, among other things, a map (Scale 1:50,000 and 1:10,000) for executing agency concerned with the management and development of mangroves, of the procedural route through the maze of legislative and institutional criteria surrounding the use of mangrove resources. It should also provide, as an adjunct to the more detailed strategic action plans (e.g., LGF for Demak), a number of site-specific models for sustainable use of those resources (e.g., SGF for Pemalang, Banten, Lamongan, and Makasar).

Data and Information regarding coastal ecosystems in Indonesia are varies countrywide and available in GOI agencies. Different methodology and standard will produce data and information, and is root of sources that debatable due to un-able and un-capable to interpret. Of course all data and information are valuable for MFF and no bias practically. Therefore need to be shared for workable and to be coordinated for improvement to find out a fruitful sound of those data and information in the field of implementation. Collection, analysis and interpretation of the data and information's by different stakeholders which will be used sectorally to support the implementation selected of PoWs of Indonesia MFF may concurrent with NCB. Until recently, mechanisms for provincial cooperation in the areas concern for the MFF implementation e.g., LGF at Demak are well developed. The existing cooperation to build a good data and information are in progress, and need to be update for risk of duplications.

As an institute, MFF Indonesia has various memberships either from the government such as National Development Planning Agency (Bappenas); Ministry of Home Affairs (MOHA), Ministry of Marine Affairs and Fisheries (MOMAF), Ministry of Forestry (MOF), Ministry of the Environment (MOE), or from NGO Wetlands International Indonesia Programme (WIIP), LPP Mangrove and Mangrove Expert etc, and it will involve private sectors. Concerning the activities related to mangroves management, it will collaborate with KKMN members or NCB members or even broader than NCB. KKMN that based on Perpres Stranas Mangrove, and NCB based on the commitment between NCB and Regional Secretary can support each other activities mutually.

3. Principle of MFF Indonesia

3.1. PoW regional MFF

MFF's objectives are supported by 15 Programmes of Work (PoWs), grouped under the three "pillars" of **Apply knowledge**, **Empower civil society** and **Enhance governance**. By making more knowledge available, and by empowering people and institutions to use that knowledge, MFF enables coastal stakeholders to play a more effective role in governance of coastal areas. Capacity building, climate change, gender equality, knowledge management, communications, and private sector partnerships are cross-cutting themes integrated throughout this framework to help achieve positive results for each PoW.

Each NCB has developed a National Strategy and Action Plan (NSAP) for MFF implementation that reflects national priorities for sustainable coastal development, based on identification of the most relevant PoWs for that country. This has facilitated country ownership of the PoWs, and has helped to generate collaboration and learning among the NCB members and other national stakeholders.

The PoWs are implemented through, or in partnership with, the governments of member countries, institutional partners, non-governmental organizations (NGOs), community-based organizations and the private sector.

The RSC oversees this work to ensure accountability and transparency to MFF's donors and other contributors.

3.1.1. Apply knowledge

- Improving knowledge for management.
- Designing sound coastal rehabilitation
- Adopting reef to ridge approaches
- Integrating economic valuation
- Applying, monitoring and evaluation

3.1.2. Empower civil society

- Promoting civil society engagement
- Building capacity for management
- Supporting environmentally sustainable livelihood
- Improving community resilience
- Financing coastal conservation

3.1.3. Enhance Governance

- Supproting national coastal programmes
- Strengthening integrated coastal planning
- Contributing to marine protected areas
- Promoting management assessment and monitoring
- Encouraging sustainable business practices

3.2 Cross Cutting Issues

Human impacts arising from coastal development coupled with global climate changes continue to put environmental stress on coasts. There is a growing need to find new ways for ethical and equitable utilization of coastal resources. Integrated Coast Management (ICM) is one process that involves a multitude of approaches and activities to find environmentally sustainable methods to manage coasts. Its dynamic nature necessitates a deeper understanding of the ecological as well as socio-economic functions of coastal ecosystems.

MFF realizes that in order to achieve its overarching goals relating to integrated coastal management (ICM), adequate capacity in terms of human, technology and institutions need to be strengthened and enhanced across the region.

MFF hence stresses on the need to bolster the capacities of all stakeholder groups involved in managing coastal ecosystems. Through this Program of Work it identifies and fulfills capacity needs and gaps, and building on strengths and opportunities. In each member country MFF recognizes capacity building as a fundamental need and works towards creating regional networks of researchers, managers and practitioners of coastal issues.

Through initial consultations and the experience from MFF Phase 1, the research project selected five key sectors that have major investments in coastal areas which are economically dependent on coastal ecosystems. The selected sectors were tourism, fisheries and aquaculture, ports and harbours, oil and gas, and mining and quarrying. Indicators for each sector such as GDP contribution, rate of employment provided by the sector and environmental impact were ranked in order to determine the overall importance of the five sectors in each of the eight MFF countries. The research project concluded that the five sectors are diverse and challenging in many ways. As such a strategic step by step approach was essential if MFF is to successfully engage the private sector.

3.3 PoW National Indonesia

It has been proposed that MFF Indonesia will focus on district/local level management of coastal ecosystems, especially to (a) increase awareness of the economic value of coastal ecosystems and use this to prioritize, promote and support coastal conservation and development actions (PoW 4); (b) support coastal livelihoods initiatives and existing local wisdom in protecting coastal ecosystems that are both sustainable and help to maintain natural ecosystems (PoW 8), and (c) improve the resilience of coastal communities through coastal ecosystem management (PoW 9). In addition to the above PoWs, there is a need to address natural disaster and climate change.

3.3.1. PoW 4

- Development of simple, easy-to-apply ecosystem valuation tools and methods that can be used for planning and appraising coastal conservation and development activities
- Generation of information on coastal ecosystem values in response to specific development and conservation challenges and issues, and for particular high-value or threatened ecosystems and locations
- Training and awareness building among both development and conservation planners on the economic valuate of coastal ecosystems and the use of economic tools

- Development of decision-support tools including databases and GIS maps, which integrate data on economic values with information on biophysical and socio-economic characteristics, trends and vulnerabilities in coastal areas

3.3.2. PoW 8

- Development of models to guide livelihood restoration in post-disaster situations, and methodologies to promote an action-learning approach to ensure that livelihood restoration activities are adapted to specific local needs and ecosystem conditions
- Development and replication of small community-led ecotourism activities related to mangroves and other coastal ecosystems, and improve access to markets
- Support the restoration of fisheries and aquaculture in tsunami-affected areas, and ensure that these efforts are environmentally sustainable
- Development of efforts to add value to local use and marketing of non-fish mangrove products linked to community-based management and conservation approaches
- Identification and information sharing on alternative livelihoods which can address key threats to coastal ecosystems which arise from unsustainable exploitation or damaging harvesting methods, while meeting the long-term needs and changing socio-economic aspirations of coastal communities

3.3.3. PoW 9

- Further application of vulnerability assessment and mapping in coastal areas, including integrating livelihood and ecosystem information into exiting databases and associated disaster preparedness and response strategies
- Continuation and incorporation of additional countries into the coastal community resilience component of the USAID IOTWS, including replicating activities in other villages, and extending methodologies for assessing community vulnerability, with particular attention to the most vulnerable groups including women and children
- Support for activities to strengthen coastal shelter belts and green belts where they are clearly needed and have been proved to make a demonstrable contribution to the protection of coastal communities and settlements, using environmentally-sound techniques

In elaborating PoWs, we urge to integrate every data and information as a reference to develop program and activities under MFF.

The three focussed PoWs are closely linked to other MFF intervention areas, i.e.:

- Strengthening the awareness and participation of civil society (PoW 6)
- Developing sustainable financing mechanisms that will provide long-term sources of funding, at all levels, for coastal ecosystems and livelihood activities (PoW 10)
- Review of innovative and sustainable funding mechanisms (PoW 10.1)
- Development of simple, easy-to-apply ecosystems valuation tools and methods that can be used for planning and appraising coastal conservation and development activities (PoW 4.1).

Generally, there is very limited understanding of the values and functions of mangrove forests and mangroves are often regarded as degraded and worthless areas which need to be utilized for

other purposes. It is recently (due to tsunamis), when large investments have been made in constructing coastal protection works (e.g., reforestation and/or rehabilitation) and water treatments plants, that attempt to reproduce the natural functions of the mangrove forests, that stakeholders are beginning to realize the enormous intrinsic value of mangroves (See: PoWs 4,8,9). Of which Key Strategic Socio-economic Action are an important based line for implementation of the PoWs (4,8,9) in Indonesia.

In all MFF PoWs there is a basic lacks of perceptions on the best ways to proceed. With NSMEMI as a bridge and as a source of action program, proposed program by vendors can realized and to be accommodate to overcome the issues.

3.4 Climate Change as MFF Indonesia Priority Programme

As a commitment Indonesia government to decrease of green house gas, speech of Indonesia President Dr. Susilo Bambang Yudhoyono giving statement in Conference of Climate Change in Copenhagen Denmark that mention Indonesia will commitment to reduce green house effect amount 26% until 2020 and more over 41% if International community aid Indonesia. As effort to make the program successful, MFF Indonesia has concerned to participate and contribute to reduce green house effect also. Considering the result of research that mentions mangrove capability to absorb carbon more effective than primary forest [15].

Climate Mitigation and Adaptation

The terms “adaptation” and “mitigation” are two important terms that are fundamental in the climate change debate. The IPCC defined adaptation as adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate harm or exploits beneficial opportunities. Similarly, [77, 78] defined adaptation as an understanding of how individuals, groups and natural systems can prepare for and respond to changes in climate or their environment. According to them, it is crucial to reducing vulnerability to climate change. While mitigation tackles the causes of climate change, adaptation tackles the effects of the phenomenon. The potential to adjust in order to minimize negative impact and maximize any benefits from changes in climate is known as adaptive capacity. A successful adaptation can reduce vulnerability by building on and strengthening existing coping strategies. In general the more mitigation there is, the less will be the impacts to which we will have to adjust, and the less the risks for which we will have to try and prepare. Conversely, the greater the degree of preparatory adaptation, the less may be the impacts associated with any given degree of climate change.

For people today, already feeling the impacts of past inaction in reducing greenhouse gas emissions, adaptation is not altogether passive, rather it is an active adjustment in response to new stimuli. However, our present age has proactive options (mitigation), and must also plan to live with the consequences (adaptation) of global warming. The idea that less mitigation means greater climatic change and consequently requiring more adaptation is the basis for the urgency surrounding reductions in greenhouse gases. Climate mitigation and adaptation should not be seen as alternatives to each other, as they are not discrete activities but rather a combined set of actions in an overall strategy to reduce greenhouse gas emissions.

4. MFF Projects

4.1 National Project

4.1.1 Criteria for national project

Recent reviews have provided detailed discussion of global coastal diversity and of coastal aspects in the overall context of biological diversity in the MFF POWs. The purpose of this section is to highlight those aspects of coastal ecosystems which are particularly relevant to the selection and management of a representative system of MPA and sustainable management in the context of MFF PoW (see Table 4.1).

Table 4.1. Aspects of coastal and/or marine biodiversity relevant to the selection of large project sites

The large scale of coastal ecosystems	Two key physical factors influence the scale of marine environments. The first is the linkage of water masses. Marine environments are typically strongly linked by the mixing of water masses and, in coastal areas, greatly influenced by rivers and land runoff. Water masses are mixed through currents, tides and the action of wind and storms. A marine area can therefore be strongly influenced by the effects of activities in distant marine areas and on lands. The second factor is the supporting property of water.
Site differences in recruitment	The status of areas as sinks or sources can be an important factors in conservation planning. Good sinks receiving regular recruitment fro a wide range of sources are probably more resilient in the face of natural and human impacts than other areas. Good sources of recruits may require protection in order to maintain the supply of recruits to downstream areas.
Key breeding and migration areas	Many adult fish and invertebrates are widely scattered but return to specific sites to spawn. Such sites are often known to fishermen and may be heavily fished. Similarly, many marine mammals, birds and reptiles have a large total range but a small breeding range or critical breeding sites which are important to their conservation. The routes followed by birds, mammals and fish and by invertebrates such as spiny lobsters, squids and horseshoe crabs as they migrate to breed may be similarly critical to the conservation of these species.
Isolated areas and endemism	Marine endemism is rare in comparison to terrestrial environments. Marine endemics tend to be restricted to specialized habitats or are found around isolated small islands. The implication of endemic species, particularly when they are rare and isolated, is that their habitats should be of priority for protective management.
Areas of high productivity	In coastal habitats productivity is generally driven by smaller amounts of nutrients originating from the land. Many coastal areas support productive communities such as mangroves, coral reefs, seagrass beds, estuaries, which often provide rich feeding, breeding and nursery grounds for numerous species.
Vulnerable species	Some species produce small numbers of eggs or offspring. Others are viviparous. Such species are particularly significant in terms of coastal marine biodiversity. Firstly, because they produce small numbers of eggs or young their populations are likely to take longer to recover after a natural or human impact. Secondly, as described above, such species often have important breeding sites and seasons at which they are particularly vulnerable. The consideration of species vulnerability is an important aspect of the design of measures to protect biological diversity.

Extinction	The open boundaries between habitats and the relative ease of dispersal means that extinction in the sea is not a major concern as it is on land, except for the limited number of endemic species, some of the large air-breathing species and those with low annual fecundity.
Taxonomic diversity	Patterns of species diversity in the Indonesian shallow waters and/or small islands waters are still poorly known compared with terrestrial species.
Genetic diversity	The preservation of genetic diversity is a basic requirement for sustaining populations, resistance to disease and adaptability to changing environmental conditions. If the populations are genetically and physically separated, efforts to protect one population may have little impact on others.
Ecosystem diversity	Ecosystem or habitat diversity is not amenable to the same forms of analysis as taxonomic diversity nevertheless, the diversity of ecosystems and habitats in an area, or the presence of unique habitats, provides a measure of its importance for conservation. In agenda 21, the following ecosystems are accorded highest priority, on the basis of their diversity and productivity: mangroves, coral reefs, seagrass beds, estuaries, and other type of tropical coastal wetlands and other spawning and nursery areas.

4.1.2 Criteria location selection based on standard degree of damages/vulnerability

Broader Criteria for Selection of Priority Areas

Besides the coastal ecosystem criteria, priorities have been identified on the basis of ecological and bio-geographic criteria in the first instance, using existing and available data. The other, equally important criteria were used to provide additional justification for or against the selection of a particular area and in considering the probability of establishing and successfully managing of sustainable coastal resources including MPA (Table 4.2).

Table 4.2. Criteria for selection of Indonesian MFF priority areas

Biogeographic importance	1. Either contains rare biogeographic qualities or is representative of a biogeographic type or types. 2. Contains unique or unusual geological features.
Ecological importance	1. Contributes to maintenance of essential ecological processes or life-support systems e.g. source for larvae for downstream areas. 2. Integrity – The degree, to which the area either by itself or in association with other protected areas, encompasses a complete ecosystem. 3. Contain a variety of habitats. 4. Contain habitat for rare or endangered species. 5. Contain nursery or juvenile areas. 6. Contains feeding, breeding or rest areas. 7. Contains rare or unique habitat for any species. 8. Preserves genetic diversity i.e. is diverse or abundant in species terms.
Naturalness	The extent to which the area has been protected from, or has not been subject to human-induced change.
Economic importance	Existing or potential contribution to economic value by virtue of its protection e.g. protection of an area for recreation, subsistence, use by traditional inhabitants, appreciation by tourists and others or as a refuge nursery area or source of supply for economically important species.

Social importance	Existing or potential value to the local, national or international communities because of its heritage, historical, cultural, traditional aesthetic, educational or recreational qualities.
National significance	Is or has the potential or included on a list of areas of national importance or is the subject of an international or national conservation agreement.
Practicality Feasibility	1. Degree of insulation from external destructive influences. 2. Social and political acceptability, degree of community support. 3. Accessibility for education, tourism, recreation. 4. Compatibility with existing uses, particularly by locals. 5. Ease of management, compatibility with existing management regimes.
Forest Status	1. StateForest 2. Non-StateForest

4.2 Implementation of MFF Programme

The initiative will be implemented through a series of on-the-ground projects. The initial MFF projects on the ground will be categorized into three scales:

- Large Grant Facility (LGF) with a budget range of USD 100,000 – 250,000;
- Medium Size Project with a budget range of USD 50,000-100,000; and
- Small Grants Facility projects with a budget range of USD 5,000-25,000[1].

4.2.1 Small Grant Facility (SGF)

The major aim of the MFF Small Grant Facility (SGF) is to support local community action in the restoration and management of coastal ecosystems and their services as a basis for sustainable development. Apart from providing direct environmental and livelihood benefits locally, SGF projects will also offer tangible models to inspire policy-making. SGF projects will contribute concrete measures to ensure participation, gender equity and secure livelihoods for marginalized groups.

The SGF will support projects which:

- Promote innovative community based coastal rehabilitation projects.
- Build local capacity to implement sustainable development strategies, creating local ownership.
- Creation of public awareness on environmental issues as an integral part of the project.
- Address livelihood, incomes, and equality and gender concerns.
- Demonstrate high replicability, co-financing and scaling-up potential.
- Create an impact on policy at National/Provincial/District levels.

Examples of umbrella activities that bridging among the ministries is:

- Rehabilitation of natural resources (e.g. mangroves, coral reefs and seagrasses) that benefit coastal fisheries.

[1]Based on the experiences of operating small grant projects, NCB has decided not to have projects under US$25,000.

- Development of community management plans.
- Livelihood projects.
- Community-based re-establishment of coastal buffer zones such as beach/coastal forests and sand-dunes.
- Initiatives for regenerating mangroves and other coastal vegetation.
- Local wisdom and traditional knowledge.
- Education and public awareness rising.
- Capacity building and technical exchange.

Elaboration of such criteria will be put in the Operational Guidelines.

Key indicatorsfor effectiveness of the program

Based on the priorities of PoW and the criteria developed in this strategy, to be more efficient implementation, proposed activities should consider:

- Meet the local needs;
- Based on the participatory approach ;
- Support the integrated coastal management;
- Compliment and strengthen to other activities fundedby other sources;
- Oriented into the coordination among stakeholders;
- Have an outlook for strengthening the local institutions and implementing laws and regulations.

4.2.2 LGF/MSP

Large/Medium National Projects

Large National Projects of the SNPEM are integrated approach that nationally applicable at the local level, cross-sectoral up to provincial and visible socio-economically, politically and ecologically. The implementation of for example LGF in Demak, will ensure that Large National Projects sounding internationally and the impacts at the livelihood levels established widely to countrywide.

Coastal ecosystems in Indonesia includes mangroves, coral reefs, sea-grass beds, seaweeds, estuaries, lagoons etc., serve continuously at a glance. These ecosystems can be conserved at natural basis and/or man made systems for their life sustainability e.g., a valuable species of crabs, fishes and mollusks for human being and food security.

Coastal ecosystems play important roles in supporting the lifelihoods of community. The ecosystems can be conserved sustainably. This allows integrated management regimes to be established which provide for continued human use while achieving the conservation objectives. The ecosystems can be sustainably used with respects of biodiversity (see section 5.1.1) and other perspectives including, socio-economic aspects (see section 5.1.2).

MFF large projects are based on the national interest, which is implemented through the ecosystem region approach. In addition, the MFF national projects are intended to have wider impacts on the improvement of coastal ecosystems.

4.2.3 Mangrove for Climate Change

Proposed from MFF Regional with funding from DANIDA.

4.2.4 Knowledge sharing and capacity Building

Knowladge sharing and capacity building will also focus on early-age or young generation. It is assumed that young generation easier in adopting the knowledge of ecosystems, environment, climate changes, etc. Other knowledge sharing will be taken from the success story of MFF program/project that conducted or implemented in many places in Indonesia including SGF and LGF projects (in Demak). Good example of capacity building can be seen from activity of Mitra Bahari in Pemalang District.

4.2.5 Private Sector Engagement

Establishment the coordination and coorperation with private sector can be done in the form of CSR. Some possibility programs that can be offered such as:

- MCC projects are developing Mangrove for Climate Changes, while lerning programs are conducted by WIPP.
- Regional MFF through CSR-Asia (voulentary based) with Indonesian NCB are selecting Pemalang District as an international demo-site for traninning socio-etnografi mangrove.
- Collaborative management/CSR for voulentary planting mangrove in the coastal of Muara Angke, Jakarta.

4.2.6 Other

There are many other development models of community based empowerment in utilizing mangroves such as, ecotourism, silvo-fishery, bee farming in mangrove, mangrove rehabilitation by local communities (Rantai Emas: Rehabilitasi Pantai Entaskan Masyarakat Setempat) and many others.

Box-4: MFF Indonesia in action

Coastal ecosystems play an important roles in supporting the lifelihoods of community. Thus, the major aim of the MFF Indonesia is to support local community action in the restoration and management of coastal ecosystems and their services as a basis for sustainable development by facilitating both SGF and/or LGF. Based on the site-selection criteria as listed in Table 4.1 and 4.2, Bedono and Timbulsloko Villages in Demak, Central Java Province was selected as one of Demo-site of MFF Indonesia and receiving LGF, because of the strong eagerness of the local people in restoration and conserving the mangroves. Some activities from launching the MFF In Demak by Committee Chairman and by the regent of Demak, as well as PCM workshop, FGDs, Replanting mangroves in the filed, Establishing the mangrove information Center, etc have been conducted. Therefore, the implementation of LGF in Demak, will ensure that Large National Projects sounding internationally and the impacts at the livelihood levels established widely to countrywide.

5. Action Plan Indonesia

Action plan of the activity of MFF Indonesia up to 2016 is listed in the Table 5.1. below.

Tabel 5.1. Action plan activities of MFF Indonesia up to 2016.

Theme	2012	2013	2014	2015	2016
Mission	Integrated Coastal Management	Climate Change	Gender	Private Sector Engagement	Knowledge Management and sharing
Target	Well known by national partnership	Combination National, Regional and other collaboration to support Climate Change	Using gender for empowering the activities in the coastal area	Collaboration with private sector to sustain the programme	Extrapolate good lesson learn from Project Implementation to National/ regional level
Source Fund	MFF	MFF Danida Project	MFF Danida Project	MFF Danida Project, CSR	MFF Danida Project, CSR
Leading sector	NCB	NCB	NCB	NCB Private Sector (BUMN)	NCB

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Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS

About Mangroves for the Future

Mangroves for the Future (MFF) is a unique partner-led initiative to promote investment in coastal ecosystem conservation for sustainable development. It provides a collaborative platform among the many different agencies, sectors and countries who are addressing challenges to coastal ecosystem and livelihood issues, to work towards a common goal.

MFF builds on a history of coastal management interventions before and after the 2004 Indian Ocean tsunami, especially the call to continue the momentum and partnerships generated by the immediate post-tsunami response. It initially focused on the countries worst-affected by the tsunami; India, Indonesia, Maldives, Seychelles, Sri Lanka, and Thailand. MFF has expanded to include Bangladesh, Cambodia, Pakistan and Viet Nam. MFF will continue to reach out other countries of the region that face similar issues, with an overall aim to promote an integrated ocean wide approach to coastal zone management.

The initiative uses mangroves as a flagship ecosystem, but MFF is inclusive of all coastal ecosystems, including coral reefs, estuaries, lagoons, sandy beaches, sea grasses and wetlands. Its long-term management strategy is based on identified needs and priorities for long-term sustainable coastal ecosystem management. These priorities emerged from extensive consultations with over 200 individuals and 160 institutions involved in coastal management.

MFF seeks to achieve demonstrable results in influencing regional cooperation, national programme support, private sector engagement and community action. This will be achieved using a strategy of generating knowledge, empowering institutions and individuals to promote good governance in coastal ecosystem management.

Learn more at: www.mangrovesforthefuture.org