Proceedings of

International Symposium on the Conservation of the Coastal Areas of the Bay of Bengal,

7 March 2019 Dhaka, Bangladesh

The Bay of Bengal as a Wetland: Challenges & Opportunities

BoB WeT
The Bay of Bengal Wetland Partnership

Ramsar Center Japan 2019

Acknowledgements

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22 March 2019
The Editors

Proceedings of International Symposium on the Conservation of the Coastal Areas of the Bay of Bengal, 7 March 2019, Dhaka, Bangladesh
The Bay of Bengal as a Wetland: Challenges & Opportunities

Edited by Bishnu B. Bhandari, Reiko Nakamura and Sanowar Hossain

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Editorial Note

The International Symposium on the Conservation of the Coastal Areas of the Bay of Bengal held in Dhaka on the 7th March of 2019 was a unique event in the history of Ramsar Center Japan, where 20 presenters representing various disciplines, countries and regions were able to articulate their thoughts and ideas within the stipulated time of 12 minutes, followed by a short live floor interaction. The symposium was attended by some 50 international participants coming from 8 countries. The papers submitted to the organizers were the testimony of the diversity of the disciplines in wetland conservation. After each presentation, there was a short question & answer session. Following the technical presentations in the 4th session, all the participants were systematically divided into 3 break outs, each under a group leader. Each group discussed the issue and made a short presentation in the plenary with floor discussion.

This is the report of the compilations of the proceedings of the inaugural and closing sessions and technical papers presented in the symposium. The technical papers have been divided into 4 parts. The final summary of each group discussion is also presented in this report.

Some of the exemplary works that have caught the eyes of the editors are presented below along with the reference of the author's name.

1. The mole crab is a good indicator of clean sea water. This crab is found only in the sea where there is clean water. There is no record of their being sighted in the turbid water (see **Sansanee Choowaew**).
2. Fisher communities of the Odisha coasts consider the turtles their best friend as the turtles feed on jellyfish, which is a nuisance to fishermen's net while fishing (see ***Wardi Kasinath***).
3. The successful ecotourism activities adopted in the village of Laem Nao in Thailand is the result of the compliance of an informal rule of "No Change and No Harm to Nature" by the community. Everybody complies with this rule. As a result, none encroach the forest. People just respect the forest and make sure that they are not harmed by any means. (See **Sansanee Choowaew**).
4. The best example of community-based conservation is found in the village of U To in the Rakhine coast of Myanmar. The villagers were successful to designate an area of 200 ha (500 acres) of mangrove forest as a conservation area and establish a nursery of about one acre along with a shade and boardwalks. This was possible with the strong partnership between local communities and the Village Tract Authority (VTA). This partnership was reinforced by professional organizations: Myanmar Forest Association and Mangrove Service Network. The success was possible due to the synergy between people's needs and interests, VTA's support and technical expertise from the professional organizations (See ***Myo Lwin***).
5. The solar-tent technology developed and applied by the scientist of Odisha is an excellent example of drying the fishes hygienically. This technology is simple and produces dry fishes of high quality. The fishes smell good and color is white. Therefore, the demand of these fishes is high in the market. The technology is cost effective and uses local resources. The technology is disseminated though the Self-Help Group of fisher women in the coastal village of Odisha (See ***Durga Prasad Dash***).
6. A longitudinal study (1993-2019) of Landstate Sattelite images of the Hatiya and Saint Martin islands of Bangladesh concludes that "*... in the last 20 years, (the annual) net sea level rise observed in the Charchenga Point of the Hatiya Island is 2.94 mm which causes regular tidal flooding in the Hatiya along with the river bank erosion at an increasing rate. As a result, human displacement is at alarming rate in the Island*". The sea level rising trend of Charcheng Point of the Hatiya is 11.8mm for the last 20 years (see ***Muhammad Abdur Rahaman et al.***).
7. Likewise the data on land use change in the Saint Martin island show that the vegetation cover in 1994 was 230 ha and that in 2019 is 125 ha. The number of water bodies was 85 in 1994 but those in 2019 are only 30 and the number of sandy beach has decreased from 560 in 1994 to 256 in 2019. On the contrary, the number of settlement has increased from 22 in 1994 to 190 in 2019. "*If the island loses the vegetation cover by this rate, the Saint Martin Island will be a barren island in 2050 or 30 years from now*" (see ***Mujammad Abdur Rahaman et al.***).
8. The Youth Model adopted by the RRC-East Asia is mention-worthy here as the model targets only youth in wetlands. The model provides a kind of mock exercise for the students to develop leadership and other attributes in wetlands. The youths perform different roles such as Secretary-General, delegates, journalists, and volunteers and others. The participants are taught negotiation skills, team works, formulating the COP resolution, etcetera. This is a good example of instilling in students and youth a sense of love for wetlands and wetland conservation (see ***Norman Emmanuel C. Ramirez***).
9. Post harvests fish processing waste constitute around 50% in fishery. These wastes can be recycled into organic fertilizers. The refinery operation is easy & low cost in terms of production and the use of energy. The organic fertilizers can be used in increasing the food production. Fish-bio extracts can be used as liquid fertilizers for plants and crops and can be powdered for soil and aquaculture pond recharge. Their uses enhances resistance against disease, drought, flood and cyclone (See ***B. B.Sahu***)

The editors hope that this report would be useful to discover new and pragmatic ideas in the Bay of Bengal so that the ideas of resilient livelihood, community-based conservation and judicious use of resources can be effectively promoted in the area. With these we would like to close our note here.

Happy Reading

The Editors
22 March 2019

Inaugural Session

Welcome Remarks: Dr. Sanowar Hossain

Dr Sanowar Hossain, the President of Bangladesh POUSH, extended his warmest welcome to the participants of the Symposium and said that he was so happy to be the part of the organizing this very symposium on the Bay of Bengal today in Dhaka. Bangladesh's lion share of economy comes from blue economy and economy is based on the sea. Therefore, without the resources of the Bay, it would be extremely difficult for Bangladesh to move forward to the direction of progression. Once again welcoming all the participants, both native and international, from 8 countries he expressed the hope that the Symposium would come up with some concrete checklists of works to be done to manage and conserve the Bay wisely and judiciously.

Remarks: Ms. Reiko Nakamura

Ms. Reiko Nakamura, the Secretary General expressed her happiness over the ability of the Ramsar Center Japan in partnership with Bangladesh POUSH to organize today's International Symposium here in Dhaka. Today's event is a special event for her as well as for the entire RCJ family. The idea of the Bay of Bengal as a wetland was impregnated in our minds about 5-6 years ago. Since then RCJ has been doing regularly very many small meetings, discussions, mini-symposia and informal roundtables on the idea. The concept led us to believe that the BoB is economically, politically and socio-culturally very important for the people of the region. Therefore, the conservation of its mega-biodiversity is the key concern of our thinking. She hoped that the deliberation, even though of one day duration, would be able to set the agenda that is needed to move ahead with the Herculean path of a resilient conservation, judicious utilization and effective management of resources in and around the Bay of Bengal. In this regard, she wished to receive the participant's active support and cooperation.

Remarks: Prof. Yukihiro Shimatani

On behalf of Japan Wetland Society, Prof. Yukihiro Shimatani congratulated the organizers for convening this very symposium on the wise use of the resources of the Bay of Bengal, which is, not only the source of livelihood for the people of the region but also is the protective shield against the disasters. As all know, the Bay is the power house of various types of water-induced disasters. Since wetlands and DRR are very closely related to each other, the BoB program has, in my opinion, two-pronged objectives. One is to protect its valuable wetland resources and the other is to reduce the risks to disasters. He wished a grand success to the Symposium and looked forward to receiving good suggestions from the deliberations.

Chief Guest's Remark: Dr. S.M. Munjurul Hannan Khan

The Chief Guest, Dr. S.M. Munjurul Hannan Khan, Additional Secretary of the Ministry of Environment, Forest and Climate Change, Government of Bangladesh offered his thanks to the organizer for inviting him as the Chief Guest of the Symposium. He said that Bangladesh has been working on the issues of wetlands since a long time and said that nature conservation is the obligation of every Bangladeshi citizen, which has been well-stipulated in the Constitution. Various agencies and organizations are dedicating their resources, energy and time to the cause of wetland conservation in Bangladesh. The designation of two Ramsar sites is the testimony of Bangladesh's commitment to the cause of wetland conservation.

Bangladesh is not an exception to many problems and challenges faced by the world communities. Some of these problems are the bulging population, heavy dependence of over 400 million people for their livelihood, impact of climate change, etcetera. Because of the impact of climate change the globally threatened Royal Bengal Tiger may go to extinct. So it is urgently required that we begin to study the impact of climate change, sea level rise and temperature rise on tiger and other endangered fauna. The pollution is also equally an important issue for all of us. The good thing is that Bangladesh has now the support of the Supreme Court which has given a verdict on the rivers that the rivers should be treated as living beings. These beings have rights to exist as they are. So it is our duty to protect these natural resources. He wished every success to the symposium and hoped the Symposium would provide a set of practical guidelines to the government of Bangladesh and other partners concerned.

Keynote:

Bay of Bengal Wetland Partnership: A New Initiative for the Conservation of a Transboundary Wetland[1]

Bishnu B. Bhandari[2], Reiko Nakamura[3] & Sanowar Hossain[4]

The paper is written here with two things in mind. One is to provide a brief overview of the jewels of the Bay of Bengal and the other is to give a highlight of the proposed program, the BoB Wetland Partnership, initiated by the Ramsar Center Japan (RCJ). The overview of the BoB is in the first part whereas the second part explains the BoB Wetland Partnership Program in a nutshell.

In ancient times, the Bay of Bengal area was known by different names -- *Mahodadhi* (Great River Receptacle), *Purba Payodhi* (Eastern Ocean), *Vangop Sagar, Vanga Sagar* in ancient Sanskrit literature, *Golfo de Bengala* in Portugese, *Nanyang* (Southern Sea) in Chinese. The BoB was also called Chola Sea (or Lake). By the 10th century, the Bay has been called by the name of the Bay of Bengal. It is called *Bengal ki Khadi* in Hindi, *Bengalko Khadi* in Nepali and Bangosagar in Bengali.

The Bay touches the boundaries of 7 countries (Bangladesh, India, Indonesia, Malaysia, Myanmar, Sri Lanka & Thailand) in South East Asia. Therefore, it is the fitting example of a transboundary wetland. Outstanding characteristics such as historical, geographical and biological features are discussed in Part I.

Part I: Unique Features of the Bay of Bengal

Geographically, the Bay of Bengal is the world's largest triangular basin. According to a FAO Study it is one of the 64 large marine ecosystems in the world (Sivasubramaniam, 1985). Its actual area is 2.2 million km2. Its costal area from the southern point of Sri Lanka to the northern part of Indonesia's Aceh is estimated about 6,300 km long. It is an enclosed sea – an arc stretching from the southern end of Sri Lanka to southeastern edge of India (Kanya Kumari), up and along the Mouth of Ganges of Bangladesh and the western coast of Myanmar and down to the western coast of Thailand (the Isthmus of Kra including Phuket) or the Andaman Sea, the Penang Island of Malaysia and the northern edge of Aceh of Indonesia (Bhandari, 2016a).

The Bay of Bengal houses several gulfs, straits and islands such as the Gulf of Manar, Palk Strait, Mouth of Ganges, Gulf of Mottama, Mergui Archipelago, Andaman & Nicobar Islands, Andaman Sea, beach, estuary, tidal mudflat, coral reef, backwa ter mangrove forest etcetera.

Historical evidence shows that the region was colonized only after the 15th century. In the second half of the 19th century, the British Empire envisioned a grand design of developing rubber plantation in Malaysia, rice in Burma (present Myanmar) and coffee & tea in Ceylon (present Sri Lanka). This plan was supported by imperial capital and South-Asian labor. In the implementation of the plan, the British authority mobilized the emigration of almost 30 million workers between 1840 and 1940 that crossed the Bay from India to Malaysia, Myanmar, and Sri Lanka. Only about 2 million of them travelled back and forth. There was always a circular migration around the Bay. It is important to note that about 140,000 refuges embarked on the long march from Rangoon to India in the late 1930's. On the way, many died of exposure, exhaustion, starvation, heart failure and amputation. Indeed, the Bay was the home of the world's biggest emigration (Amrith, 2013).

This vast political and economic connection fell apart when World War II took place in the early 1940's. World War II was the turning point for political, economic and cultural connection in Asia. After the collapse of the British Empire, new nation-states emerged in the South East region, where the issue of citizenship and belongingness were prominent. These nation-states began to exploit internal resources and internal labor. The sea was of no concern for them. Thus the Bay was simply a "Forgotten Sea" in the 1960's (Amrith, 2013).

Besides, the historical and geographical features, the Bay of Bengal have other important features as well, which are briefly mentioned below.

1. The Bay of Bengal is a vast concourse of flora, fauna & ecosystems: The ecologist calls it as a large marine ecosystem, whereas the student of wetlands views it as a huge wetland, housing a exceptionally rich aquatic diversity, meeting the livelihoods of millions of people and serving as the habitat of globally threatened fauna. The common key species of the areas include the Royal Bengal Tiger, Leatherback Sea Turtle, Malayan Box Turtle, Irrawaddy Dolphin (rare & endangered), Saltwater Crocodile (the Nicobar Islands), the nesting of the Olive Ridley Sea Turtle, White-Bellied Sea Gull, Hilsa, sea cow, Horse-Shoe crab, and other marine life such as whale, hogfish, school of dolphins, Tuna etcetera (Wildlife Conservation Society). Plus the area has so many coral reefs, fish spawning & nursery areas and mangrove forests.

1 Paper presented at the "International Symposium on the Conservation of the Coastal Area of the Bay of Bengal" 7 March 2019, Dhaka, Bangladesh (Organizer: Bangladesh POUSH in association with Ramsar Center Japan). The authors are grateful to Mr. Iwasaki Shimpei, Mr. Durga P. Dash, Ajit Pattnaik and Prof. India Palihakkra for their valuable suggestions.

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3 Secretary-General, Ramsar Center Japan
4 President, Bangladesh POUSH

2. The Bay of Bengal is the melting pot of numerous ecosystems such as coastal ecosystems, forests, mangroves, aquatic system, intertidal zone, estuarine system etcetera and the habitat of those species mentioned above. The above and other fauna depend, not only on a particular ecosystem but also many other ecosystems for meeting their daily as well as seasonal needs. All these ecosystems occur in the Bay of Bengal area.

3. The Bay of Bengal is home to sea-based peoples. The area houses four distinct tribal groups. These groups are sea-based tribes. And they are the *Sentinelese tribe* (indigenous, zero contact and untouched with outsiders, hostile, violent and kill outsiders), the *Jarawa tribe* (darkest of the dark, oldest, Agro-Asian tribe), the *Onge tribe* (semi-nomadic, least fertile but most sterile people with their own language) and the *Moken tribe* (called Sea-Gypsies found in Southern Burma & Thailand). The Sea is their home. They are stateless and their culture is sea-based. (See https://en.wikipedia.org/wiki/Sentinelese_people, Bhandari, 2016b).

4. The Bay of Bengal is the source of the livelihoods for millions. According to a FAO study, some 400 million people from the eight countries (Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka & Thailand) heavily depend on coastal and marine resources of the Bay of Bengal. The fishery crafts alone stand at about 325,000 in these countries. This heavy dependence has a heavy impact on the quality of life and the prospects for economic growth in these countries. Major livelihood activities are oil & gas refineries, fisheries, rice growing, ship building and ship-breaking, coconut and cashew cultivation, salt production, tourism, shrimp farming, herbs, spices etcetera. (Hossain, 2016).

5. The Bay of Bengal is highly prone to disasters. Water-induced hazards such as cyclone, Tsunami, flood and storm are regular features of the area. Besides, the area is the house of diversities such as different political systems, laws, languages, cultures, customs, norms & values. It is said that coastal wetland sequester carbon, which is called blue carbon.

2. Environmental Problems

The Bay receives pollutants (sediments, runoff and nutrients) that spill into the area coming from 7 rivers and important cities that ring the littoral area. In fact, the area is a sink of organic and inorganic wastes of the area. Storm and flood surges fan out these pollutants as well as a huge quantity of plastics to the sea (Dash, 2016). Similarly, the critical habitat such as mangroves, coral reef and estuaries are declining and deteriorating due to overfishing, loss of sea turtle and so forth. The impact is on both terrestrial and aquatic species due to the shifting of coastal line, shrinking of river deltas etcetera.

The Bay also receives the discarded hulks of the world's unwanted ships. Chittagong of Bangladesh alone handles about a fifth of the world's total unwanted ships. This industry has created a huge employment in Chittagong but it is one of the most dangerous occupations in the world. People have to work and wade into toxic and oily sludge to take the parts of the ships. Every day the workers inhale dangerous chemicals including lead and asbestos.

Global warming is a singular ecological issue that concerns all of us. The first victim of warming is ice and snow as they are very sensitive to the rise in temperature. Their melt pours into the ocean and causes the sea to raise its level. It should be noted that a meter rise of sea level can inundate a half of Bangladesh and a large area of coast in the littoral zone. The world's oceans are likely to rise due to global warming, the causes being both global and cumulative. The IPCC estimates that globally the sea level will rise between 19 and 59 cm by 2100.

All these problems have a severe impact on the quality of life of the people and their livelihoods and even economic growth of these countries. The priority action should address all these problems. Some urgency is required in the management & improvement of pollution, restoration of degraded critical habitats, resilience of the coastal wetlands and people-centered livelihood programs on the ground.

3. Regional Initiative

Several organizations are in operation at the regional level. Some are inter-governmental and while others are multilateral. Major ones are mentioned below.

1. SAARC (The South Asian Association for Regional Cooperation) is an intergovernmental organization dedicated for the promotion of the welfare of the peoples of South Asia and providing all individual opportunity to live in dignity and realize their full potentials. Eight member countries – Afghanistan, Bangladesh, Bhutan, India, Nepal, the Maldives, Pakistan and Sri Lanka. Excepting Afghanistan, Pakistan and the Maldives-are in the association.

2. IORA: The Indian Ocean Rim Association is an international organization of coastal states bordering the Indian Ocean. Headquartered Ebene, Mauritius, it is a regional forum bringing together representatives of governments, business and academia for promoting cooperation and closer integration among them. It has 21 countries as members and 7 of them are dialogue partners. Fisheries management is one of their priority areas (https://en.wikipedia.org/wiki/Indian-Ocean -Rim-Association).

3. BBIN Initiative: This is a sub-regional initiative in East Asia and consists of four countries namely Bangladesh, Bhutan, India and Nepal. The Initiative focuses on water resources, connectivity of power, transport and infrastructure.

4. BIMSTEC (Bay of Bengal Initiative for Multi-sectoral Technical & Cooperation) comprises some 7 countries (Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka and Thailand). Among its various sectoral reviews, agriculture, climate change, fisheries, mountain economy and blue economy are the ones related to this partnership program.

5. ASEAN (Association of Southeast Asian Nations): Ten countries of Southeast Asian countries (Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Laos, Myanmar, Cambodia and Vietnam) have formed this very regional organization basically to promote economic growth and regional stability.

6. Other Organizations: include many UN Regional Offices, IUCN, SACEP (South Asian Association for Regional Cooperation), BOBP-IGO, Asia Pacific Fishery Commission (APFIC), South East Asian Fisheries Development Center (SEAFDEC), Indian Ocean Tuna Commission, Regional Fisheries Organization, Bay of Bengal Large Marine Ecosystem,

7. Ramsar sites along coastal rim: Many countries have designated coastal wetlands as Ramsar sites, the sites of international importance. Their total number is 23. These coastal Ramsar sites are: (1) Vankalai Sanctuary, (2) Wilpattu Ramsar Cluster, (3) Annaiwilundawa Tank Sanctuary, (4) Kuman Wetland Cluster, (5) Bundala and (6) Madhuganga in Sri Lanka. Five sites (1) Point Calimere Wildlife & Bird Sanctuary, (2) Kolleru Lake, (3) Chillika Lake, 4) Bhitarkanika Mangroves, and (5) East Calcutta Wetlands are in India. Bangladesh has only two sites: (1) Sundarbans Reserved Forest and (2) Tanguar Haor whereas Myanmar has 5 sites – (1) Indawgyi Wildlife Sanctuary, (2) Gulf of Mottama, (3) Moeyungyi Wetland Wildlife Sanctuary, (4) Inlay Lake Ramsar Site and (5) Meinmahal Kyun Wildlife Sanctuary. Thailand has 5 sites in the coastal region. They are: (1) Kaper Estuary-Laemson Marine NP-Kraburi Estuary, (2) Ko Ra-ko Phra Thong Archipelago, (3) Pang Nga Bay Marine National Park, (4) Krabi Estuary, and (5) Had Chao Mai Marine NP- Ta Libong Island Non-hunting Area –Trang River Estuary.

Part II: BoB Wetlands Partnership

This part attempts to provide the conceptual framework of the BoB Wetland Pertnership, followed by its chronological development. It also talks about current activities of Partnership and its future plan of actions.

The Bay of Bengal Wetland Partnership is a macro concept guided by following principles.

The Partnership views the entire Bay of Bengal as a single organic whole. The term Organic Whole means all the parts and activities should be considered as part of the activities of universe as a whole. In other words, the total is more than the sum of its parts. This concept is opposed to reductionism or atomism. The whole is the result of the reciprocal play of all parts. Our concept is based on the organicism philosophy. It is opposed to reductionism.

The Partnership begins with where people have problems. Problem is the point of entry to the activities.

The Partnership incorporates ethical concerns such as deep ecology. The concept of deep ecology is based on the principle that humanity is the part of nature, rather than apart from or separate to it.

The Partnership seeks the active, informed and meaningful participation of the partners.

The Partnership provides a forum for the active sharing of mutual benefits, potential hazards, marketing information etcetera.

The Partnership is a loose network of those willing and able partners, bringing together public and private sectors, non-governmental and professional organizations, academia, research institutions, media, scientists, and practitioners involved in the conservation of the coastal areas. Its overall objective is to create an environment for mutual sharing of benefits and raising voices in order to inform decision making process. The Partnership was initiated by RCJ in conjunction with partners in 2016 with funding support from KNCF.

The idea of the Bay of Bengal Wetland Partnership came into an open discussion in Yangon on the 4th February 2016 when the participants from 9 countries gathered in a mini-symposium held in Yoma Hotel, Yangon. A total of 8 papers were presented covering different aspects. Its proceeding was digitally published by the RCJ under the name of "*The Bay of Bengal: A Forgotten Sea*" and posted in its website (http://rcj.o.oo7.jp/), Since then several workshops and field works have taken places, their chronological development is briefly presented in Box A.

Box A: Chronological Development of the Bay of Bengal Wetland Partnership

2016 = Mini-Symposium on the Bay of Bengal, Yangon, Myanmar
2016 = International Workshop on the Conservation and Wise Use of Wetlands along the Bay of Bengal, Mahidol University
2017 = Publication of the report "Rapid Assessment of the Gulf of Mottama"
2017 = Intensive study of the U To Village in Myanmar
2018 = Holding of a Community Sharing Field Workshop for the Fishermen from three Countries- India, Myanmar and Bangladesh
2018 = Field study on Crab Raising in Thailand
2018 = Exploratory Study of Coastal Wetland-based Livelihood Activities in the Coastal Area facing the Bay of Bengal in Sri Lanka
2018 = Training on "Crab Banking and Eco-Tourism" in Thailand
2019 = Community Sharing Workshop for Fishermen in Cox's Bazaar

Commyunity Sharing Workshop for Fisherman, Cox's Bazar, March 2019

In the course of our mini-symposium and field studies, we discovered many successful practices in the region. Some of the noteworthy examples are the fishermen' cooperatives in Odisha, responsible fisheries in Bangladesh, ecotourism and crab farming in Thailand, wetland-related livelihoods in Sri Lanka, face-to-face dialogue among fishermen of India, Bangladesh and Myanmar, training on crab farming etcetera.

In 2018, the first Community Sharing Workshop was organized in Odisha for the fishermen of Bangladesh, Myanmar and India. The second Community Sharing Workshop was organized in the first week of March from 4 -5 in Cox's Bazaar for fishers from Bangladesh and India. This workshop is intended to provide the hands-on activities on fisheries, turtle conservation, beach nourishment, responsible fisheries and fish preservation. On the occasion, a new RCJ-TOYOTA project "Achieving the SDG No. 14 through Community-based Resource Management & Conservation of Coastal and Marine Biodiversity of the Bay of Bengal in the Teknaf Peninsula, Bangladesh" was also kicked off.

Now let me share something about this very International Symposium. Its major objectives are to assess the current status, challenges and successes in wetland conservation, develop a consensus on agenda and modality, identify willing and able partners and encourage them to join the partnership and highlight the importance of ecosystem services.

At the moment, organizations representing 7 coastal countries - (1) Bangladesh, (2) India, (3) Malaysia, (4) Myanmar, (5) Thailand, and (6) Sri Lanka have joined the partnership. Other countries are (1) Japan and (2) Nepal. Japan is a leading country for the Partnership Activities. At the moment, Indonesia, and two more highland countries Bhutan and China do not have representatives in the symposium.

7. Our Roadmap

The vision of the Partnership is the environmentally excellent, economically prosperous and socially equitable & peaceful Bay of Bengal as a whole. It is a lofty goal and will take our resources, time and patience for which we are very much determined. No doubt, we will be able to reach our goal, if we all combine our strength, wisdom and environmental intelligence together in a synergistic way. With these things together in mind, we would continue our collaboration with grassroots people with whole-hearted support from our local partners and we hope to bring our dream true. The specific plan of action for the next few years is proposed as follows.

Strengthen the current network of partners and sensitize them as much as possible

Continue series of community sharing workshops for the fishermen, coastal land-dependant people, community-based organizations and local practitioners

Develop innovative project based on the success of the network partners

Mount the demonstration project on the ground in collaboration with local organizations and governments

We are hopeful that the Symposium would enable us to set the agenda for the judicious management, conservation of re-

sources, sustainable development and resilient livelihoods of the people of the Bay of Bengal area.

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Part I: Efforts at the Regional Level

International Cooperation on the Environment of the Bay of Bengal in the BOBP-IGO Perspective

Yugraj Singh Yadava[5]

[Note: This summary is based on the PPT presentation made by the author in the Symposium. — Editors]

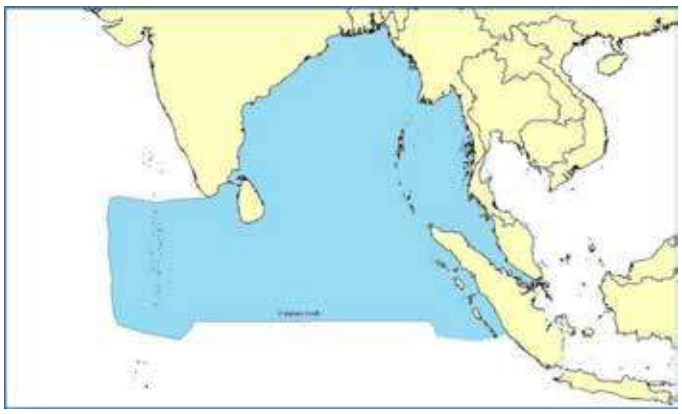
1. Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO)

The BOBP-IGO, established in 2003, is an outgrowth of the erstwhile Bay of Bengal Programme of FAO which started in 1979. It is a regional fisheries advisory body consisting of four-member countries (Bangladesh, India, the Maldives & Sri Lanka) with the cooperating countries: Myanmar, Thailand, Indonesia & Malaysia.

What is regional cooperation in the context of the seas?

Cooperation is an act of working together for a common purpose. In this case the common purpose is sustaining the gain from economic uses (*e.g.* food, livelihoods, healthy stocks, foreign exchange) and obtaining benefit such as complementary policies, knowledge base and better governance.

3. The primary objective of the paper is to share cross-sectoral learning on regional cooperation (marine fisheries & environment) although wetlands are highly important for marine ecosystem. However, they are not covered here as they are covered in other presentations. Here the presentation has been divided into the following 4 sections.



1: State of Fisheries and Environment in Bay of Bengal
2: Institutional and Governance Framework for Regional Cooperation
3: Example of Regional Cooperation and Achievements
4: Lessons Learned and Way Forward

Section 1: State of Fisheries and Environment in the Bay of Bengal

Some facts & figures, according to BOBLME (2015) are as follows.

- Number of countries-8
- Combined coastal population-185 million
- Tropical coral reefs –3.65% of the world
- Number of fishers -3.7 million
- Number of boats-415 000
- Annual catch-6 million tons/US$ 4 billion
- Value of marine and coastal ecosystem service: > US$ 72 billion a year
- Aquaculture US$ 9.4 billion
- Fisheries US$ 32.4 billion
- Tourism US$ 18.7 billion

The future of the Bay as our common heritage is increasingly vulnerable because of:

- Fishing down the food chain
- Of the 46 commercially important species, 11 species are fully exploited and 4 are fully or over-exploited
- Over capacity of fleet
- Use of highly efficient and harmful gear

Section 2: Institutional & Governance Framework for Regional Cooperation

In the region, there are 5 institutional and governance frameworks

1. Regional Geopolitical Organizations

1) South Asian Association for Regional Cooperation (SAARC): SAARC Environment Ministers meet periodically to take stock of and further regional cooperation on environmental issues. In October 1997, during Third Meeting of the SAARC Ministers, SAARC Environmental Action Plan was adopted. Climate change and sea level rise were flagged as areas of concern. SAARC Coastal Zone Management Centre (hosted by Maldives) was created. However, SAARC Environmental Ministers have not met since 2011.
2) Association of Southeast Asian Nations (ASEAN)

2. Regional Economic Organizations

1) Bay of Bengal Initiative for Multi-sectoral and Economic Cooperation is a bridge between South Asia and Southeast Asia. In 2005, during 8th BIMSTEC Meeting in Dhaka, environment and disaster management were identified as priority areas. Fishery is another focal point of BIMSTEC (led by Thailand). Ecosystem-based Fisheries Management in the Bay of Bengal was proposed in the first meeting of the BIMSTEC Fisheries Committee in 2001.

3. Regional Sectoral Organizations (mainly environment & fisheries)

1) South Asian Association for Regional Cooperation (SACEP): Part of Regional Seas Programme of the UN Environmental Programme
2) IUCN's Mangroves for the Future
3) Regional Fisheries Organizations
4) Asia-Pacific Fishery Commission (APFIC): Umbrella organization for policy advocacy
5) BOBP-IGO: Bottom-up capacity building, policy advocacy and regional synergy & technology diffusion
6) South-East Asian Fisheries Development Centre (SEAFDEC): Capacity building, policy support & technology development
7) Indian Ocean Tuna Commission for stock management
8) Bay of Bengal Large Marine Ecosystem Project

4. International Instrument for Regional Cooperation

"It is one of the advances in maritime international law, resulting from the intensification of fishing, that the former *laissez faire* treatment of the living resources of the sea in the high seas has been replaced by a recognition of a duty to have due regard to the rights of other States and the needs of conservation for the benefit of all." (ICJ, Fisheries Jurisdiction Case, 1974)

1) United Nations Convention on Law of the Sea: according to Article 64: Highly migratory species "The coastal State

5 Director, BOBP-IGO

and other States whose nationals fish in the region for the highly migratory species…shall cooperate directly or through appropriate international organizations…to ensuring conservation and promoting the objective of optimum utilization…"

2) United Nations Convention on Law of the Sea
   a. *Article 118: Cooperation of States in the conservation and management of living resources*
   b. *Article 119: Conservation of the living resources of the high seas*
   c. *Article 123: Cooperation of States bordering enclosed or semi-enclosed seas*
3) Convention on Biological Diversity
   a. Article 5. Cooperation: Each Contracting Party shall… cooperate…, in respect of areas beyond national jurisdiction and on other matters of mutual interest.
   b. Article 17. Exchange of Information: The Contracting Parties shall facilitate the exchange of information…
   c. Article 18. Technical and Scientific Cooperation: The Contracting Parties shall promote international technical and scientific cooperation…
4) Code of Conduct for Responsible Fisheries
   a. Article 6: …In recognizing the transboundary nature of many aquatic ecosystems, States should encourage bilateral and multilateral cooperation in research, as appropriate.
   b. Article 7: …States in the case of straddling and highly migratory stocks should cooperate to ensure effective conservation and management of the resources (on transboundary stocks).
   c. Article 10: States with neighboring coastal areas should cooperate …to facilitate the sustainable use…
5) The UN Fish Stocks Agreement: Focuses on conservation and management of straddling and highly migratory fish stocks; introduces precautionary approach to fisheries management; specifies obligation of flag states–innovative enforcement provisions; promotes special needs of developing countries; paves the way for regional fisheries management organizations.
6) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES): To ensure that international trade in specimens of wild animals and plants does not threaten their survival. Provisions for penalizing non-complying parties.
7) Convention on the Conservation of Migratory Species of Wild Animals (1979): Aims to conserve terrestrial, marine and avian migratory species throughout their range.
8) The 1992 Earth summit
   a. The Rio Declaration puts 'human' at the centre of concern for sustainable development and acknowledged the sovereign right and responsibility of states to ensure controlling of damage to the environment.
   b. Agenda 21 calls for international co-operation needed for sustainable development, conservation and management of resources, strengthening of stakeholders and governance issues.
9) Sustainable Development Goals
   a. Goal 14: Life Below Water: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
   b. Goal 15: Life on Land: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
   c. Goal 17: Partnership for the Goals: Strengthen the means of implementation and revitalize the global partnership for sustainable development.
10) International Organizations
   a. Food & Agriculture Organization of United Nations
   b. Other UN Organizations: Umbrella bodies, larger policy direction, national level capacity building, technology and knowledge transfer. Recently, there is a concern that UN bodies are moving toward policy direction only while their field presence is reduced.

Section 3: Examples of Regional Cooperation

1. BOBP-IGO: Strategic Action Plan: The plan has identified the following six activities based on felt-needs.
   a. Adapting to climate change
   b. Improving MCS
   c. Livelihood
   d. Safety to sea
   e. Sea fish
   f. Adopting CCRF & promulgating EAFM. The detailed activities are presented below.

Adopting CCRF	**Promulgating EAFM**
1. A regular training programme instituted in 2008 2. Targets: junior and middle-level officials 3. Covered: Bangladesh, India, Maldives, Sri Lanka, Myanmar, Indonesia 4. 6 programmes; 120+ trained	5. Started in collaboration with BOBLME. Carried forward by BOBP-IGO 6. Regional Programmes; several national programmes; 70+ trained 7. Strategy: To develop both in-country trainers and practitioners

2. Capacity building in data collecting, collation and analysis
During regional and subsequent national MCS meeting, data collection and reporting was identified as a major short-comings
   a. Lack of fund, wherewithal and trained manpower.
   b. Lack of private-public partnership
   c. Lack of involvement of general academia
   d. This need was again reflected during CCRF and EAFM training programmes.
   e. There is also a lack of demand for data and a national level plan on utilization of data.
   f. Data and analytical reports are often not timely available
   g. A administration + R&D, Institution dialogue is often missing on developing an effective data collection and reporting mechanism.

3. Bay of Bengal Large Marine Ecosystem (BOBLME) Project: Funded by GEF, implemented by FAO from 2009-2015. The extension phase under progress & is likely to start by 2020, adopted transboundary diagnostic approach. Major threats are (1) over-exploitation of fish stocks, (2) habitat degradation, (3) pollution

4. BOBLME Phase 1 was a foundational Project
   a. Based on the need to lay the foundations for change including demonstrations of transboundary cooperation, before implementing a second phase action programme that will lead to the long-term goal relating to an improvement in the health of the Bay of Bengal and its fisheries.
   b. Focused on increasing capacity in natural resources management, increasing knowledge about the ecosystem, developing indicators for tracking changes and starting to improve ecosystem health through transboundary demonstration activities.
   c. Has two major outputs
      i. Transboundary Diagnostic Analysis – TDA: Review and analysis of the major transboundary issues and their causes
      ii. Strategic Action Programme –SAP: A strategic action plan for addressing the major transboundary issues and their causes

Section 4: Lessons Learned and Way Forward

1) Countries are more forthcoming in recognizing and discussing transboundary issues. However, actual and effec-

tive on-field examples of regional cooperation are scant.

2) Challenge in moving towards a regional cooperative arrangement.
   a. Political relations
   b. Compatibility of national objectives
   c. Lack of regional leadership
   d. Undermining importance of environment & fisheries in policy
   e. Bureaucratic inertia
3) Regional cooperation is costly…
   a. Countries need to adjust their priorities and policies.
   b. The nature of commitment of the Government also changes under a regional framework –became more binding!
   c. From data to research to policy and action–more transparency becomes necessary (owing to sharing information and knowledge).
4) Moving towards cooperation
   a. Primary level: Cooperation in research and information sharing
   b. Informal and non-binding
5) Secondary level: Cooperation in primary level + implementation & enforcement.
   a. Formal & binding.

Ramsar Regional Center–East Asia
The Area of Works and Plans for the Bay of Bengal

Norman Emmanuel C. Ramirez[6]

1. Introduction

The Ramsar Regional Center–East Asia (RRC-EA, herein referred to as the Center) is one of the regional initiatives formally recognized by the Ramsar Convention. As a Ramsar Regional Initiative, the RRC-EA was established through the initiative of the Ministry of Environment (MOE) of the Republic of Korea to serve as a regional platform for capacity building, information exchange, and cooperation among governments, international and national non-government organizations, local communities, technical experts and business organizations.

In 2009, the RRC-EA officially started operations in Changwon City with support from the MOE and the Gyeongnam Provincial Government. In January 2016, the RRC-EA office relocated to Suncheon City, after the signing of a five-year Memorandum of Understanding between the MOE, Suncheon City and the RRC-EA.

The RRC-EA works with the 17 countries in East, Southeast and South Asia that are Contracting Parties to the Ramsar Convention (Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Japan, Republic of Korea, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, and Viet Nam) and collaborates also with non-Contracting Parties in the region for further implementation of the Ramsar Convention.

2. Governance and Institutional Arrangements

The RRC-EA Steering Committee provides guidance in the development of policies and programs for the Center. It comprises the Heads of the Ramsar Administrative Authorities or their appointed representatives from the 17 countries. The Executive Director leads the day-to-day operations of the Center with support from technical and administrative officers.

The Center maintains close coordination with the Ramsar Convention Secretariat and the Ramsar Administrative Authorities to ensure complementarity of its activities with national initiatives and the Ramsar Strategic Plan.

3. Areas of Work

The RRC-EA's work mainly focuses on four areas: (1) promoting, capacity building, communication, education, participation and awareness (CEPA); (2) maintaining networks of wetland managers and wetland education centers; (3) managing the Wetland Fund; and (4) supporting the implementation of the Ramsar Convention.

3.1 CEPA

Regional training

Since 2009, the RRC-EA has organized regional level trainings for wetland managers annually. It is a five-day training basically consisting of four sessions: (1) information and experience sharing, (2) seeking solutions on common and site-specific problems, (3) lectures of wetland experts, and (4) field visit. More than 300 wetland managers have benefitted from the training and improved their knowledge and capacity on wetland management. The training also provided opportunities for cooperation between wetland managers. The selection of participants is not based on current job or affiliation. The training is open to all interested individuals who work closely on wetland conservation and management. As of now, the Center has already organized 10 regional trainings.

National Training

While organizing the regional level trainings, the Center realized that only limited numbers of wetland managers were able to participate in the trainings because of language issues. To provide equal opportunities for education and capacity building to wetland managers who are not very adept in English, the Center developed a new training module called "National level training" or "Local language training" for wetland managers. This approach allows for the use of national language as the medium of communication during trainings. To date, the training has been effective in delivering messages to the participants and in encouraging communication among themselves to understand issues better and to reach agreements. The Center has completed trainings in Bangladesh, Bhutan, Cambodia, Indonesia, Mongolia, Myanmar, Thailand and Viet Nam.

Subregional training

In recent years, the Center observed that there is a gap in terms of the scale of its capacity building interventions. Thus, the it introduced subregional trainings for wetland managers as capacity building support in between the regional and national levels. These subregional trainings targets transboundary wetlands and help strengthen cooperation among stakeholders in the Yellow/West Sea (Republic of Korea, China and Democratic People's Republic of Korea), Lower Mekong River (Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam), and the Bay of Bengal (Bangladesh, India, Indonesia, Myanmar and Sri Lanka). The Center organized a subregional training for wetland managers in the Yellow/West Sea in 2018.

Training Module Development

The RRC-EA develops training modules to institutionalize capacity building support for wetland managers and stakeholders. Video lectures on the Ramsar Site Management Effectiveness Tracking Tool (R-METT) and Rapid Assessment of Wetland Ecosystem Services (RAWES) have been developed as products of the Center. These videos are accessible through YouTube and the website.

3.2 Youth Model Ramsar Convention

The Youth Model Ramsar Convention (YMRC) aims to raise the awareness of the youth and future generations about wetlands. The Model is designed to simulate the basic proceedings of a Ramsar COP and targets high school students from across the Republic of Korea. The YMRC is a Ramsar COP for students. Students attending the YMRC play different roles such as Secretary General, Deputy Secretary General, delegates, journalists and volunteers, among others. Participants learn negotiation skills and practice teamwork. Applying the basic rules of procedure for Ramsar COPs and formulating COP resolutions are some features of the YMRC. Around 200 students participate in the YMRC every year.

World Wetlands Day

The Center supports the World Wetlands Day (WWD) celebrations by producing posters, pins, brochures, hand fans and eco-bags that promote the WWD and the Ramsar Convention. The Center collaborates with the Kia Tigers professional baseball team to promote the global event by hosting a nationally televised ceremonial pitch and hit, and by providing a venue for distributing WWD materials to spectators of baseball games. The Center and Kia Tigers organized two events, one each in 2017 and 2018.

6 Program Officer, Ramsar Regional Center – East Asia

Translation of Ramsar Guidebook

In 2017, the RRC-EA published the Ramsar Guidebook "Designation and Management of Ramsar Sites" as part of the RRC-EA guidebook series. This publication provides simplified information on the process to designate Ramsar Sites in order to highlight the various linkages between the designation and management stages. It is written for wetland managers and site-level stakeholders in a simple non-technical language. In 2018, the Center supported the translation of this guidebook from English into nine languages of the countries: Cambodia, China, Indonesia, Republic of Korea, Lao PDR, Mongolia, Myanmar, Nepal and Viet Nam.

Website and Web Magazine

The RRC-EA website is continuously being maintained which uploads new developments on its own and partner's activities. Such information is also published in the quarterly web magazine. The web magazine features articles related to the World Wetlands Day theme, updates on its activities, Wetland Fund projects, and introduction to wetland experts.

3.2 Network of Wetland Managers and Wetland Education Centers

The establishment and maintenance of a regional communication platform and network of wetland managers and wetland education centers is expected to facilitate the effective exchange and dissemination of information related to wetland conservation, management and restoration. The Center hosts an online communication platform where innovations and good practices can be shared by wetland managers.

By virtue of a Memorandum of Understanding between the RRC-EA and Wetland Link International, the Center assumed the role as focal point for Wetland Link International (WLI) in Asia. Wetland Link International (WLI) is a global network for wetland education centers with 350 members over 6 continents that undertakes various activities on site.

As "WLI-Asia", the RRC-EA will directly connect with WLI-Asia members to reinvigorate the network and to provide further assistance in the development of wetland education centers. At the moment, the RRC-EA has prioritized East and Southeast Asian countries in its initiatives as WLI-Asia. It organized the 6th WLI-Asia Conference in November 2017 and plans to hold the 7th WLI-Asia Conference in December 2019. The RRC-EA has also recently published the first edition of the "Wetland Centers in Asia"– a book that introduces 43 wetland centers in East, Southeast and South Asia.

3.3, Wetland Fund

The RRC-EA supports the implementation of wetland conservation projects through its Wetland Fund. The Fund is a grant program that provides complementary support to ongoing and planned national wetland initiatives as a contribution of participating Contracting Parties to the implementation of the Ramsar Convention.

The grant program generally finances projects aligned with two thematic areas: (1) wetland conservation and wise use, and (2) celebration of WWD, including research studies that can influence policy development and national and site level measures related to wetland management, conservation and restoration.

The Wetland Fund helps grantees gain the track record and experience in developing and implementing short term and small-scale projects to prepare them for access to larger grants from donor organizations in the future. As of 2018, a total of 46 projects from 14 countries in East, Southeast and South Asia have been implemented.

3.4 Support to the Implementation of the Ramsar Convention

Being a recognized Ramsar Regional Initiative, the Center maintains cooperation and linkages with the Ramsar Secretariat and with Ramsar National Focal Points to ensure that the initiatives of the Center are in synchronization with global and national commitments and developments. It is the goal of the Center to provide the highest quality of services to countries with the use of up-to-date information as a contribution to the effective implementation of the Ramsar Convention.

The Center mobilizes CEPA National Focal Points as well as STRP National Focal Points by way of online or face-to-face workshops to facilitate the exchange of ideas and experiences in the wise use and conservation of wetlands in East, Southeast and South Asia. The Ramsar Convention tools and guidelines are also being promoted and developed by the Center for the use of wetland managers.

The Center participates in Meetings of the Conference of the Contracting Parties to the Ramsar Convention (Ramsar COP) to promote its accomplishments and contributions. It also assists Contracting Parties in the development of relevant COP resolutions. During the recent Ramsar COP13, the Center organized two (2) side events: (1) Wetland City Accreditation of the Ramsar Convention: Strengthening Sub-National Government Support for Wetland Conservation and Wise Use, and (2) Promoting the Values of Wetlands through the Rapid Assessment of Wetland Ecosystem Services and Good Practices on Sustainable Urban Wetlands in Asia.

Ramsar Site Management Effectiveness Tracking Tool

The Ramsar Convention encourages the Contracting Parties to adopt approaches for the wise use of wetlands, to designate suitable wetlands for inclusion in the List of Wetlands of International Importance and to ensure that these wetlands are effectively managed. In order to achieve these, periodic assessment of the effectiveness of wetland management is encouraged. Such assessments look into the past and the current management practices and systems to determine areas for improvement as well as identify good lessons.

A number of assessment tools and methodologies have already been developed and used for protected areas. The Ramsar Site Management Effectiveness Tracking Tool (R-METT) developed by the World Wide Fund for Nature (WWF) and the World Bank is one of the most widely used management effectiveness assessment tools.

The Contracting Parties to the Ramsar Convention recognized the need to develop a customized METT for Ramsar Sites. In June 2014, the Ministry of Natural Resources and Environment of Thailand, the Ministry of Environment and the Gyeongnam Province of the Republic of Korea, and the RRC-EA jointly organized a workshop in Thailand to adapt the METT for the specific Ramsar Sites.

Through Resolution XII.15, Ramsar COP12 formally adopted the Ramsar Site Management Effectiveness Tracking Tool (R-METT) and encouraged the Contracting Parties to use the R-METT in evaluating the management effectiveness of Ramsar Sites. The Center is regularly promoting the use of the R-METT through its CEPA program.

Rapid Assessment of Wetland Ecosystem Services

Wetlands are ecosystems that include inland waters, and coastal and marine areas. They offer a broad range of benefits to society and the economy. But similar to other ecosystems, wetlands are also facing threats that lead to the loss of wetland functions. Wetland degradation does not only negatively impact on biodiversity, but also on the livelihoods of communities residing within and adjacent to wetlands. Consequently, these impacts are experienced as well by the general populace who enjoys the benefits derived from wetlands.

Considering the multitude of development needs of the society, national and local governments are responsible for prioritizing sectors for the corresponding policy support and financial

resources. Wetlands often receive less recognition due to the low awareness of policy and decision-makers on the value of wetlands and wetland ecosystem services. Thus, it is necessary to work towards improving the understanding and appreciation of policy and decision-makers with regard to wetland benefits.

In Ramsar COP11, the Contracting Parties adopted Resolution XI.8 and agreed to revise the recording of information for the Information Sheet on Ramsar Wetlands (RIS) by elaborating and describing fully the elements of the ecological character and the ecosystems provided by the wetland.

In this context, the Center, together with the Ramsar Convention Secretariat and technical experts, has developed a simple yet reliable Rapid Assessment of Wetland Ecosystem Services (RAWES). By using the RAWES, wetland managers can:

- facilitate the integration of ecosystem services in wetland management plans
- help improve the effectiveness of wetland management with more comprehensive information at hand
- update and provide more detailed information on wetland ecosystem services in the RIS
- clearly define and disseminate the benefits of wetlands to key wetland stakeholders, especially to policy and decision-makers, and
- have an alternative option to carry out an ecosystem services assessment that is not time-consuming and costly

4. Plans for the Bay of Bengal Region

Following the Yellow/West Sea and Lower Mekong River, the Center intends to hold its next sub-regional training in 2020 that will focus on priority issues of the Bay of Bengal. The Center partners will be involved and mobilized in organizing this event. The subregional training will highlight case studies of other transboundary wetlands, which the Bay of Bengal stakeholders may learn from.

Community-based Coastal Wetlands Management under the Mangroves for the Future Initiative

Raquibul Amin
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1. Introduction

The Mangroves for the Future (MFF) initiative was initiated in response to the devastation of the 2004 Asia Tsunami, with a focus on ecosystem restoration and livelihood diversification in six countries. Over the years the program has evolved into a unique strategic partnership working to promote sound coastal resource management policies and practice, strengthening the resilience of coastal resource-dependent communities in 11 countries throughout the Asia region. The programme is co-chaired by IUCN and UNDP and has more than 300 institutional and implementing partners. Strategic guidance is given to the MFF program by a Regional Steering Committee (RSC) and in each partner country implementation is overseen by National Coordinating Body (NCB) with representatives from government, civil society organizations and private sectors. MFF supports a grant facility to encourage the local community to take actions on the ground and develop replicable models for building coastal resilience.

The MFF has been in operation in Bangladesh since early 2013. The MFF Bangladesh's focus is on building coastal community resilience and promoting an ecosystem-based approach to climate change adaptation. Future scope of the country program, as identified by the NCB is the conservation of the Bay of Bengal and adjacent coastal areas in Bangladesh and promote sustainable development and partnerships. The Conservation of coastal wetlands has been one of the focuses of the MFF in Bangladesh within the larger context of coastal governance. Two successful cases of coastal management from Shyamnagar Upazilla (sub-district) are elaborated in this brief paper.

2. Social-Ecological System and Stakeholder Engagement

The MFF adopted a social-ecological system approach and actively tried to influence changes in norms and practices that cause detrimental environmental impacts, and encouraged actions for win-win outcomes for both social and ecological systems. The MFF's Social-Ecological System (SES) approach focuses on the dynamic linkages between the social, which includes the economic aspects, and ecological/environmental attributes. All MFF grant projects were planned to have multiple and linked to social and environmental results. All 16 grant projects implemented in Shyamnagar, a sub-district near the Sundarban mangrove forest and facing the full brunt of climate change impacts, resulted in positive social and ecological outcomes. In the heart of the social-ecological system approach is the proper stakeholder engagement. Stakeholder engagement was carried out at multiple levels. At the national level, policymakers were engaged through the National Coordinating Body (NCB) headed by the Secretary of the Ministry of Environment, Forest and Climate Change. The NCB decided the geographic area where the MFF grant projects would be implemented. Field project selection is guided by findings of a comprehensive participatory site assessment in accordance with the MFF Resilience Protocol which allows extensive dialogues with the men, women, youth, professionals, local leaders, NGOs, CBOs, and government officials and promoted a shared understanding of the site-specific context, issues, and problems and a shared vision for a resilient community. Based on a call for concept notes, the grant projects were subsequently awarded to local NGOs/CBOs addressing the identified problems and contributing to achieving the shared vision.

The shared vision is supported by a Citizen's Action Plan that captures the aspirations of a large number of people for sustainable development and ecosystem protection. It includes simple actions that can be taken by local actors like Union Parisad (smallest administrative unit), Upazilla (sub-district) Parishad, local NGOs and community people themselves. Consequently, it influenced three local Union Parishads of Shyamanagr to include activities like mangrove rehabilitation and integrated water and farm management in their annual development plans. The shared vision for a resilient Shyamnagar helped the MFF to implement the grant projects more strategically. One of the best results that emanated from the shared vision and citizen's action plan was the rehabilitation of mangroves in fallow lands under a co-management system involving the local community, Union Parishad and Forest Department. Another example is the retrieval of a derelict canal from "elite capture" and excavating it to render it as a common pool resource.

Figure 1&2: Transformation facilitated by MFF (2013-2017).

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3. Community based Mangroves Rehabilitation

The MFF supported a GIS mapping study to find out suitable areas for mangrove rehabilitation and the tenure system to support the people's vision of a resilient Shyamnagar. Sora village under the Gabura union was identified to pilot the mangrove rehabilitation activity. The MFF grantee CNRS facilitated dialogues among village communities, local Union Parisad (UP) and Forest Department who agreed on a shared governance structure and benefit sharing mechanism. A 35 member's Village Conservation Forum (VCF) was established, and it was agreed that community would receive 40% of benefits (from fruits, honey, fuel woods, and mangroves nursery), UP would get 40% and the rest 20% would be used to maintain the forest. The model was first piloted in 25 ha. The MFF has further upscaled the model through allocating medium grant to Sushilan. The village conservation forums are now under the supervision of Sundarban Co-management Committee, which is a formal body recognized under the Protect Area Rule.

The idea of planting mangroves in coastal area is not new, but the governance mechanism is an invention from the MFF. It has become a replicable model of mangrove rehabilitation in Shyamnagar and beyond. The MFF supported rehabilitation of 100 ha through its small and medium grant projects. Climate Resilient Ecosystems and Livelihoods (CREL) - a project of the Forest Department funded by USAID came forward to leverage their investment and rehabilitated more than 300 ha. The mangroves now look like a natural forest and provides shelter for fishes and birds. The village Gabura has now become less vulnerable to erosion and tidal surges. Gabura has transformed from a vulnerable island to a resilient island with mangroves all around protecting its fragile embankment. The MFF-VCF earned BDT 0.25 million by selling mangrove saplings to CREL project in 2014. Villagers reported that illegal entry to Sundarban has decreased. An average person (usually women) catches post-larvae of fish, crabs and shrimp worth about BDT 200/day - this income is well comparable with what they use to get from the Sundarbans.

The institutional arrangement for a shared governance mechanism is a new lesson learned from the MFF intervention. The involvement of local communities along with Union Parishad was the key to develop local ownership and ensure the sustainability of the initiative. On the technical side, the Assisted Natural Regeneration (ANR) of mangroves was found cheaper and more efficient method compared to seedling raising and planting. The land tenure map provided an excellent insight on land use and avoids future conflict. The MFF mangrove rehabilitation model should be adopted as a best practice of Ecosystem-based Adaptation (EbA) and disaster risk reduction strategy in char land. However, more advocacy with the government agencies and political leadership is needed to mainstream the model.

4. Equitable water governance brings prosperity to Sabkhali, Shyamnagar

Figure 3: Status of canal in 2012

Figure 4: The canal in 2014 during the re-excavation.

Figure 5: The canal in 2016: These chicken coops, as well as the saplings further up the bank, are part of the new integrated farming methods introduced through the MFF

Sabkhali is an agricultural village highly vulnerable to climate change and tidal surges, salt water intrusion, and water logging. Two consecutive cyclones in 2007 and 2009 worsened the situation. There is severe shortage of freshwater. A handful of farmers could grow only rain-fed rice with the little water that could be stored in the only remaining natural canal that flows through the village. Most part of the canal was silted up and illegally occupied by local elites. For the rest of the year, life was very hard for the marginal farmers from Munda indigenous people and local community.

In 2014, the MFF teamed up with Caritas, a global confederation of Catholic relief, development and social service organization, to support community-based water and farmland management projects, with the ambition that this would help Sabkhali farmers improve their resilience and food security. Through the project, a group of villagers re-excavated the 2 km-long canal, improving its capacity to store rain water. Women were trained to start small business to earn a living.

The Sabkhali community established a democratically elected executive committee that would equally distribute irrigation water and land for the 360 farming households to use water in the winter. This way, everyone gets an equal share of water as a common pool resource, access to land for cultivation, and an opportunity to earn a living. Women in Sabkhali hold one of the largest stakes in effective water governance, and the gender composition of the executive committee was designed to reflect this. By the end of the project in 2017, they made up 50% of the cooperative.

To ensure that siltation in the canal continues to be kept under control, the community also created a fund which farmers contribute to equally. Crop production has also doubled in last three years. Fish farms were set up; wheat, vegetables and watermelon were introduced as less water-intensive crops; and attempts were made to introduce sheep and poultry. Around 800 kg of fish were produced in 2017. Due to increased availability of fresh water, the varieties of fish and birds in the canal and the farmland have increased in the last three years. The farmers have also planted more than 2,000 salt-tolerant fruit saplings

along the dykes of the canal, creating a greener landscape. Due to increased salinity levels after cyclone Aila, grasses disappeared from the croplands in the area adjacent to the canal. Since 2015, the grasses have started to reappear, indicating reduced soil salinity as a result of better irrigation. Re-excavating the canal has proved particularly beneficial to women, who were previously forced to walk miles to collect water for household use, and now only need to walk a short distance to the canal. With more free time, women have been able to participate in decision-making processes regarding their vital resources.

With the MFF's support, the small enterprise groups have also linked with the government's poverty eradication program, the *Ekti Bari Ekti Khamar* Project, run by the Palli Sanchay Bank (PSB). This is a microfinance scheme in which the bank provides a loan, equal to a community organization's deposit, at 1% interest. All six community enterprises registered with the PSB, allowing them to continue scaling up their activities even after the project had officially closed.

The MFF initiative has demonstrated how coordinated action at the community level can be successful and sustainable. The Ministry of Disaster Management and Relief has recognized this model as a disaster risk reduction strategy and requested that two Union Disaster Management Committees in Shyamnagar scale up their interventions. The MFF Bangladesh National Coordinating Body (NCB) and the Ministry of Environment and Forests have discussed the reclamation of canals and other common pool resources in other coastal areas, and have advocated for community-based management of these resources.

Conclusion

Resilience analysis processes that the MFF adopted provided the community, local leaders and duty bearers space for dialogue to analyze the problems, develop a shared vision and detail the strategies to achieve the vision. The visioning exercise was found to be a powerful tool to encourage actions among the community members and establish ownership of the MFF supported interventions. The context-specific strategies that people developed and later implemented by the MFF through local partners were simple but innovative, and they provided tangible benefits, such as access to safe drinking water, and protection of embankments with mangroves. In summary, understanding the complex web of problems and their root causes, allowing the community to develop local solutions and innovations, constructing a shared vision for a positive future, linking local people with duty bearers and national policymakers were a few factors that facilitated the positive outcomes in Shyamnagar. The model is available for any interested actor to replicate and scale up in other coastal areas of Bangladesh and beyond.

Geo-Morphological Evolution and Coastal Dynamics along the Coastal Shoreline of the Bay of Bengal in Relation to Climate-induced Disaster Fifty Years of Human-Nature Interaction

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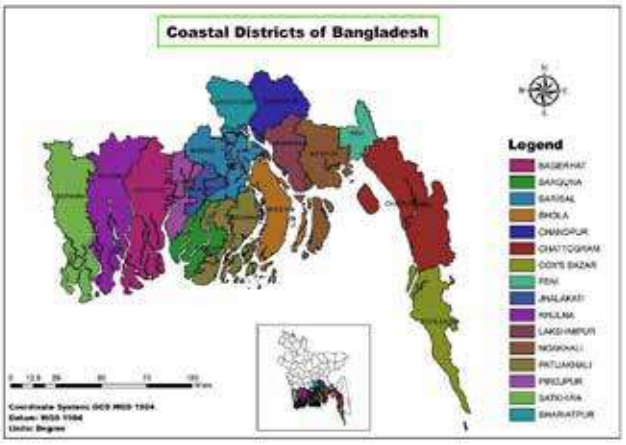
Abstract: This paper draws upon the application of Remote Sensing (RS) and GIS techniques to investigate the dynamic nature of coastal geomorphological features along the coastal belt of Bangladesh. The paper also investigates changes of land uses (vegetation, settlement pattern, agricultural land, water bodies) in course of time using RS and GIS for the last fifty years. It also made efforts to find out scenario of land erosion and land accretion along the coastal shoreline of the Bay of Bengal which demark the changes of shoreline as well as nature of the Bay. The study is intended to draw a scenario of human-nature interaction aligned with geomorphological dynamics and sea level changes caused by climate-induced extremities. The geomorphological characteristic of the coastal areas of Bangladesh is highly dynamic where geological subsidence and rising sea level is experienced in the last fifty years along with land erosion and accretion with different rates remain a constant phenomenon. This study focuses on the whole coastal zone including western, central and eastern which comprise the 720 km coastal area of the country. This study uses the past 25year Landsat satellite images and sea level data. This research shows that the rate of accretion and erosion are changing coastal geomorphological features in the whole coastal shoreline and also reshaping shore characteristics especially in the central coastal area. It also reveals that river trajectory is changing with notable characteristics in the coastal districts especially in the western and central coastal districts which is is reshaping the human settlement pattern, vegetation coverage especially the unique mangrove forest Sundarbans and agricultural lands in the whole coastal areas. Overlaying geological subsidy and sea level rising data, the study shows that western coastal region is going to be dried up in the next 25 years. That is why saline characteristics will reduce suitability for mangrove in the Sundarbans areas which is major threat for existence of the unique mangrove forest Sundarbans. On the other hand, overlaying geological subsidy and sea level rising data, the study illustrates that the eastern coastal region will submerge due to increasing tidal inundation and will go to permanently under the water logging condition in the next 25 years for which the climate-induced factors will be placed in the forefront for the whole eastern coastal districts. The existence of the Saint Martin, the only coral reef island of Bangladesh is under threat for this climate- induced sea level rise and geological subsidy experience.

1. Introduction

The coastal regions of Bangladesh are disaster prone due to its geographical location. Climate induced natural disasters like severe cyclone, shocking tidal surges, severe floods, underhanded river erosion, excessive rainfall, overwhelming salinity intrusion, sea level rise etc. are occurring more frequently in greater intensities along with prominent human activities. On the other hand, coastal shoreline is geologically dynamic in terms of subsidence and uplifting characteristics. Sea level rise, bank erosion overlaying with subsidence and uplifting, coastal shoreline along the Bay of Bengal is changing continuously and forming diverse new land forms, changing land use patterns, changing vegetation coverage, changing river morphology as well as river trajectory which tends to change human settlement.

2. Methodology for Land Use Mapping

The study was conducted along the coastal belt of Bangladesh containing 16 coastal district adjacent to the shoreline of the Bay of Bengal including Bagerhat, Barguna, Barisal, Bhola, Chandpur, Chittagong, Cox's Bazar, Feni, Jhalakathi, Khulna, Laxmipur, Noakhali, Pirojpur, Patuakhali, Satkhira and Shariatpur (map 1) through analyzing Landsat Satellite images for the period of 1994 to 2019 for land cover mapping in terms of agricultural land use changes, changes of human settlement pattern, dynamics of vegetation coverage and changing characteristics of water bodies. The Landsat data (1994 and 2019) have been acquired from the U.S. Geological Survey Earth explorer interface. The table below shows the details of the Landsat Satellite images used for analysis:



Map 1: Study area

Satellite/Sensor	Date of Acquisition	No. of Bands	Resolution(m)
Landsat-7, ETM+	January 1994	8	30
Landsat-8, ETM+	January 2019	8	30

The supervised pixel-based classification was conducted in the Erdas Imagine platform for which 'training sites' (the areas defined for each land cover type within the image) are required. We used Google Earth, which is free (even if proprietary), easy to use, and includes very high-resolution imagery for the historical time period for assisting to identify appropriate training sites. A unique identifier is assigned to each known land cover type. Four land cover types have been identified for this study:

Land Cover Type	Description
Agriculture	Areas covering lands used for agricultural production i.e. paddy and seasonal crops.
Vegetation	Areas covering home and village-based vegetation.
Human Settlement	Areas indicating built up area.
Water bodies	River and relevant water areas.

Sea level data for the same period was analyzed for the Hiron Point, Charchenga and Bakkhali river point extracting from University of Hawai Sea Level Center. The project as made overlaying seal kevel rising data with geological subsidence and uplifting information of coastal area of Bangladesh for the three coastal regions namely western coastal region, central coastal region and eastern coastal region.

3. Sea Level Rise and Geological Dynamics of Coastal Region of Bangladesh

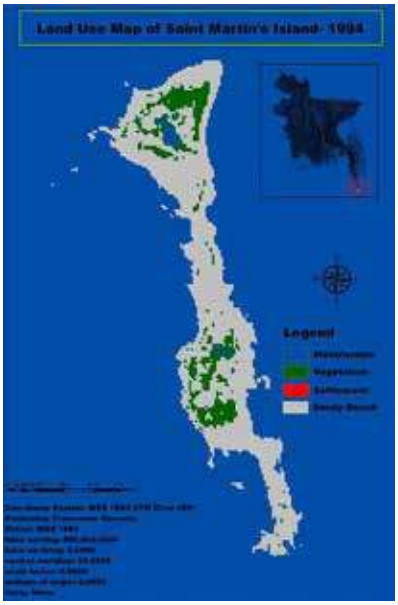
The physical geography of Bangladesh's coastal area is more diverse and dynamic than is generally recognized. Failure to recognize this has led to serious misconceptions about the potential impacts of a rising sea-level on Bangladesh with global warming. This situation has been aggravated by accounts giving incorrect information on current rates of coastal erosion and land subsidence. It is found through analyzing sea level data for the period of 1983 to 1999 that the average sea level rising trend of Charchenga point of Hatiya is 11.8 mm for 20 years (Figure 1). At the same time, according to Bramar, 2017 geological uplifting was observed in this point is .018 mm for each year which account of 8.36 mm for this same period. As a result, in the last 20 years, net sea level rise observed in this point is 2.94 mm which causes regular tidal flooding in Hatiya along with the river bank erosion at the increasing rate. As a result, human displacement is at larming rate in Hatiya Island.

Figure 1: Sea level rising in Charchenga point (1983-1999)

SLR has the potential to interact with the coastal zone in a number of ways including inundation, erosion and salt water intrusion. Inundation and intrusion will clearly be affected by the relatively slow increases in mean sea level over the next century and beyond. The characteristics of extreme sea level rise events are dependent on the atmospheric storm intensity and movement of coastal geometry.

4. Changing land Cover

In the study area of Saint Martin Island, the only coral reef island of Bangladesh under Cox's Bazaar district; changing trends of vegetation coverage, water bodies, sandy beach and settlement pattern changing characteristics were measured for the period of 1994 to 2019 (Map 2 and Map 3) and it is found that vegetation coverage are decreasing at an alarming rate. The study reveals that in 1994 there was 230 ha of vegetation but it stands at only 125 ha in 2019 as well as in each year the Saint Martin Island is losing vegetation coverage at a rate of 4.2 ha. If the island loses by this rate then within 30 years as well as at 2050, the Saint Martin Island will be a barren Island. Though the island is covered by the Bay of Bengal but in 1994 it was found that there was 85 ha water bodies inside the island which stands at 30 ha in 2019. At the same time, sandy beach reduced 15.2 ha for each year on an average in the last 20 years but settlement is increasing at the rate of 8.4 ha in each year in the last 20 years and it may be concluded that within 50 years the island would be full of human settlement if the settlement increasing rate continues at this rate (Table 1).



Map 2: Land cover in Saint Martin Island (1994)

Map 3: Land cover in Saint Martin Island (2019)

Land Use	1994(Ha)	2019(Ha)
Vegetation	230	125
Water bodies	85	30
Sandy Beach	560	256
Settlement	22	190

Table 1: Land use change in Saint Martin Island

Part II: Wetlands & Disaster Risk Reduction

Wetlands and Disaster Risk Reduction in Bangladesh

Sanowar Hossain[8]

1. Introduction

Bangladesh possesses enormous area of wetlands including rivers and streams, freshwater lakes and marshes, *haors, baors, beels*, water storage reservoirs, fish ponds, flooded cultivated fields and estuarine systems with extensive mangrove swamps. The haors, baors, beels and jheels are of fluvial origin and are commonly identified as freshwater wetlands. These freshwater wetlands occupy four landscape units - floodplains, freshwater marshes, lakes and swamp forests. Bangladesh is estimated to possess seven to eight million hectares of wetlands in the form of permanent rivers and streams (480,000 ha), estuarine and mangrove swamps (610,000 ha), shallow lakes and marshes (120 000-290 000 ha), large reservoirs (90,000 ha), small ponds and tanks (150 000-180 000 ha), shrimp ponds (90000-115000 ha) and seasonally flooded flood plains (5,770,000 ha).

Haors, which are bowl-shaped depressions between the natural levees of a river subject to monsoon flooding every year, are mostly found in the eastern region of the country, known collectively as Haor basin covering an area of approximately 24,500 km2. There are altogether 411 haors comprising an area of about 8000 km2 dispersed in the districts of Sunamgonj, Sylhet, Moulvibazar, Hobigonj, Netrokona & Kishoreganj.

Beels are large surface waterbodies that accumulate surface runoff water through internal drainage channels; these depressions are mostly topographic lows produced by erosions and are seen all over Bangladesh. Beels are small saucer-like depressions of a marshy character. Many of the beels dry up in the winter but during the rains expand into broad and shallow sheets of water, which may be described as fresh water lagoons. In the active floodplains of the Surma-Meghna, the Brahmaputra-Jamuna, and the Ganges-Padma river systems, there are several large and small beels. In Bangladesh, there are thousands of beels of different sizes. Some of the most common names are Chalan Beel, Chand Beel and Arial Beel. Most of these large beels have shrunk quite considerably in recent decades. Beels are mainly fed by surface runoff water. A few larger ones are fed by floodwater during the wet season from the parent river channel. Normally, beels remain deeply flooded for most of the wet season.

Baors are oxbow lakes, formed by dead arms of rivers and are situated in the moribund delta of the Ganges in western part of the country. In Bangladesh, oxbow lakes are quite visible in the older floodplains. Locally, the feature is also known as beel, baor, and jheel. Usually, oxbow lakes are deeply flooded during the monsoon, either through local rainfall and runoff water or by river flood. During the monsoon season oxbow lakes act as local water reservoirs, and help control the local flood level. In some areas, these lakes serve as valuable sources of irrigation during the dry season.

The Haor, Baors and Beels play an important role in the ecology, economy and livelihood of the country. Those wetlands have been highly explored for a long time; during the 1990s the nation realized the needs of resource management seriously and from then the management and conservation of those water bodies got priority. Though the status of wetland management initiatives is not in satisfactory level but in some cases the success is appreciable and can be followed for the management of different lake basins considering the socio-economic and ecological contest and with adaptation if necessary.

Wetland resources: The life and livelihood on Bangladesh is dependent on the wetlands. The lakes are the source of fisheries, aquatic vegetation and other biodiversity, irrigation, navigation, flood control, etcetera. About fisheries resources, some 260 species of freshwater fishes are found in the inland water bodies of Bangladesh. Inland fisheries alone cover an area of 4.3 million hectares of which 94% comprise open water capture fisheries, and only 6% closed water system. The haors, beels and baors offer tremendous scope and potential to augment fish production by adoption of culture-based fishery enhancement technique. Sixty three species of fishes were recorded from the water bodies of Chanda Beel. The haors, beels and baors are the main source and reserves of the brood stock of fish. Tangua is one of the famous breeding ground for native crabs and flat fishes (Chital) of the country.

Water-body	Hector
(a) Inland open water	
(1) Rivers (During dry sea)	
Ganges	27,165
Padma	42,325
Jamuna	73,666
Meghna (upper)	33,597
Meghna (lower)	40,407
Other rivers and canal	262,580
Sub-total	**479,735**
(2) Estuarine area	551,828
(3) Beels and haor	114,161
(4) Kaptai lake (man-made)	68,800
(5) Inundable floodplains (seasonal)	5,486,609
Sub-total	**6,221,398**
(b) Close water-body	
(i) Ponds and tanks	146,890
(ii) Oxbow lakes	
(iii) Brackish water farms	260,378
Sub-total	515,268
(c) Marine-water Exclusive Zone	7,000,000

2. Threats to the Lakes of Bangladesh

Almost every lake of Bangladesh is under threat. There is huge population pressure, climate change impact and development interactions. The following are the major threats to the lakes of Bangladesh: 1. disappearance, 2. pollution, 3. over-harvesting of the natural resources, 4. land use conflict, 5. lack of upstream water flow in winter, 6. over-flow of water in monsoon, 7. increase risk of flood, 8. entrance of saline water due to lack of water flow in winter.

Degradation of Lakes

- Degradation of wetlands has caused several problems including
- extinction and reduction of wildlife
- extinction of many indigenous wild and domesticated rice varieties
- loss of many indigenous aquatic plants, herbs, shrubs and weeds
- loss of natural soil nutrients
- loss of natural water reservoirs and of their resultant benefits
- increase in the occurrence of flooding and degeneration of wetland-based ecosystems, occupations, socio-economic institutions and cultures

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3. Climate Change and Disaster Impact in Wetlands

Extreme Weather: Climatic haphazard and weather calamities play a severe damage of wetland ecosystem and biodiversity. Small beels are being drained annually to increase catches, and this has been increasing the rate of sedimentation. Severe soil erosion in the water catchment areas of all the great rivers has resulted in greatly increased rates of siltation, and this has now become a serious problem at many of the wetlands. At the same time, flash floods have become a common phenomenon and these now cause considerable damage to rice paddies at the beginning of every monsoon season. Reed beds severely disappeared or become very rare, probably due to a combination of over-utilization (of useful species) and changes in water quality (leading to poorer light penetration). Run-off during exceptionally heavy rainfall occurring in neighboring upland areas is responsible for flash floods. Such floods occur as waters from the hilly upstream rush to the plains with high velocity, mauling standing crops and destroying physical infrastructure. Flash floods cause extensive damages to crops and property, particularly in the haor areas. Around 4000 km2 area of southeast and 1400 km2 area of north-east Bangladesh are subject to flash flood. For crops, it is their timing which is usually most important. Early floods (in April-May) generally cause severe damages. Hydrologic alterations due to frequent natural calamities cause deposition of fill material for development, drainage for development, farming, and mosquito control, dredging and stream channelization for navigation, development, and flood control, diking and damming to form ponds and lakes, diversion of flow to or from wetlands.

Amphibians, reptiles and mammals have all reportedly decreased significantly in numbers, mainly due to habitat destruction, but also due to storm surges, cyclones (Sidr, Aila, Nargis and others), Crop loss was found to be rather high during the months of *Choitra* (March-April), *Baishakh* (April-May) and *Jaistha* (May-June) due to lack of adequate rainfall, drought conditions, or because of hailstorms. Major crop damage is expected in *Bhadra* (August-September) and *Aashwin* (September-October) due to excessive rainfall and cyclonic storms. A lower level of crop loss in *Srabon* (July-August) could be expected due to rainfall induced water logging, since transplanting *Aman* paddy becomes difficult in inundated low lying lands, which has a great potential to reduce yield for late transplanting of the seedlings. The frequent cyclone is causing loss of vegetation and erosion in Sundarbans which are the coastal mangroves that straddle the coasts of western Bangladesh and neighboring India.

Drought: In terms of magnitude drought exhibits a pronounced spatial distribution in Bangladesh. The western parts of the country receive less rainfall averaging some 1400 mm as against the national average of about 2150 mm. As a consequence, susceptibility and severity of drought in the western districts are much higher than elsewhere. Characteristics of moisture retention capacity and infiltration are damaged due to high prevalence of droughts which was observed in the western districts of Rajshahi, Bogra, Pabna, Dinajpur, Rangpur and Kustia. Drought occurred during the late rainy season and caused a net reduction of rice production. The recorded dryness in the winter for many of the eastern wetlands of Bangladesh is much higher than the previous record and also caused lack of upstream water flow in winter.

Salinity Intrusion: Ingress of salinity is a major problem in coastal Bangladesh. Diminished flow in the dry season allows salinity to penetrate far inland through this estuarine river system. Salinity limits opportunities for supplemental irrigation of rice crops in freshwater areas and damages the same crops by flooding during very high tides. The upland progression of saline water during the dry season eliminated surface water potentials for significant land areas in the southwest, south-central and southeast regions. The increased salinity has affected the natural regeneration of mangroves, and in some areas there is now no regeneration at all. The density of Spotted Deer in Sundarban appears to be lower in western areas, where salinity is highest, than in the east where it is lowest. Salinity was reported from many of the closed water wetlands of southern Bangladesh, including the beel basin of Gopalganj and Masura districts.

Role of Wetlands for Disaster Risk Reduction

Naoya Furuta[9]

IUCN started to work on the issue of Disaster Risk Reduction since 2004 when the Western Indian Ocean earthquake and Tsunami occurred. After this tragic event, it was reported that impacts of the Tsunami were significantly reduced in areas where natural defense such as mangrove forests or sand dunes existed. For example, one of the coastal resorts in Sri Lanka that was built behind the coastal dunes and vegetation was not affected by the Tsunami and only 5 cm high wave reached to the resort.

On the other hand, in the close area to that, the whole coastal resort was destroyed by the Tsunami and 27 people lost their lives. The reason for this tragedy was that this resort destroyed sand dunes and vegetation and was built in front of the sea to have a good ocean view for the visitors. And Tsunami hit directly to the resort. Based on these observations at the Indian Western Indian Ocean Tsunami in 2004, IUCN experts in CEM (Commission on Ecosystem Management) started to discuss the important role of ecosystem management for Disaster Risk Reduction and coined the new term Ecosystem-based Disaster Risk Reduction or Eco-DRR in short [1].

The number of disaster events have increased significantly since 1980s, mainly those events due to either meteorological & hydrological or climatic reasons. Of course we would immediately assume that this rise is due to climate change impacts but the answer is also that there are more people living in areas that are impacted by such hazard events, such as coastal areas and river beds. And those areas are also important for wetlands. Here we can see the very close linkage between wetlands conservation and disaster risk reduction. At the same time, in terms of distributions of the disasters around the world Asia has been consistently the most affected region, followed by the Americas and Africa from the view point of number of disaster events, disaster mortality and economic loss caused by disasters.

We tend to use the term "natural disaster". However it is questioned by many experts recently as disaster is not a natural phenomenon. According to the UNISDR, a disaster is defined as "a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources" [2]. This means disaster is not a natural phenomenon by itself but rather the ability of human society to cope with matters.

Disaster risk refers to the potential disaster losses – in lives, assets, livelihoods, etc – which could occur to a particular community or society over some specified future time period [2]. We often express risk in terms of three factors: hazard (cyclone, Tsunami); vulnerability and exposure. It is important to distinguish between these three elements as they require different sets of policies and remedies in order to reduce disaster risk. Thus it is important to stress that disaster risk cannot only attribute to the hazard that is a natural phenomenon but more depends on vulnerability and exposure that is related to human activities.

There is a growing recognition on Ecosystem-based Disaster Risk Reduction (Eco-DRR) in the past few years. Eco-DRR is defined as "the sustainable management, conservation, and restoration to reduce disaster risk, with the aim of achieving sustainable and resilient development" [3]. In 2008, a global partnership of organizations called PEDRR (Partnership for Ecosystems and Disaster Risk Reduction) was organized and has been jointly promoting Eco-DRR, collecting relevant information and providing capacity development since then [4]. Because of this joint effort, in the past few years Eco-DRR was successfully integrated into both conservation policy and DRR, Climate Change and Sustainable Development frameworks.

For example, The 3rd World Conference on DRR took place in Sendai in 2015 and adopted Sendai Framework for Disaster Risk Reduction 2015-2030. Ecosystem-based approaches (EbA) were also strongly embedded into this strategy. At the Ramsar COP12 in 2015, a decision on Wetlands and Disaster Risk Reduction was adopted. CBD also recognizes the importance of ecosystem-based approaches for Disaster Risk Reduction and Climate Change Adaptation and recently adopted a Voluntary Guidelines for Eco-DRR and EbA at its COP14 in 2018. There are also various guidelines and practices on the ground [5][6][7][8][9].

With these active implementations on the ground based on the similar concepts and terminology, IUCN coined the concept called Nature-based Solutions to incorporate all these similar ecosystem-based approaches to address various challenges in our society [10]. Nature-based Solutions are defined as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits". IUCN is now developing NbS standard.

In the academic world, there has been also a growing evidence to support the role of Eco-DRR in major scientific journals in the past few years. And interestingly many of them are focusing on coastal ecosystems that are closely linked to the wetlands [11][12][13][14][15][16][17]. Those studies argued the ability of coral reefs to reduce wave energy, oyster reefs to grow in height for the rise, etc. Sutton-Grier *et al*. reviewed various types of Eco-DRR approaches in the coastal areas and compared pros and cons of different approaches – natural, built and hybrid approaches and concluded that there is a huge research potential for the hybrid approaches [18].

In Japan, there is also a growing interest on Eco-DRR since the Great East Japan Earthquake in 2011. The Ministry of the Environment of Japan developed a guideline for Eco-DRR for local governments. Recently, there are also several research projects started in the field of Eco-DRR. One of such examples that I am involved in is a research project titled "*Research and Social Implementation of Eco-DRR as Climate Change Adaptation in Shrinking Society*" managed by Research Institute of Humanity and Nature (RHIN) Kyoto. This 2.5 million USD project attracted more than 100 scientists in Japan and is now trying to develop a methodology to evaluate multi-functionality of Eco-DRR as well as supporting to implement Eco-DRR activities through trans-disciplinary approach [19].

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Urban Wetlands for Disaster Risk Reduction in Japan

Yukihiro Shimatani [10]

Introduction

In recent years, disasters have occurred around the world due to the influence of climate change, and Eco - DRR has attracted attention. Wetlands form an important part of the ecosystem and have various Eco-DRR functions.

This paper focuses on urban areas.There are various wetlands in the city such as coasts, rivers, irrigation canals, ohori(castle moats), irrigation ponds, springs, gardens and etc.. Due to the influence of urbanization, degradation of such wetlands such as scale reduction, artificialization, deterioration of water quality and a decrease in networks has been progressing. Meanwhile, cities have disaster risks such as storm surges, earthquakes, tsunamis, floods, droughts and fires, and urban wetlands have disaster prevention functions against these disaster risks, but deterioration of urban wetland It seems that disaster resilience is also declining.

Here we focus on the city's wetlands in Japan and discuss the functions of urban wetlands including Eco-DRR function, and discuss the conservation of urban wetlands from the viewpoint of strengthening urban resilience.

Wetlands in the city and disaster prevention function

There are various wetlands in the city such as coasts, rivers, irrigation canals, moats, irrigation ponds, springs and gardens. Due to the influence of urbanization, the reduction of wetlands, artificialization and deterioration of the environment are occurring.

The figure shows the length of the water space in the 1880s and the present in Tokyo, Osaka, Hiroshima. Approximately 50% of the length of water space has disappeared instead of landfill or changing to sewer system. Especially the decrease of moats, irrigation canals, canals are remarkable. Meanwhile, it is hoped that cities have disaster risks such as storm surge, earthquake, tsunami, flood, drought and fire, and urban wetlands will fulfill the disaster prevention function.

I would like to explain cases in Japan on the relationship between each category of urban wetlands and disaster prevention functions.

First of all, coastal forests are explained. In the Edo era, large-scale coastal forests were constructed on many coasts in Japan to prevent salt damage, blowing sand and to alleviate storm surge damage.The tree species is mainly pine but various trees were used. In many places the coastal forest is still preserved. Atagohama in Fukuoka city, where I live, is a landfill site, there is a pine forest regenerated by the citizen's hands, and I think it has a function of control of storm surge.

Moats are water space for battle defense made around castles in the Edo period (about 200-300 years ago), and they are worthwhile as historical, landscape and living habitat places. In addition, they have flood control and fire spread prevention function, they are also important as spaces for disaster prevention.The moat of Saga Castle is a good example. It is a wide waterside space, it is important as a habitat for many creatures or a place to provide beautiful scenery and is currently positioned as a regulating place for flood protection. In the center of the major cities in Japan moats of the castle are left and important as urban wetland including the historical meaning.

Most of the urban canals were constructed in the early modern era and built to supply living water and agricultural water at that time. Although they are still used as agricultural water at present, they are also important environmental spaces. In addition, they have modernly important functions as a fire spreading prevention zone at the time of earthquake or as a water source for fire-fighting water or emergency water. The photograph shows how the river water is used as the household water when an earthquake occurs. When an earthquake occurs, the water supply facilities are damaged, the water supply cannot supply tap water for a long time, and the role as a water supply source in urban river disasters is large.

There are about 200,000 irrigation ponds in Japan, but most of them were made before the early modern era. In the process of expanding the urban area, they have been included as part of urban areas, making it an environmentally important space in cities. In addition, the irrigation ponds have flood control ability, and play an important function for flood control.

In 2003, the Mikasa River flooded, and the central part of Fukuoka city such as Hakata Station became a major disaster submerged. There are 121 irrigation ponds in the Mikasa River basin, and according to our simulation calculation, it is clear that if there are no ponds, the amount of flooding is about doubled. It has also been clarified that if the ponds were effectively operated, the amount of flooding could be reduced to 1/2. The irrigation ponds have large environmental function and flood control function in the urban area. It is also true that there are many tasks related to irrigation ponds such as the number of reservoirs decreasing as conversion to residential land due to urbanization and there are dangers of bank breakage. At the northern Kyushu heavy rain in 2017, some irrigation ponds were collapsed and the dead occurred. Maintaining the flood control function of the irrigation pond and improving proper maintenance of the embankment of ponds are major issues under climate change.

Sprinkling wetlands in cities also play an important role as emergency water sources in the event of a disaster. At the Kumamoto earthquake in 2016, the water supply facilities were damaged by the earthquake and tap water cut-off occurred. In Kumamoto city where spring water is abundant, spring water is used as water for daily life and the disaster resilience of the area was enhanced.

It is common to place a water space such as a pond in the Japanese garden, and the garden can be positioned as a urban wetland. The urban garden is an important Eco-DRR space which has the function of suppressing outflow of flood and preventing spreading of fire. Also in recent years attention has been focused on suppression of flood outflow as a rain garden.

The figure of the green infrastructure that Setagaya-ku of Tokyo is showing is also a wetland city which made the whole city wet. It aimed at the comprehensive solution of urban problems such as urban water circulation system healthy, urban flood control, water quality purification, landscape improvement, heat island suppression and so on.

As mentioned above, we have focused on various types of wetlands in cities and have looked at their disaster prevention functions. I think that you understand that all cities' wetlands have some disaster prevention function. We start with having citizens of the general public recognize that urban wetlands have disaster prevention function, and we must strive to conserve urban wetlands and strengthen environmental functions and disaster prevention functions of urban wetlands .

10 Professor, Kyushu University, Saga Prefecture, Japan & President, Japan Wetland Society

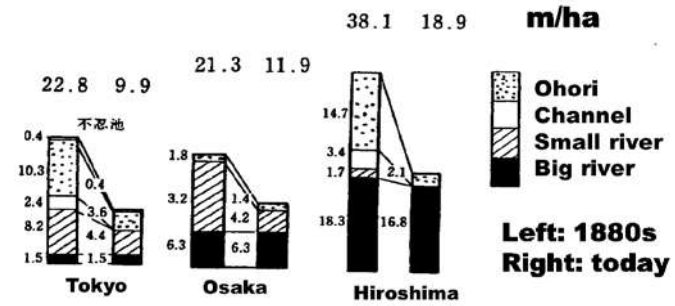


Fig.1 Change of length of water space of three cities in Japan

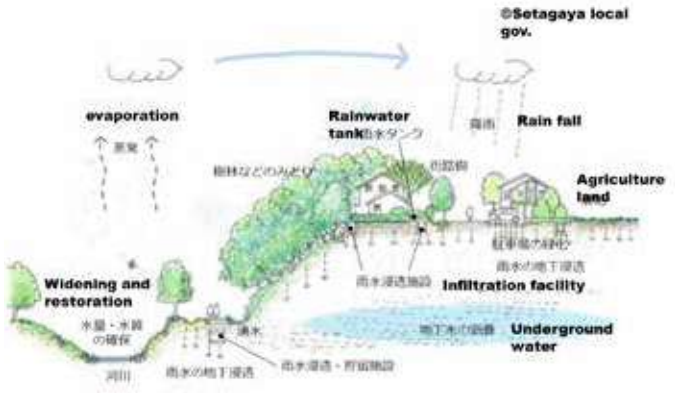


Fig. 2 Green infrastructure image in urban area(Setagaya local gov.)

Fig.3 Urban wetlands enforce urban resilience

Ecosystem Management & Disaster Risk Reduction: Lessons from the Mahanadi Delta

Ritesh Sikka[11]

1. Introduction

Recent research and experience that have shaped international and national discourse on disasters have underlined the significance of addressing underlying causes of risk as a means of reducing vulnerability and exposure and building community resilience. This thinking is most emphatically expressed within the Sendai Framework for Disaster Risk Reduction (SFDRR), adopted by UN member states on 18 March 2015 at the Third UN World Conference on Disaster Risk Reduction. The Framework emphasizes reduction of the impacts of disaster events, by reducing risk and managing conditions of hazard, exposure and vulnerability, while building the capacity of communities and governments for prevention, preparedness, response and recovery. The Partners for Resilience: Strategic Partnership (PfR SP), a collaborative program linking civil society organizations working in humanitarian, development, ecosystem management and climate change adaptation domains, emerged as follow up to the Sendai Framework, with an overall objective of supporting its implementation by building civil society capacity and evidence-based engagement with policy and decision makers.

The PfR SP promotes a multi-sectoral approach for managing disaster risks in development. The Integrated Risk Management (IRM) approach promoted by the partnership, blends Disaster Risk Reduction (DRR), Ecosystem Management and Restoration (EMR) and Climate Change Adaptation (CCA) to address the multi-faceted dimensions of vulnerability reduction and building community resilience. The IRM adopts these diverse pathways as dynamics with overlapping aims and interventions to attaining resilience (SFDRR), sustaining development (SDGs) and adapting to the changing climate (COP 21). The IRM puts people in the centre stage, builds on local and traditional knowledge, links different domains and focuses on community livelihoods. The PfR SP focuses on strengthening CSOs engagement capacity at various levels to create conducive environment for the IRM. The program recognizes the important role of CSOs in supporting realization of effective risk reduction through innovative action at the grassroots level and connecting experiences to policy making at various scales. The PfR SP implementation in India is focused on water mediated risks which constitute a majority of disasters in the country and, where application of the IRM can help leverage change by connecting actions across various development and conservation sectors. The first phase of PfR was from 2011-2015. The second phase is currently midway through implementation from 2016-2020. Wetlands International and its partners have been implementing the PfR since 2011 in Mahandai Delta in a total of 69 villages.

2. Risk Context in the Delta

The delta of the Mahanadi River spans 13,871 km2 (including the area of the Chilika lagoon and its direct catchment) between 19°40¢–20° 35¢ N latitude and 85°40¢–86°45¢ E longitude around the confluence of the Mahanadi River within the Bay of Bengal, on the east coast of India. The Mahanadi is one of the major east flowing peninsular rivers of the country, flowing for 958 km and draining a basin of139,681 km2 across the states of Chhattisgarh, Maharashtra, Jharkhand and Odisha before flowing into the sea. The central part of the delta is distinct for its extensive plain, the coastal parts contain lakes, creeks, swamps, beaches, tidal flats and mangroves.

At the same time, the delta is the ecological and socio-economic hub of the state of Odisha. It supports more than one-third of its population, 68% of which are farmers. The delta is the source of multiple ecosystem services critical to the ecological and economic security of the region.

Severe storms appear to be becoming more frequent in the Bay of Bengal. During the 1960s there were only three flood events on the Mahanadi delta; in the first decade of the new century there were seven. But the problem is not just climate change; it is at least as much due to changing land use.

The delta contains conservation areas, such as freshwater and coastal wetlands, and biodiversity hotspots with a wide range of species including rare and threatened ones. A total of 211 bird species have been identified at the Chilika lagoon, and it supports probably the world's largest population of Irrawady Dolphins.

3. Challenges

Since 1975, a third of the delta's wetlands have been lost to farm drainage schemes, ports, industrial plants and prawn farms. Wetlands once absorbed excess flow, while mangroves on the coast absorbed some of the tidal and wind force of cyclones. But the water, whether from storm surges or river floods, has to go somewhere. And all too often, the water has ended up trapped behind embankments in stagnant and waterlogged fields.

The Mahanadi River delta in Odisha is ravaged by floods each year. In addition to floods, the coastal districts of the Mahanadi delta are frequented by cyclones and tropical depressions.

The wetlands in the Mahanadi delta floodplains formerly served the important function of buffering excess flood waters and acted as water reservoirs during dry periods. Alterations in natural water flows, environmental damage and climate change have increased the frequency and intensity of weather-related disasters for communities living in the delta and floodplains.

Hard infrastructure that was built as a short-term solution for flood defense has disrupted the natural linkages between wetlands and water. The delta is now marked with persistent water logging, low agricultural productivity, loss of migratory fisheries, declining incomes, social conflicts, migration and health hazards due to limited availability of safe drinking water and sanitation. Due to climate change rainfall patterns have altered and there is an increased frequency of extreme hydrological events. This makes the life and livelihoods of communities even more vulnerable to flooding.

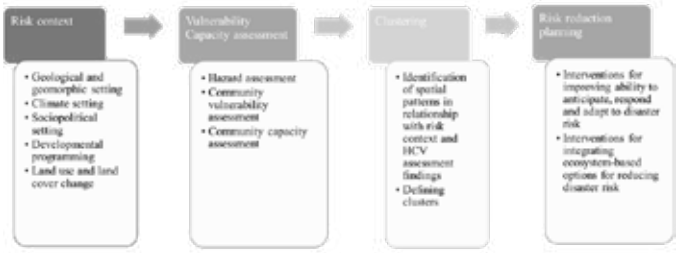
4. Cluster Planning Approach

The cluster planning approach is an intuitive, multi-scale framework aimed at identifying ecosystem-based intervention needs and opportunities to support disaster risk reduction planning within communities. Such an approach builds on knowledge of landscape-scale drivers of disaster risks and organizes risk reduction interventions in 'clusters', or smaller landscape units comprising communities facing similar patterns of risks from natural hazards. The underlying assumption is that community-level risk reduction actions need to be complemented by multi-scale interventions to harness and benefit from ecosystem services that reduce disaster risk. Cluster planning approach enables blending of administrative scales (along which disaster risk reduction planning is conventionally organized) with landscape scales (which is relevant for managing ecosystem services). Ecosystem services are delivered at multiple spatial and temporal scales which vary from being short term,

11 WISA, India

site level to long term and global level.

Compared with a conventional disaster risk reduction planning approach which derives information from community assessments, a cluster planning approach begins with locating the community within its landscape, and subsequently identifying different spatial scales at which ecosystem services can be managed to reduce disaster risk. While recognizing that landscapes can be large, the approach allows for incorporation of intermediate planning level(s) comprising smaller landscape entities, which due to factors related to the geomorphic setting and land-use create a hazard context that is shared between adjacent communities. This enables the bridging between administrative and ecological scales within an intermediate 'cluster' scale, at which landscape management and developmental programming can converge to facilitate application of ecosystem-based approaches for disaster risk reduction.



5. PfR interventions

PfR interventions focused on diverting risk of inundation by strengthening embankments, and undertaking relief and rehabilitation measures, restore wetlands as natural buffers to flood, manage embankments to release water in the controlled quantity, introducing salt tolerant crops, vegetating coastline to prevent erosion. A cluster approach is adopted to enable linking risk reduction plans for villages located in similar risk contexts and having opportunities for joint actions. An elucidation of the approach is done for the Mahanadi Delta, Orissa. The hazard patterns of the villages within any given cluster bear a strong commonality, for example most of the coastal villages face the hazards in the form of tidal inundation, coastal storms, saline intrusion and coastal erosion. However, if the risk reduction plans are limited to village boundaries, the interventions take the form of constructing structures that reduce the intrusion of sea water or protect from cyclones and so on. Taken as a cluster, coastal villages can jointly invest in greening the coastline, maintaining free flow of water to reduce water-logging, better management of upstream hydraulic structures and several other options. It is possible to then plan for climate adaptation interventions at reasonable scale. In the revised scheme, the village level contingency plans would still be at the centre, but the interventions therein would be reviewed using ecosystem management and climate change adaptation criterions. Additionally, there would be interventions that would be taken up jointly in the cluster to enhance resilience. This would not just be limited to physical interventions, but also linking with policy processes and capacity building. Given the estuarine nature of the landscape, salinity would be a perpetual challenge, and thereby introducing salt tolerant crops would be most suited to the conditions. However, the freshwater wedge could be increased by revitalizing and harvesting rainwater with vegetative bunds. The skills set of the households could also be broadened to reduce dependence on agriculture. Forms of enterprise as aquarium fish, ornamental shell making could be introduced as these are based on available resources. The structure and location of embankments could also be redesigned to reduce water logging. Shelterbelt plantations would assist in reducing coastal erosion as well as reducing the impact of salt and sand that comes in with the sea-wind.

Secondly, community preparedness to disasters would need to be enhanced by strengthening local institutions and developing effective early warning systems. However, the fluvial regimes and coastal processes could only be addressed through the Integrated Water Resources and Coastal Zone Management Planning. The communities would need to participate in these processes clearly articulating the impacts of siltation and closure of river mouth and declining flows. The coastal protection could also be strengthened if longer areas of coastline are vegetated creating natural protection barriers. As a matter of priority, the community would first of all engage in revitalizing the water sources and greening the coastline, while simultaneously investing into institutions to enable better disaster preparedness. The emphasis of flood control within the Mahanadi Delta has been largely structural. The focus now is on revisiting the adequacy of the Hirakud Reservoir Rule curve – a relationship between water storage and releases in a reservoir which determines allocation for water uses for various purposes as irrigation and hydropower as well as downstream releases.

After a risk assessment in Puri district with the communities, it was identified there was a need to restore wetlands as well which act as natural buffers to floods. The floodplain needs to be reactivated, and the embankments managed to release waters in controlled quantity to ensure that in-channel sediment deposition is reduced. Additionally, the hydrological connectivity needs to be ensured that the water flushes out between systems. Further, collaboration with research organizations is required to have a better understanding of climate change impacts.

The PfR has enabled its two partners in integrating resilience into their strategic organizational framework. The district disaster management plan being developed by the national disaster management authority now includes the ecosystem management template and has been introduced in Puri in the Mahanadi delta.

6. Conclusion

The cluster planning approach provides a useful multi-scale planning framework for identifying ecosystem-based interventions for disaster risk reduction within a landscape. Through the use of this approach in the Mahanadi Delta, it was possible to identify a range of ecosystem-based interventions for disaster risk reduction, building on the knowledge of delta-wide water and sediment dynamics related processes which underpin functioning of healthy ecosystems. The analysis also highlighted the limitations of structural interventions such as flood embankments. Such structural interventions, when viewed in the context of landscape processes, have the potential of aggravating vulnerability in the medium to long term, by impeding water, sediment and nutrient exchange between river channels and floodplains. The approach also enables capturing of landscape scale information, related to geo-morphological as well as developmental programming, and the analysis of risk contexts, thereby supporting more robust disaster risk reduction planning. By embedding administrative planning units within ecological planning units, a more realistic integration of ecosystem services within disaster risk reduction is made possible. Finally, the clusters form an important intermediate planning stage between district level (which does not fully encompass ecosystem services scale) and delta level (at which heterogeneity created by geo-morphological and developmental programming processes tend to merge)

Part III: Examples of Community-based Conservation

Sustainable Forest Conservation and Livelihood Support through Community-based Activities at U To Village, Rakhine Coast, Myanmar

Mr. Myo Lwin[12]

1. Background

Rakhine coast is situated in the Bay of Bangal with 740 km long endowed with mangrove forest, sea grasses and unspoiled beaches and is surrounded by tropical evergreen forest. Southern tip of the Rakhine coast line is under the administration of the Ayayarwady Region. The mangrove forests have been seriously affected by the large scale cutting of mangrove trees for timber, fuel wood, charcoal and agricultural & coastal development. Previously this area was highly rich of unique biodiversity and habitats. There are mangrove species, freshwater and marine fish species, shrimp species and crab species found in the Rakhine coast.

At present biodiversity of the said area is declining due to overexploitation of mangrove resources both for forest products and fisheries, and unsustainable fishing practice. Nevertheless there are some dedicated communites who really want their mangrove back in their area and it is an encouraging signal that promoting the community-based mangrove conservation would lead towards the restoration of mangrove ecosystem in Myanmar.

This project has been implemented by the Myanmar Forest Association (MFA). Ramsar Center Japan (RCJ) is the executive agency. The TOYOTA Environmental Activities Grant Program provides the funding. The focus of the Project is the estuary zone along the Rakhine coast in U To village and Seik Kyi village near Chaung Tha beach, Pathein Township, Ayayarwady Region between 170′ 30″N 9427′ 45″ and 1655′ 30″ N 9431″ 0″E.

The people of this area are dependent on fishing, dry fish-processing, crab and mollusk harvesting and small scale agriculture. Chaung Tha beach is one of the most famous recreational beaches crowded with local visitors and tourists

This Project covers 2 villages and at least 300 households with 1200 population. The project has supported the community to improve their environmental awareness and the livelihood.

The major objectives of the Project were as follow.

1) Assist local community in the conservation and plantation of the mangroves
2) Promote crab and mollusk fattening and explore soft-shelled crab farming
3) Promote community-based eco-tourism in the area
4) Improve small scale agriculture

2. Activities of the Project

The Project has been implemented through the involvement of local people on a community-based approach. The following activities have been implemented in the area.

- One village meeting discussed about value of mangrove forest and importance of the mangrove forest conservation for the future of their livelihood. Then Village Development Group (VDG) was formed and it planned the future activities through the active participation of the villagers.
- Established village mangrove nursery (100′ x 100′) at the eastern side of the village and bought (5000) seedlings of *Kandelia canded, Baugulera gymnorhiza and Ceriops decandra species*, collected their seeds and raised 1,6000 seedlings.
- Socio-economic survey was conducted and data collected in the villages.
- Established the mangrove conservation area and at the gaps and open areas mangrove seedling were planted in the gap and open areas. In some places, seeds were directly sown with the participation of villagers.
- Some120 red sign-boards have been posted along the boundary of conservation area to improve and support effective conservation of the mangroves.
- Crab fattening training was conducted with the technical expertise of the Mangrove Service Network (MSN). Twelve villagers were trained.
- Mangrove sapling plantation began with Tree Planting Ceremony on 30 July 2017. Some 1000 mangrove seedlings have been planted with the participation of village administrators, students and villagers.
- After the Tree Planting Ceremony about (20,000) saplings of mangrove were planted until 2018.
- The wooden boardwalk -180′ in length 5′ in height and 3′ in width - was constructed between mangrove nursery and the Pathein – Chaung Tha Highway to support villagers and visitors about awareness on mangrove conservation.
- The neighboring country study visit and on site training was arranged by the RCJ-MFA and Mahidol University, Thailand. Two members, one each from the MFA and village participated at the study tour. The tour provided practical knowledge on crab bank Rayong Province of Thailand.
- 100 copies of the posters of the TOYOTA-RCJ and MFA Project were distributed to the villagers and others.
- The Project provided tools, wooden boats with engine to the villager including the transportation cost.
- Along the mangrove conservation areas 40 concrete poles (10′ x 5″ x 4″) have been erected and blue colored-iron sign boards demarcates the boundary of the conservation area.
- Community-based ecotourism training has been conducted and 20 villagers attended the training to get the knowledge and ideas of community-based ecotourism for their additional income generation.
- At the project area of the Seik Kyi village, the agriculture-based livelihood was supported by providing 50 packs of 16 varieties of vegetable seeds for the supply in the Chaung Tha market.
- The Minister of the MONERC, U Own Win inspected the U To Mangrove Conservation Project site on 24 November 2018. He distributed 15 improved fuel-saving stoves to the villagers of U To village and instructed the officials from regional forest department to cooperate at U To mangrove conservation project.
- Continues the patrolling of the mangrove conservation areas by the VDG members and the project personnel.
- The undergrowth cleaning, weeding and climber cutting operation have already been done at about 40 acres of natural mangrove forest area.
- The Poster (8′x6′) has been installed at the Pathein-Chaungtha Main Road.
- The RCJ observation team with 7 members visited the U To village and conducted the village meeting for its exit activities.

All the activities - mangrove tree planting ceremony, plantation works, crab fattening, soft shell crab raising, calm and mollusk breeding and the formation of the Mangrove Forest Conservation Group – were undertaken in close collaboration with stakeholders including village administrators, the elders,

12 Myanmar Forest Association, Myanmar

villagers and students from village school.

At the first awareness program on conservation of mangrove forest near U To village people were not interested in the project activities. But, within this two-year period, more and more people have realized the values of mangrove forests and become interested to conserve the mangrove forest along the U To stream. The canopy cover of the mangrove forest is more dense and thicker now than before. There is no more illicit cutting of mangrove trees and encroachment to the mangrove conservation areas because of the awareness, involvement and participation of local villagers.

U To village gratefully acknowledges the assistance and cooperation received from TOYOTA, RCJ and MFA.

Wooden board walk was constructed around the mangrove nursery

Awareness poster

Wooden signboard installed at the Pathein-Chaunytha main road

Community Participation in the Gulf of Mottama Ramsar Site

Min Thiha Zaw[13]

There are many wetlands in Myanmar. Among of them, the Gulf of Mottama is the largest turbidity zone, estuarine wetland in South East Asia. The Gulf of Mottama (now called the Gulf) touches the Yangon Region, Bago Region and Mon State. Intertidal mudflat area is approximately 150,000 ha. The Gulf looks like funnel-shape where the Sittaung River is the major flow into the Gulf and connection with the Bay of Bengal. The fluctuation of tide range is very strong when the high tide time, the water is high about 7 to 8 meters and at the low tide time, the water is deep about 3 meters. So, the habitats of the Gulf are not stable that it depends on water current change and tide erosion. There are rich populations of biota including abundance of invertebrates in the Gulf. So, the area is very important as a breeding ground and feeding area for fish and supports about 150,000 to 200,000 of migratory waterbirds in the non-breeding season. The migratory waterbirds include Critically Endangered species of spoon-billed sandpiper, endangered species of Great Knot and Near-Threatened Species of Black-tailed Godwit, Bar-tailed Godwit, Eurasian Curlew, Red-necked Stint, Curlew Sandpiper, Asian dowitcher, River Tern, Sport-billed Pelican, Painted Stock and Black-headed Ibis. The 50% of global population of Spoon-billed Sandpiper are wintering in the Gulf. So, it is one of the largest mudflat in the world for wintering Spoon-billed Sandpiper and other migratory birds. Moreover, the Gulf also supports a large population of people mainly in the form of fishes and crabs. For these reasons, the north-east of the Gulf was designated as the Ramsar Site on the 10th May, 2017 with the advocacy effort of BANCA since 2010. The Gulf meets six out of the nine Ramsar Criteria. Helvetas Myanmar, NAG, IUCN and BANCA were working with the government to designate extension of the Ramsar Site on either area of the Gulf and prepare a long-term coastal resources management plan with the financial support of the Swiss Agency for Development and Cooperation (SDC).

The Spoon-billed Sandpiper is a long-distance migratory bird because it is breeding in Chukota, Russia. They migrate to the South East Asia countries in non-breeding seasons. The Nanthar Island of the Gulf, Ayeyarwaddy Delta and the mudflat of Myeik in Tanintharyi Region Myanmar are some of the wintering grounds for the Spoon-billed Sandpiper in Myanmar. They flew about (8000) km to winter in Myanmar. They have problems along the EAAFP flay-way that confronting the impact of weather and bird hunters resulting in the decline of the the Spoon-billed Sandpiper population. The higher population of Spoon-billed Sandpiper is found wintering in the Gulf than in other areas. The Spoon-billed Sandpiper and other shore birds are confronting problem in the Gulf where the biodiversity resources are decreasing due to over-fishing by using (small mesh size illegal fishing net). Some of the villagers who are doing birds hunting in the Gulf for the livelihooods. According to the BANCA investigation on the socio-economic and livelihood assessment of hunters, 64 birds hunters, some 9 hunters are totally dependent on birds hunting for their livelihood, 13 hunters have other business such as fishing and 41 hunters catch birds for their subsistence food. BANCA carried out the emergency responses to change the hunter's livelihoods with the support of Birdlife International, RSPB, Arcona Consulting, Darwin Initiative and other international organization. BANCA worked with the villagers and formed conservation groups of volunteers called Local Conservation Groups (LCG). The Group assists the villagers in the conservation of the natural resources in the Gulf of Mottama. Former hunters were selected as the leaders of the LCGs. BANCA conducted various programs to seek the active participation of village head, fishers and women. Several kinds of capacity building training for LCG were conducted. Most of the LCG members are fisherman and former hunters. These groups provide regular patrolling in the Gulf even while fishing.

For the community participation of conservation, BANCA carried out several kinds of awareness and educational programs in coastal villages and also advocacy to regional and local government since 2010. With the successful engagement of local authorities and communities, they have who endorsed the Gulf of Mottama as a Ramsar site in 2014.

BANCA also supports community development works such as the construction of the rain-fed water pond for the community uses. There are 8 water ponds in the Gulf of Mottama. BANCA also established a Enviromental Education And Sustainability Center (Eesc) in TheinNgu village, Belin Township, Mon State on 30th December, 2016. The objective is to conduct the educational and awareness programs on environmental conservation of the Gulf area. The displays of environmental information, different species & their habitats and the Key Biodiversity of Myanmar are the attraction of the center along with its nursery. This nursery is producing over 10,000 of seedlings annually in the Gulf. Sometime, capacity building training and meetings are also held in Center.

The BANCA staff-members along with the Local Conservation Group (LCG) are always patrolling each township of the Gulf area especially in the wintering season to record illegal fishing nets and birds hunting by using SMART program. One of the major reasons for decline of the fishes is the use of some of the small mesh size (6 mm) fishing net by the middle man. These nets are set up during ebb tide.

So, Helvetas Myanmar, NAG, IUCN, BANCA and Local Community are now involved in the protection and conservation, especially of natural resources, wintering birds and their habitats focusing on education, awareness and livelihood of community people in the Gulf of Mottama.

13 Biodiversity and Nature Conservation Association (BANCA)

Community-based Management of Wetland Resources for Ecotourism

Sansanee Choowaew[14]

1. Introduction

Thailand has 6 provinces locating along the coastline of the Bay of Bengal and the Andaman Sea, namely Ranong, Phang-Nga, Phuket, Krabi, Trang, and Satun. According to the Statistics of the Tourism Department (2017), the total number of domestic and international tourists to these 6 Andaman provinces was 23,469,126 in 2016 with average growth rates of 3 – 10 % per year (Table 1). Ranong, Trang, and Satun had more domestic than international tourists, while Phang-Nga, Phuket, and Krabi had more international than domestic tourists.

Table 1. Number of Tourists (both domestic and international) to 6 Andaman Provinces along the Coast of the Bay of Bengal of Thailand, 2014 – 2016.

Province	2014	2015	2016
Ranong	682,360	742,126	775,220
Phang-Nga	3,446,695	3,871,700	4,156,224
Phuket	11,312,037	12,520,769	12,709,415
Krabi	3,403,435	3,557,409	3,673,635
Trang	1,086,897	1,161,831	1,192,408
Satun	863,167	932,911	962,224
Total	20,794,591	22,786,746	23,469,126

Source: Tourism Department, 2017.

These 6 provinces have abundant natural resources and a wide variety of tourist resources and attractions. Wetlands and wetland resources including highly fertile mangrove forests, many beautiful beaches, crystal clear and clean sea, coral reefs, seagrass-beds as well as coastal communities' livelihoods are significant ecotourism attractions. Five out of fourteen Ramsar Sites of Thailand lie in Ranong, Phang-Nga, Krabi, and Trang provinces. Opportunities are availed to local coastal communities whose livelihoods, major occupations and income are in agricultural and fishery sectors to involve with community-based ecotourism management.

2. Objectives

This paper aims to:

1) Introduce some good examples of community-based management of wetland resources for ecotourism along the coast of the Bay of Bengal in Thailand; and
2) Compile and present some key contributing factors leading to possibilities and positive outcomes of wise use and community-based management of wetlands and wetland resources for ecotourism

3. Some Examples

Three sites in 3 provinces are selected as representative examples of good practices of community-based management of wetlands and wetland resources for ecotourism.

Case No 1

Laem Nao Village, Nakha sub-district, Suksamran District, Ranong Province

A muslim fishing community has settled here for more than 200 years. This fishing community is located in naturally beautiful landscape and fertile mangrove forest of Laem Son National Park. Houses in this small village are simply designed and built on stilts along the shoreline. In front of the village, there is a 100 m long cement bridge serving as a pier and fish landing site. Villagers use boats for transportation. Their daily life is closely dependent on the sea and mangroves. One strict rule which all villagers respect is "*no change and no harm to the nature*". With people's respect to the nature, the nearby forest has never been encroached or disturbed and the sea is clean and clear. An indicator of natural fertility is the presence of Mole crab or Sand crab under the sandy beach. This is a very rare species which lives only in clean and clear seawater. At present, this species can be found only at a very few sites on the coastline of the Bay of Bengal of Thailand.

Local fishermen have been practicing and maintaining the *subsistent and sustainable fisheries* for generations. They are well aware of the importance and values of coastal and marine resources. More than 20 years, all villagers have collectively agreed to set up common fishing rule and code of fishery conduct – *not to destroy the cycle of marine life but maintain and enhance natural stock*. Such inherited practices include applying appropriate fishing methods, types and sizes of gears and tools, fishing areas, fishing periods and times. Diving to hunt for giant prawns and lobsters is prohibited, but only 4 – 4.5 inches nets are allowed to be placed to avoid catching small juvenile prawns and crabs. Only big size of mollusk, especially Wing shell – a famously popular shell among tourists and seafood lovers, is collected. Juvenile wing shells are safely left in muddy substrate to allow them to grow and breed. For crab conservation, a *Crab Bank* has been established and operated by a local investor in cooperation with Laem Nao community members. When egg-bearing crabs are caught in the fishing nets, mother crabs are sold (150 THB/kg) to the crab bank. Mother crabs are kept in a floating cage (3m wide x 3m long x 2.5m deep, with 1.5 inch mesh size). When times come, mother crabs release eggs, baby crabs grow, thousands of juvenile crabs will freely swim out through the cage net, grow and become natural stock. Mother crabs, after eggs released, body weight dropped, are sold in lower price. According to the local investor, less benefit from selling mother crabs after they released eggs leads to greater benefit from the increase of natural crab stock in the sea. In the fiscal year 2017, the Laem Nao Community received a budget of 50,000 THB from the government to support the operation of the village's crab bank.

Laem Nao fishing community is an attractive coastal ecotourism site. Visitors can observe, learn about, experience and hands-on local livelihoods such as organic farming, making organic fertilizer, local fishermen's activities such as fishing, collecting crab, squid, mollusk, and jelly fish. The village chief has initiated an approach to draw tourists' attention and participation in coastal resource conservation activities. Visitors can buy baby shells from the village nursery and have good fun with muddy walk to release baby shells back to their birthplace within the mangroves. Villagers collect and deposit the money received from tourists into the village fund to be used for increase of baby shells and baby crabs in the village nursery to be released back to the nature maintaining the balance of overall ecosystems. They do not have to wait for the release of baby shells which may be carried out only once a year by the Fishery Department. Visitors can also enjoy kayaking, walking and self-learning on boardwalk through mangrove, fresh sea foods directly obtained from the sea and home-stay.

These ecotourism activities based on eco-fisheries have been initiated, operated, and managed by community members for more than 5 years. Community members participate in creative thinking, planning, sharing roles and responsibilities for eco-

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tourism activities management. Women take care of accommodations and meals. Men take care of transportation, boats driving, guiding through natural attraction sites, and nature interpretation. There are 3 big places for home-stay which can accommodate a total of 50 visitors at one time. A package of 2 days/1 night including 3 meals, home-stay, all boat trips and learning activities (e.g. local fishing livelihoods, collecting wing shell, observing mole crab, kayaking, walking on a boardwalk through mangrove, grassland and beaches, etc.) costs 1,600 THB/visitor. Most visitors are Thais with an average of 15–20 visitors/month or 10 groups per month. Ecotourism activities are providing additional jobs and good income to the villagers.

Case No 2
Koh Yao Noi Community, Koh Yao Noi Island, Koh Yao Noi sub-district, Koh Yao Noi district, Phang-Nga province

Koh Yao Noi Island is home to local Muslim fishing communities. After facing with problems due to large-scale illegally inappropriate fishing boats and fishing gears, a *Group of Local Traditional Fishers* formed in 1994 has played a key role and actions to lessen illegal fishing activities, set up a *Fund for Small-scale Fisheries Promotion*, and undertaken coastal resources conservation activities. For example, many years of effort of the Group to conserve the Surf clam/Carpet clam/Venus Clam has brought back the fertile population and abundance of this bivalve species.

Koh Yao Noi Island and its community have become a well-known tourist destination for ecotourism and cultural tourism, receiving large number of tourists each year. Tourism attractions include natural beauty and peaceful landscape, sunrise and sunset views, island forest, beach forest, beautiful beaches, bays, coral reefs, and local livelihoods. Tourists can enjoy various activities such as experiencing local livelihoods on the island including rice farming, rubber plantation, handicrafts making (e.g. wax hand-drawn batik cloth, natural tie-dyed cloth, coconut shell products), coconut picking by monkeys, fishing tools making; experiencing local livelihoods in the sea including sea-fishing activities, fish cage culture (e.g. grouper, seabass, red snapper, cobia, starfish, puffer fish, spiny lobster/rock lobster cages); and many nature-based activities including bicycling around the island, swimming, coral reef snorkeling and diving. At the coral reef bay which is a popular site for sunset view, during low tide, tourists can directly see coral reefs from the beach. Tourists also enjoy fresh sea foods, especially a popular dish made with Surf clam.

On this island, besides primary and secondary schools, hospital, police office, municipal and district government offices, and good sanitary system, a wide range of accommodations of various types, sizes, and prices are available. A *Group of Ecotourism by communities of Koh Yao Noi* has been formed, especially to provide and manage home-stays. Despite of rapid growth of tourism business and number of tourism operators on this island, local communities still play important role, involving with and participating in ecotourism management. Opportunities for additional jobs and income in tourism services are availed to local communities. Fishermen have adapted and used their fishing boats to support tourism activities. Farmers and gardeners (e.g. coconut growers) open their gardens to welcome tourists to buy and enjoy drinking fresh coconut juice. Women groups produce local handicrafts for sale. Many families open local restaurants and food shops. Some community members open shops for bicycles and motorbikes renting. Their activities are not limited to ecotourism services and management, but also extend to conservation of coastal resources and the whole island ecosystems, including conservation of paddy fields and upper watershed forests, setting up and operating *Tree Bank*, increase of green areas by growing perennial trees in their gardens, land use zoning, and setting up No-resorts/hotels zones.

Case No 3
Tha Pom Klong Song Nam, Ban Nong Jik Village, Khao Kram Sub-District, Muang District, Krabi Province

Tha Pom Klong Song Nam, an area of around 400 rai (1 rai = 1,600 sqm), has spectacularly diverse ecosystems with very unique ecological characteristics. Klong Song Nam is local name for *the canal of two waters*. During hide tide, the canal has 2 types of water – fresh and brackish. Despite of being rather short (5 km long), the canal is important water source for daily life for many generations. The overall ecosystems are ecotones between freshwater and seawater systems, comprising 3 major forest types i.e. dense evergreen forest which is the origin of short streams and canal flowing to the Andaman Sea, swamp forest, and mangrove forest along both sides of the canal. The site is thus well known in another local name – *the canal of two waters and 3 forests*. The site is recorded as a habitat of at least 53 plant species, 39 bird species, 22 fish species, 7 mammal species, 5 reptile species, and 3 amphibian species (Tourism Authority of Thailand, 2004; Angchung, 2013).

Freshwater in the upper part of the canal is crystal clear and cool, connected with sub-terrain small water spring, and believed by the locals that it was created by magic and a forbidden area protected by the guardian spirits. Middle part of the canal has 2 large ponds – one having deep water with green-like jade color and another having water with very blue color. Legend said that a white crocodile lived in the ponds and guarded the forest. Local people also believe that they should not wash their cloths in the ponds on Tuesday and Saturday, as it would bring them bad luck. Every year in May, villagers perform rituals to send bad luck back to the canal and expect for happiness and peace. Such beliefs in the guardian spirits of forest and canal still remain till today. With all those beliefs, the forest, canal, and overall ecosystems remain intact, not encroached and destroyed by human development activities (Tourism Authority of Thailand, 2004).

In April 2001, Her Majesty the Queen of the late King Rama IX and the Present King visited this site for sight-seeing, canoeing, and provided 3 canoes to Khao Kram Sub-district Administration Organization to start-up and promote ecotourism. Since then, villagers of Ban Nong Jik village and local administration organization have established the whole area as *Community Forest for Ecotourism*, preserved and managed for ecotourism. The site is also part of Plants Genetic Biodiversity Conservation under the Royal Initiatives and Plants Biodiversity Research Projects.

Tha Pom Klong Song Nam is well known as a significant worth visiting site. The site is managed by Khao Kram Sub-district Administration Organization with support of villagers, Department of Forestry, Tourism Authority of Thailand (TAT), and academic institutions. Sensitive areas are identified and protected. Rules and regulations have been set up to minimize the tourism impact.

Tha Pom Klong Song Nam Learning Center developed by local communities, local schools, teachers and students, and researchers of Rajabhat Phuket University, has small exhibition area, observation point with panoramic view of surrounding forest, nature trail (700 m long wooden boardwalk to ensure visitors would not step on fragile ecosystems), trail guide, walkway maps, sideway shelters and view points, wooden bridge, lables of trees, nature interpretation and information boards, at least 5 learning bases or hands-on activity stations, swimming points where visitors are allowed to swim, sign-boards, boards showing community rules for conservation and code of conduct for visitors (DOs and DON'Ts). The TAT provided the fund to support Khao Kram Sub-District Administration Office to develop basic facilities for ecotourism and nature interpretation materials (posters, information sheets and leaflets) for communication, knowledge dissemination, and enhancement of learning experience, understanding, awareness of visitors, general public, children and youth, as well as the locals.

Ecotourism activities on-site include walking through the nature trail, learning about diverse and unique ecosystems,

swimming, canoeing, observing local livelihoods and fishing activities. Entrance fees are 50 THB/adult and 30 THB/child for foreigners, 10 THB/adult and 5 THB/child for Thais. Parking fees are 100 THB/bus, 20 THB/car, and 10 THB/bike. Canoe rental service is available at 100 THB/hr or 600 THB/day. Tha Pom Klong Song Nam attracts many domestic and international visitors and tourists. Each year, this ecotourism site receives at least 100,000 visitors and tourists, generating income of around 1 million THB (not including additional income from local souvenirs and services) for Khao Kram Sub-district Administration Organization.

4. Common Key Factors Contributing to Community-Based Wise Use and Management of Wetland Resources for Ecotourism

All 3 examples, chosen as good practices, possess and share many common contributing factors. Some key factors contributing and leading to possibilities, good practices, and positive outcomes of community-based wise use and management of wetlands and wetland resources for ecotourism are listed as follows.

- Diversity, uniqueness, and quality of ecotourism resources: availability of various, diverse, unique and healthy ecosystems; high biodiversity; abundant natural resources
- Diversity of ecotourism activities: combination of activities e.g. inland-coastal-marine ecotourism, nature-culture-livelihoods ecotourism, agriculture-fisheries-farms ecotourism, health-sports-beauty ecotourism
- Ecotourism management structures and community involvement: at community level to sub-district level; from community ecotourism groups or community enterprise groups to sub-district committee; participation of multi-stakeholders and all relevant groups; clearly defined leaders/managers with good leadership; interest, capacity, willingness, and readiness of community members; clearly stated management objectives, shared role, responsibilities and actions; setting up of rules and management guidelines which are practicable and mutually agreed; setting up code of conduct for tourists to safeguard fragile ecosystems; regular consultations among stakeholders
- Wise use of wetlands and wetland resources: wise use of wetlands and wetland resources to provide long-term benefits; maintain natural properties, all components, ecological interactions; maintain the high quality of ecotourism resources in the long term, knowing and using eco-indicators or quality index; minimize potential impact from ecotourism activities; integration of ecosystems, biodiversity, and culture conservation activities into ecotourism promotion e.g. participatory hands-on activities for tourists in crabs and clams conservation; promoting responsible ecotourism; reducing wastes
- Ecotourism facilities: availability of information services, leaflets, posters, guiding maps, local guides, learning center, exhibitions, nature trails, boardwalk, nature interpretation, nameplates of trees, sign-boards, information boards, sideway shelters, observation/view points, learning bases or hands-on activity stations
- Basic facilities: availability of necessary facilities e.g. toilets, foods/drinks shops, souvenir shops, accommodations
- Knowledge/experience sharing and transfer: exchange of information, knowledge, and experience between hosts and visitors; interactions and exchange of scientific knowledge and local wisdom; transfer of knowledge to younger generations
- Technical and funding support: availability of technical back-up from various government agencies, academic and research institutions; availability of funding support from government, public and private sectors; possibilities for self-raising funds and self-generating income
- Benefits gained, benefit sharing: improved local economy in terms of jobs, income, and economic livelihoods; long-term benefits for and shared by different groups of local communities and ecotourism operators; benefits are also paid back to nature/ecosystems
- In-coming tourists and visitors: enhanced understanding, experience, and knowledge of tourists/visitors about nature, different types of ecosystems, and different cultural settings and livelihoods; continuous and regular visits; continuously increasing number of tourists and visitors; appropriate number of tourists and visitors, not beyond carrying capacity of the sites
- Promotion and marketing channels: conventional media e.g. newspapers, TV and radio programs; social media online e.g. websites, facebook

5. Conclusion

At several sites of Thailand's coastline, it has been clearly proved that community-based management of wetlands and wetland resources for ecotourism is very possible and highly effective. Local livelihood activities and ecotourism activities management combined together can go a long very well and successfully provide great benefits to local economy and overall ecosystems. There are many factors contributing and leading to possibilities, good practices, and positive outcomes.

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Building Resilience Capacity of the Local Communities along the Bahuda Estuary Area in India

Durga Parsad Dash[15]

Abstract: PALLISHREE is a grass root level NGO working for the conservation and wise use of wetlands in the State of Odisha, India since the last 2 decades. With the technical support of RCJ, Japan climate smart education and awareness projects have been implemented for conservation and wise use of wetlands. One of the important wetland namely, Bahuda Muhan Sagar is the estuary of River Bahuda having 80km2. water spread area along the Bay of Bengal. The only one sea mouth of the wetland is rapidly closing due to the littoral drift accelerated by the adverse effect of climate change. Erosion, accretion, tidal influence, wave sludge and repeated cyclones have been occurring adversely and damaging the natural resources and biodiversity in between Gopalpur & Vishakhapatnam along the Bay of Bengal. The proposed project area is coming under this zone. As such this area has been severely affected by the repeated cyclones such as Phailin & Hud hud. In order to implement the project by the local people, a participatory appraisal in the wetland was planned and conducted. The focal point of the project, Learning Centers for Community Resilience have been established in the schools which have been the learning center for the students and the findings like water quality of the wetland, bio-diversity, climate change and parameters have been displayed at the common place involving the local fishers of Fisherman Society and the women Self Help Groups including local media. Awareness level has been increased among the stakeholders through wall paintings, street play/cultural program, posters and education materials like booklet, leaflet and newsletters. Observation of different important Days and nature camps, essay & painting competitions among students are the activities implemented to enhance the knowledge level on wetland conservation. Actions like raising nursery and plantation of mangroves with other general plants and creating natural resource-based livelihood opportunities brought sustainable environmental conservation and the wise use of the wetland. Solid waste management in schools and energy saving life style has been promoted in the community. Conservation-based skill training including eco-friendly livelihood opportunities has been created for the women SHG members. The project will be completed in March 2019.

1. Introduction

PALLISHREE is a grass root level NGO working for the conservation and wise use of wetlands in the State of Odisha, India since last 2 decades with the technical support of RCJ, Japan. Japan based funding agencies like Japan Fund for Global Environment, Keidanren Nature Conservation Fund and TOYOTA Environmental Activity Grant Program, NALAPO Green Fund. have come forward to support various projects to enhance the capacity of the stakeholders through environmental education as well as climate change adaptive education and awareness for conservation and wise use of wetlands.

Bahuda Muhan Sagar is the estuary of River Bahuda having 80 sq. kms. water spread area along the Bay of Bengal (BoB). This unique wetland of lagoon eco-system is coming under two States, "Odisha & Andhra Pradesh" having the longitude & latitude 190 06' 23.47" N & 840 46' 17.02" E. Neither of the States has taken interest on conservation measures of this wetland. The only one sea mouth of the wetland is rapidly closing due to the littoral drift accelerated by the adverse effect of climate change. The vulnerability has been increased many folds by *El Nino* in Indian Ocean. So erosion, accretion, tidal influence, wave sludge and repeated cyclones have been occurring adversely and damaging the natural resources, biodiversity in between Gopalpur & Vishakhapatnam along the BoB and the proposed project area is coming under this zone as such this area has been severely affected by the repeated cyclones such as Phailin & Hud hud in 2013 & 2014 and severe drought in 2015.

2. Major Causes of Increased Vulnerability of the Estuary

The wetland is coming under the boundary line of two States, Odisha and Andhra and no conservation activity has been initiated by any State Governments. So there is a conflict between the two fishermen communities of Odiya & Telgu in these two States. No wetland policy has been enacted here in this wetland; hence the vulnerability has been increasing due to man-made detrimental interventions. The use of very small mess size net in fishing (zero-net used by the fishermen) is causing the decrease of small juveniles in the wetland. Prawn culture is increasing as there is no conservation act and restriction from Government. There is no water quality management of the wetland. Open garbage dumping in this wetland is a regular phenomenon. Shrimp juvenile catching by zero net from mouth area by the fishers caused decline in prawn production in the wetland. Rampant poaching of migratory birds is also another problem. Indiscriminate use of chemical fertilizer in the catchment area causes nutrient load into the wetland ultimately polluting the habitat of various micro living beings, fish juvenile and thus causing imbalance of biodiversity.

3. Aim & Objectives of the Intervention

PALLISHREE has started interventions in this wetland with all necessary technical support from RCJ, Japan and financial support of JFGE, Japan. This three years' plan project commenced from 2016 to 2019 with the following aim and objectives.

- Building capacity of community on eco-specific adaption and mitigation measures to resist and cope with climate change risks through community institutions in the coastal zone of the Bahuda Muhana Sagar
- Restoring the nature of the Bahuda Muhana Sagar and contributing to improvement of biodiversity and biological productivity. Enhancing knowledge source & skill development prioritising on indigenous climate variability knowledge through trainings, workshop, exposure programs and model demonstration for future climate change challenges
- Developing better understanding of responsible fisheries among the fishers in the Bahuda Muhana Sagar and promoting wise fisheries management

4. Intervention Strategy

The project aims to address the issues by enhancing the capacity of the stakeholders through their active participation in the implementation of the project. In order to implement the project by the local people, a participatory appraisal in the wetland have been planned and conducted. The focal point of the project, Learning Centers for Community Resilience (LCCR) have been established in the schools which has been the learning center for the students and studied water quality of the wetland, bio-diversity, climate change parameters. Awareness level has increased among the stakeholders through wall paintings, street play/cultural program, posters and education materials like booklets, leaflets and newsletters. Observation of different important Days and essay & painting competitions among students are the activities implemented. Actions like

15 Secretary, PALLISHREE, India

raising nursery and plantation of mangroves with other general plants and creating natural resource-based livelihood opportunities brought sustainable environmental conservation and the wise use of the wetland. Solid waste management in schools and energy saving life style has been promoted in the community. Conservation-based skill training including eco-friendly livelihood opportunities have been created for the women SHG members. The details of the achievements are as follows.

5. Intervention Measures Undertaken_

There are a number of activities undertaken in this project such as an awareness raising, establishment of focal point, various training programs, workshops, conservation & wise use activities and capacity building. The outcomes from different activities derived in this project are described below.

a) Awareness Building of Stakeholders

Wall painting: A number of paintings on educative messages on the conservation and wise use of Bahuda Muhana Sagar and its biodiversity through pictures have been permanently painted over the walls in the strategic places of the community in order to catch the attention of the stakeholders. Since 60% people are illiterate, so the theme of the message has been expressed as a learning material through pictorial method for better understanding over their present local climate change issues and their role and responsibility. This has been putting tremendous effect over the minds of the people as they have come across everyday to this wall painting.

Ghodanach: This is a very interesting street play which provides education and at the same time entertainment. This is a cultural activity which is widely accepted in which about 7 persons participate. Among the important players, one put mythological questions and other person answers in song form and also dances as per sequence. Another two players put special attractive dress with two large size toy horses fixed with their body and dance with the sequence of songs. Others play drums. In this project the questions and answers were put forward regarding the awareness over the conservation and wise use of Bahuda Muhana Sagar. Usually the performance takes place in the middle and open place of community where the stakeholders watch and enjoy around the performing group. The stakeholders used to put questions on climate change adaptive measures for prevention and mitigation to the players and the player answers it. This activity is one of the best tools for raising awareness among the mass audience.

Educational Materials and Display: In order to bring awareness among the students, teachers, fishermen and women the Self Help Groups, posters, booklets, leaflet pertaining on climate smart educative messages have been printed and circulated among the stakeholders. The poster emphasizes pictorial messages for all categories of stakeholders and others booklet and leaflet meant for students, teachers and other literate stakeholders.

Newsletter: A newsletter namely, BAHUDA (originally the name of river) has been planned and released two times a year. The local stakeholders have given articles for the printing of newsletter. The articles are based upon the climate change related issues and also the preventive and mitigative measures for the community including the roles and responsibilities of the stakeholders. It is also acting as a mouth piece of the community to raise voice against the local climate-related issues.

Environmental Game: This is an exercise to play among the groups and also individual level which is an eco-game on Bio Diversity Conservation (BDC), Climate Change Adaptation (CCA) and Environmental Management & Restoration (EMR) – overlaps and synergies which should be introduced before this version to ensure the participants have the basic understanding. The participants select cards with titles related to BDC, CCA & EMR. On completing this exercise, participants have a better understanding of how things happen. This is worth involving participants in various planning on resilient community building. The game has found to have most vivid impact over the participants on the themes of CCA, BDC, EMR and ICR.

Celebration of WED & WWD/AWW: Every year PALLISHREE with the active participation of the LCCR, local schools and PFCS celebrate WED & WWD/AWW in the schools and community in order to bring awareness over the conservation and wise use of wetlands in the present climate change scenario. In this activity 5000 stakeholders participate from different villages. Their active participation brings interest and enthusiasm among the stakeholders to adapt the coping mechanism in their practice to conserve and wise use of wetlands.

After the celebration of WED & WWD/AWW in first year, the stakeholders have shown their own interest for organizing the celebration on the 2nd and 3rd year of the project which has been the most successful program in the community.

b) LCCR as Focal Point of Learning: Ten important schools have been selected to establish Learning Center for Climate Change Resilience (LCCR) in the project area. It is a participatory establishment of Learning Center in the schools around the wetland in which the students and teachers will collect various data from the wetland, record the Climate Change Register, Bio Diversity Register and disseminate the findings periodically in the community with the help of resource organizations. Communities have also support for establishment of the LCCR in the local schools. This Center has been acting as the focal point in this project. All the activities have been linked with the LCCR and the student and teachers have a great role played in the implementation of the project. The students and teachers have played the role of the bridge between wetland and community for the conservation and wise use of Bahuda Muhana Sagar.

Climate Change Register & Bio Diversity Register (CCR & BDR): The LCCR has organized the record keeping, CCR & BDR each year. The daily data of weather (such as rainy, sunny, stormy, lightening etc.), ground water level, disaster, livelihood, agriculture and seasonal diseases have been collected and recorded by the students in the CCR. Information on biodiversity, availability of seasonal fishes, migratory birds and plant related issues and variations have been recorded in the BDR. In order to observe the impact over the eco-system by climate change this CCR & BDR have great role. So this recording process would be the long-term community level database which would help wetland management in future.

Training Programs for the Community: Various capacity building measures have been undertaken in the intervention program so as to develop the knowledge, skill and practice of the community. These can be listed as below:

- *Skill Training on Production of Hygienic Dry Fish:* Skill training on the preparation of dry fish hygienically has been organized for 80 fisherwomen in 2017. At the end of the project 525 fisherwomen of 10 villages are using the solar-tent technology and practicing this technology. This technology has reduced the labor cost and time in production and enhanced the quality of the product. The market demand has also increased due to enhanced quality product. So their income also has increased.
- *Training on Crab Culture:* The skill training on crab culture has been organized for 50 members of the SHG. The SHGs would practice this culture for both livelihood opportunity as well as conservation of crabs in the wetland. During the culture the crablings would be automatically released through the outlet because of the bigger mesh size net fixed in the outlet pipe. So it is a livelihood as well as conservation activities.
- *Promotion of Community Resource Persons through the Training of Trainers:* The training of trainers (ToT) has been organized every year for different stakeholders to educate the community on climate change adaptive education. The trainees have been the peer educator for the other villagers of the community. So the potential participants for TOT have been selected by the LCCR.
- *Training on Alternative Energy & Energy-Saving Lifestyle:* Necessary training has been imparted to make the com-

munity resilient with demonstrations such as models like solar lights, efficient energy saving cooking stove as low carbon technology. Traning is given to them on saving water and also utilizing the waste water in agriculture and backyard kitchen garden. It have been reflected in the community and saved the energy at the individual level in their lifestyle.

c) Engagement with Stakeholders through Workshop/ Interface/ Seminars

Workshop for Promotion of the Wise Use of Resources: The local climate change issues and the coping mechanism are discussed in the wise use workshop at the community level. The committee for execution of activities such as nursery raising, plantation program, selection of community land, findings of the LCCR etcetera. are discussed and finalized in this workshop including role and responsibility of community.

Interface Meeting between Stakeholders and Media: The local media persons have been successfully included while implementing the activities. This has been a strategy for the project to increase the visibility of the results and lesson learned from the intervention.

d) Activities and Model Intervention Demonstrating Conservation & Wise Use Practice

Nursery, Plantation: Nursery of 104,700 plants has been raised for plantation program. The community people select the land for raising nursery of mangrove species and at the same time general category of plants. So PALLISHREE has already established two nursery sites, one is for mangroves and another for fast growing different plants. Plantation program in 70 acres of land for mangroves and 75 acres for general category species have been already undertaken.

The following species of mangroves in total have been planted in 70 acres of land

Sl. No.	Name of Species	Scientific Name	No. of of plants
1	Habali	Thespisia populnea	8,500
2	Guan	Excoecaria agallocha	9,500
3	Rai	Rhizophora Apiculata	9,500
4	Sinduka	Kandelia Candel	13,500
5	Kaliachua	Bruguiera parviflora	11,000
		Total	52.000

The following species of fast growing plants in total have been planted in 75 acres of land

Sl. No.	Name of Species	Scientific Name	No. of of plants
1	Casurina	*Cusuarina equisitifolia*	12,000
2	Teak	*Tectona grandis*	6,000
3	Akasia	*Acasia auriclu formis*	11,500
4	Almond	*Terminalia catappa*	6,000
5	Karanja	*Pongania pinnata*	8,200
6	Cashewnut	*Anacardium occidentale*	9,000
		Total	52,700

Eco-friendly Livelihood Promotion Installation of Garbage-Pit: Hygienic dry fish production and crab culture, which are the eco-friendly livelihood promotion models are being practiced by the stakeholders. Necessary training has been imparted to the selected women SHG members before starting of the program.

The garbage pits have been installed of two types (degradable & non-degradable) 2 pits in each schools. Hence 20 numbers of garbage pits have been installed and garbage is managed by the students and teachers. Each year 10 tons of degradable and non-degradable garbage have been generated and managed by the LCCR successfully.

e) Community Engagement, Learning and Capacity Building Activities

Competition: Essay and painting competition among the students have been proved as a capacity building of the students in this project. So it has been organized as a campaign with competitive movement. This activity has been organized by the LCCR in each school. A total of 1500 students have been taken part in this program. The first, second and third students of each competition have been awarded. The best paintings & essays have been displayed in the LCCR.

Exploring Bahuda: The data on good practices and their identification, spawning ground of fishes, samples of different species of weeds, water sample, and biodiversity data have been collected for three major seasons (summer, rainy, and winter) and are analyzed by the students in the LCCR. Season-wise documentation in this regards including the periodical findings of CCR and the BDR have also been disseminated in the community by the LCCR which is helpful in identifying the seasonal wetland status changes.

Knowledge Exchange Program: The selected students, teachers, women from the SHGs & fishermen have visited the Chilika to observe the good practices and management. Knowledge sharing between the stakeholders of two different wetlands such as the Bahuda and the Chilika have been more effective. This program have been facilitated by the LCCR and organized by PALLISHREE.

6. Way Forward

The Project has left footprints of success and cross-learning for us and as well as the community in the landscape of the Bahuda Estuary. The team members of PALLISHREE and the community learned while working on different models. The participatory process in the implementation has become the pillar of its success and sustainability as the local community has the ownership and responsibility of the project. The community level institutions such as Fishermen Co-operative Society, LCCR and Women SHGs who have directly involved with the project shall continue the process after completion of the project period. Maintaining the CCR is a continuous process. It reflects and records the history of the wetland in respect of the CC effects. The community learned about this in the mentoring support of PALLISHREE. Resilience building is a journey, it goes with time. The participants once started this as a practice they will continue in the same lines of actions. New challenges may come in the future, but the practitioners learned how to cope or adapt to the situations by that time. The Project has put successfully the foundation pillars in the community, youth group, women and children-who are future habitants and users of the habitation. They will continue in the same line of actions. The involvement of media personnel has enhanced the voice and outreach of the successes in other similar landscapes in the State.

Community-based Sea Turtle Conservation along the Coast of the Bay of Bengal in India

Wardi Kasinath[16]

Abstract: The Rushikulya River meets Bay of Bengal at Ganja in Ganjam District of Odisha. The Olive Ridley Sea Turtles are arriving in millions every year at this Rushikulya river mouth beach. Previously, there were no conservation activities taken although this is the second largest mass nesting beach in World. PALLISHREE, formed a CBO namely KISSAN "Kruma Iswaram Sangham" (Turtle-God Association) during 2006. It was a part of the project supported by KNCF, Japan and technical support of RCJ, Japan. PALLISHREE enhanced the capacity of the local community in Sea Turtle conservation. The local community is now taking all the responsibility from mating of the turtle to release of hatchlings to the Bay of Bengal. So they have been engaged from November to the next year June, almost 8 months in a year. Generally, they used to stop fishing in the sea from November to the next year April (6 months), to safeguard the turtles from casualty. The catch of the fisherman is very high during the rest of the 4 months. Because the jelly fish in the coastal sea is eaten by the turtle and make the netting favorable in fishing. Jellyfish always create problem in fishing for the fishermen. Thus, the turtles are the friend of the local fishermen.

1. Introduction

KISSAN has promoted women SHG in different hamlets of 12 coastal villages. The members of the SHG are organized to take lead roles in conservation of mangrove plants and turtles eggs. They could understand the importance of bio-diversity conservation in reduction of risk on their lives and livelihoods. Besides, the participation effort has resulted in the promotion of special youth task force in the area. KISSAN in support of PALLISHREE is to build the capacity of these youth volunteers in the '*watch and monitoring'* spheres.

The Olive Ridley Sea Turtle (*Lepidochelys olivacea*) is one of the endangered and ecological important species in the world. Each year millions of them come to the estuary areas along the coast of Bay of Bengal, Odisha in the east coast of India for mating and mass nesting, after long distance ocean travel. Over the years, there is loss of habitat due to increased human-interferences, causing these turtles and hatchlings die, putting them as 'Vulnerable' in the IUCN Red List. They have to travel long distances in the sea for mating and nesting purpose. But at this end they are facing challenges due to human interference and other anthropogenic pressers in their natural breeding and grooming habitat.

It is here noteworthy that there are 3 mass nesting sites of these turtle like the Rushikulya rookery in Ganjam, Gahirmatha in Kendrapada and Devi rookery in Puri are the 3 biggest sites in Odisha which are exclusive for mating and mass nesting of these turtles. Every year, from November to the end of January, the ridley turtles mate in these coastal waters and anytime from January to early April, lakhs of mother turtles come ashore in mass to lay their eggs. After a 45-50 days incubation period, baby hatchlings emerge from the sandy nests to crawl into the ocean.

The Community based protection and conservation of ecosystem has been playing very crucial role in the protection of this species during mating in the nearby sea, lying if eggs on the shore, hatching of eggs and juveniles returning back to the sea.

Photo 1: Mating of the turtles in the sea

Photo 2: Female turtles coming to beach for nesting

2. Threats to the Species

The Olive Ridley sea turtles have suffered high mortality along the Odisha coast. Apart from fishing related mortality, turtles face multifarious problems while they are in the coastal waters of Odisha. The polluted beaches are not suitable for turtles, the animals and the anthropogenic activities like human poaching eggs have tipped the scales against the survival of these ancient mariners. Beach debris including plastics, discarded fishing nets, plastics, etcetera make the place unsuitable for turtles nests. The sea turtles eat plastics, especially floating plastics glued to jellyfish. This is another cause of premature death of many turtles. The jellyfish is the turtle's primary food.

The uncontrolled coastal development, vehicle movement on beaches and other human activities have destroyed or disturbed sea turtle nesting beaches in Odisha. Climate change has an impact on turtle nesting sites. It alters sand, which then affects the sex of hatchlings. It is also leading to a decline in the extent and quality of their habitat, population size and genetic diversity. To counter the high mortality rate (to predators) and low survival rates (one in a thousand), these gentle creatures have pushed towards the green or extinction. If current trends continue, the Olive Ridley sea turtles will probably go to extinct in next one decade.

3. Response by Local Communities

The Rushikulya River meets the Bay of Bengal at Ganja in Ganjam District of Odisha. The Olive Ridley sea turtle arrive in millions every year at the mouth beach of the Rushikulya River. Previously, there were no conservation activities taken although

16 President, KISSAN

this is the second largest mass nesting beach in the world. The eggs were destroyed by predators. PALLISHREE, formed a CBO namely KISSAN "Kruma Iswaram Sangham" (Turtle-God Association) during 2006. There are mythological stories in Hindu that once God became a Turtle and saved the Earth. So in order to bring emotion among the stakeholders, the local community have kept the name of the CBO as "KISSAN". It was a part of the project supported by KNCF, Japan and technical support of RCJ, Japan. PALLISHREE enhanced the capacity of the local community in sea turtle conservation and built partnership with Forest Department. The local community is now taking all the responsibility from mating of the turtle to the release of hatchlings to the Bay of Bengal. So they have been engaged from November to the next year June, almost 8 months in one year. Generally, they stop fishing in the sea from November to the next year April (6 months), to safeguard the turtles from casualty. The catch of the fisherman is very high during the rest of the 4 months. Because the jelly fish in the coastal sea is eaten by the turtle and make the netting favorable for fishing. Jellyfish always create problem in fishing for the fishermen. Thus, the turtles are the friend of the local fishermen.

KISSAN has promoted women SHG in different hamlets of 12 coastal villages. The members of the SHG are organized to take lead roles in conservation of mangrove plants and turtle eggs. They could understand the importance of bio-diversity conservation in reduction of risk on their lives and livelihoods. Besides, the participation effort has resulted in the promotion of special youth task force in the area. KISSAN with support of PALLISHREE helps build the capacity of these youth volunteers in the '*watch and monitoring*' spheres. The process has attained sustainability since it is now led and managed by the community. The NGO is supporting these community groups in the spheres of coordination with other stakeholders like the Forest Department, Fishery Department and other private associations.

Photo-3: Laying of Eggs on the Beach

Photo- 4: Covering of Eggs the Turtle

Wildlife scientist Dr. Bivash Pandav initiated the Rushikulya Sea Turtle Protection Committee (RSTPC), with the assistance of the local youth. From the time of its inception, it is also working to spread awareness among the locals about the ridleys, thus ensuring the participation of the community in conservation efforts.

The RSTPC is today a strong 37-member organization, comprising youth belonging to the three villages of Purunabandha, Gokharkuda & Podampeta.

KISSAN along with the RSTPC takes activities that included keeping the beach clean, measuring the beach profile and nesting area, monitoring the arrival of turtles for nesting and keeping fishermen and predators away from the beach during the nesting and hatching season. Besides, the Forest Department of Ganjam has been taking similar community-based initiation nowadays.

They have protected the beach landscape, hatcheries and also operating a control room/ office on the beach for this purpose.

Photo-5: Community Meeting on Conservation

4. Results

Gahirmatha rookery is coming under the Bhitarkanika Wild Life Sanctuary area in the district of Kendrapada. Since it has the largest mass nesting records, the conservation activities are somehow organized by the Forest Division. Besides several research organization and conservationists have worked along with the local NGOs/ CBOs and communities. The area is protected by the Forest Act.

But the rookeries in Devi and Rushikulya are somehow unrestricted. The local fisherman uses the same beach for their fishing and other activities.

Now the NGOs like KISSAN and the RSTPC work directly with the communities and the stakeholders. Since the members of these CBOs belong to the same fisher community, the participation was easy. Thus the process has got success and became a community led conservation efforts.

One of the success indicators of this work is that last year (in 2018), the mass nesting / Arribada activities have happened two times in this rookery. Since the turtle felt that the nesting site is safe, clean, the favorable conditions has attracted the turtles to come twice a year.

The school children are also encouraged to participate in the process. This helps them to learn from the actions taken by the elders.

Photo-6: School Children Seeing, Learning & Beach Cleaning

5. Way Forward

In wildlife we often talk about the flagship approach of conservation, which means by protecting the very species, which is at the apex of the ecosystem population, all other species or communities living in that particular ecosystem can be protected. In other words if the population of a species at the apex of the ecosystem is in a healthy state it means that the population of all other species of that particular ecosystem is in a healthy state. In aquatic environment in the coastal waters as well as in the high seas, the sea turtles and cetaceans are at the apex of the coastal/marine ecosystems.

Therefore, by protecting the estuarine sea turtles, it can be ensured that the populations of all other species in these ecosystems are well protected and it can be ensured that they are in a healthy state. The seasonal phenomenon of mass migration, mass mating, mass nesting as well as mass emergence of hatchlings is considered as one of the greatest extravaganza of nature. The site also holds areas of exceptional natural beauty and aesthetic importance. The Rushikulya sea beach along the coast being world's second largest rookery attracts over half a million female Olive Ridley sea turtles for mass nesting/ egg lying.

Protection of ecologically sensitive and important coastal as well as marine areas always safeguards the long term livelihoods of local sea fishing communities on a sustainable basis in the surrounding areas since the health of these ecosystems bear a direct relationship to the ecosystem services they provide (such as fisheries production); mangroves and breeding grounds for a variety of fish, prawns and crabs. The protection of ecologically sensitive and important coastal as well as marine areas always safeguards the long-term livelihoods of fishing communities on a sustainable basis in the surrounding areas.

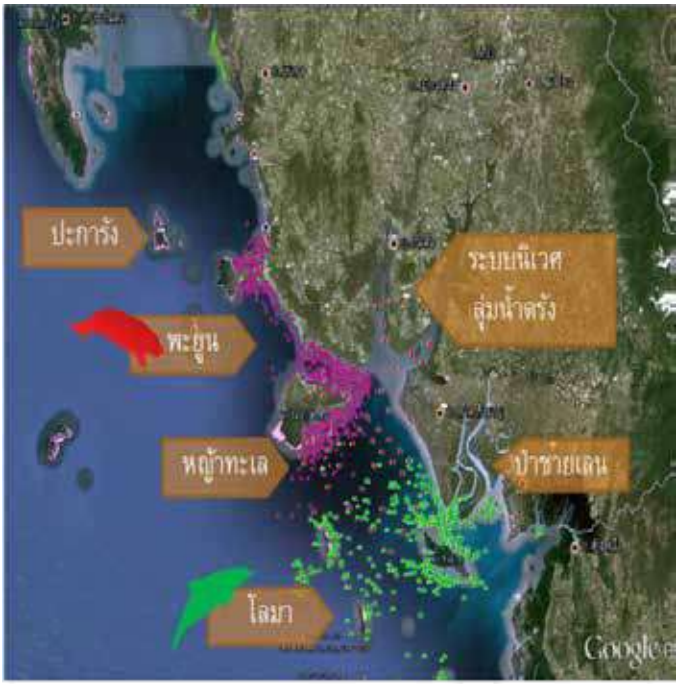
People's Efforts for the Conservation of Dugongs In Trang Province, Thailand

Maneewan Sanlee[17]

[Note: This summary is based on the PPT presentation made by the author in the Symposium. — Editors]

Introduction

Trang Province is in the southern part of Thailand on the coastline of the Andaman Sea between Krabi and Satun provinces. The Province has 119 km long coastline. It has diverse natural marine and coastal ecosystems including the Ramsar sites: Had Chao Mai NP – Koh Li Bong NHA –Trang River Estuary. The Province houses important ecosystems such as mangrove, seagrass, coral reef and marine species i.e. Dolphins, Dugongs and Sea Turtles.



2. Although the flag species of the area is dolphin, the faunal diversity of the area is as follows.

(1) Dolphins: Its total population is 150. Its species are as follows.

- Indo-Pacific Hump-backed Dolphins = 70
- Irrawaddy Dolphin = 40
- Bottlenose Dolphin = 30
- Finless Dolphin = 10

(2) Dugongs: In Thailand, the total number of dugong is about 200 and the biggest school (160-180 individuals) of dugongs is found in Trang. Dugongs migrate along the coastline of Trang, Krabi and Satun provinces. Seagrass is the food of the dugongs and its beds are their habitat.

(3) Sea turtle: The population of sea turtle is about 1,000.

(4) Seagrass bed: Had Chao Mai NP - Koh Libong NHA – Trang River Estuary have high density and houses some 11 species of seagrass in 2,000 ha.

2. Situation of Dugong in Thailand

Dugongs are in the high risk of extinction. Every year their mortality is about 5. According to the aerial survey of dugongs in Trang Province by the Department of Marine and Coastal Resources, their status from 2012 to 2018 can be summarized as follows.

- Dugongs population has decreased since 2013 due to high mortality of 13 dugongs but their number is continuously increasing since 2014.
- In 2018, their number is estimated to be at160-180 in Trang province.

The Department has been doing the aerial survey of the dugongs in the Trang Province for the past 12 years. And the latest survey at Koh Libong undertaken in the first week of March of this year i.e. 2019 sighted many pairs of mothers and calves in the sea.

3. Causes of Mortality

Dugongs, dolphins and sea turtles share the same area as fishes. This is the area for tourism as well. Therefore they are the part of the fishing and boat-tourism. [Dolphins eat mackerels contained in fishing nets and destroy the nets as well. Fishers allow them to eat fish. Whenever, they see them being killed in the fishing gears, they feel sad.] Villagers are friendly with dolphins and dugongs. The major causes of thier mortality are:

- Traps, nets & illegal fishing gears
- Marine transportation
- Disturbance from the increase of tourist boats and speed boats

4. Local Participation in Dugong Conservation

Communities love dugongs and people are friendly to dugongs. Dugongs are the Indicators of abundance of marine life. This bond is the key to the success of dugong conservation campaign in the area. The Save Andaman Network Foundation works closely with communities for seagrass-dugong conservation. Its activities are as follows.

a. Raise awareness of communities about the importance and value of dugongs
b. Increase the area and feeding ground for dugongs & other aquatic species
c. Put restriction on the use of speed boat in seagrass beds & inappropriate fishing tools.
d. Expand the commercial fishing zone by fixing the maritime routes for vessel movement
e. Support vocational development & community-based eco-tourism
f. Protect seagrass beds because dugongs feed on seagrass. The excreta of dugong serve as manure to seagrasses. Seagrass helps absorb carbon monodioxide as well.

17 Save Andaman Network Foundation (SANF), Thailand

Other activities of the Foundation undertaken in collaboration with local communities are:

1. Support coastal community organization and community network in Trang province facilitating monthly meeting to discuss urgent agenda, specially dugongs and seagrass conservation.
2. Support youth and the public for the conservation of dugong and coastal ecosystem.
3. Has established a Marine Conservation Learning Centre: The Center runs crab bank, mangrove plantation, squid breeding, seagrass breeding, study visit, hands-on practices etcetera.
4. Has set up of the Fund for Sea and Dugong Conservation
5. Has started marine and coastal resource conservation activities
6. Started Ecotourism since December 2017. More than 2,000 tourists have visited the year. Besides they are engaged in hill climbing, walking on the beach, wading etcetera.
7. Support communities to set up rules and regulations on marine and coastal conservation zoning and rare species conservation such as:
    a. Zoning Aquatic Larvae Conservation Areas in 4 village (2007)
    b. Legislation on Marine and Coastal Resources Conservation and Sustainable Use (2010) for the Bor Hin Subdistrict Administrative Organization, Dugong and Seagrass Conservation (2011) for Koh Libong Subdistrict Administrative Organization and dolphin and Seagrass Conservation (2015) for Koh Sukorn Subdistrict Administrative Organization
    c. Seagrass Conservation Zoning in Boon Kong Bay-Pru Jood, Mai Faad, Sikao district.
    d. Wing Shell Conservation Zoning in Baan Koh Mook
    e. Marine and Coastal Resources Conservation and Sustainable Use Zoning Map in Boon Kong Bay Zone, Sikao, Trang Province
    f. Collaboration with the Federation of Thai Fisheries Association to draft Fisheries Act 2015 and Marine and Coastal Resource Managmange Act 2015
    g. Support Youth and Women's Fisherfolk Network to participate in vocational career, marine processing, income generation activities (ecotourism, fishery & fish products) & conservation education.

Some Suggestions

1. More funding and policy support from the Government are required for community-based marine and coastal resources management
2. Needed specific policy to conserve seagrass beds, ecosystems and dugongs.

Part IV: Livelihood, Biodiversity, Education & Fisheries

Management of Koggala Lagoon for Sustainable Livelihood Development – A Case Study in Sri Lanka

I. R. Palihakkara and A.J.M.C.M.Siriwardana[18]

Abstract: The livelihood framework identifies five core capitals which sometimes are called livelihood building blocks. These are natural, social, human, physical and financial capital. On the other hand, rapid deforestation and biodiversity losses are depriving people of valuable mangrove-based water resources, such as fuelwood, fish, shrimp, food, medicine, and ecosystem-based services such as bird watching, boat riding. Koggala lagoon is located on the southern coast of Sri Lanka. It consists of 14 islets with forest, mangroves and terrestrial shrubs. Livelihoods around the lagoon mainly depend on tourism and fisheries. This research was conducted from 2017 January to 2018 April. Fishing mostly depends on brackish waters due to sea water intrusion into the lagoon. Majority of the respondents mentioned that there are number of societies, local governments involved in managing tourist industry as well as environment. They have been restricted harvesting of mangrove for timber and fuel wood. The landing of sea planes in the lagoon is known to affect the bird populations, and causes erosion of the lagoon banks due to the large waves created during landings. Respondents claims that decreasing of biodiversity in lagoon directly has affected on their livelihood due to large scale clearing of mangroves for construction purposes. It was identified that boats were operated by unskilled people without using safety jackets. Government involvement is necessary to prepare policies to regulate tourist industry and improve infrastructure facilities. Regulate unauthorized construction beside the lagoon and control discharge effluent from nearby free trade zone to improve lagoon biodiversity.

1. Introduction

Koggala lagoon is located between 5° 59′ - 6° 02′ N and 80° 18′ - 80° 21′ E on the southern coast of Sri Lanka with total water spread area of 7.27 km2. Water depth of lagoon ranges from 1.0 to 3.7 m (CEA, 1995). The lagoon is a rain fed coastal lake with catchment area of 60 km2 (Amarasekara *et al.*, 2012). There are number of streams connected to the lagoon. The main freshwater supplier is "Koggalaoya" (Warabokka-ela stream). Other than "Koggalaoya" Heen-ela stream contributes a minor to the freshwater inflow. A narrow 300 m long canal named as "Pol-oya" canal is the only sea outlet of lagoon, located at the southeast corner (Fig. 1). (Gunaratne *et al.*, 2010). At the lagoon mouth, there was a naturally built sand bar perpendicular to the lagoon mouth which controlled the seawater intrusion into the lagoon. With the opening of the lagoon mouth during the rainy season, rapid outflow of water begins. However, the flow of seawater into the lagoon during the monsoon and high tides ceases the formation of sand bar again in the dry season. In early 1990's it has been followed by unplanned removal of sand barrier near the lagoon mouth for some development activity. A groyne system was built to minimize coastal erosion. However, since then the mouth of lagoon has been kept open throughout the year. Therefore strong sea water influence seems to have fed by the lagoon as far as about 2 km from the lagoon outlet (G.P.Amarasekara et al., 2012, Gunaratne et al., 2010, Silva et al., 2013)

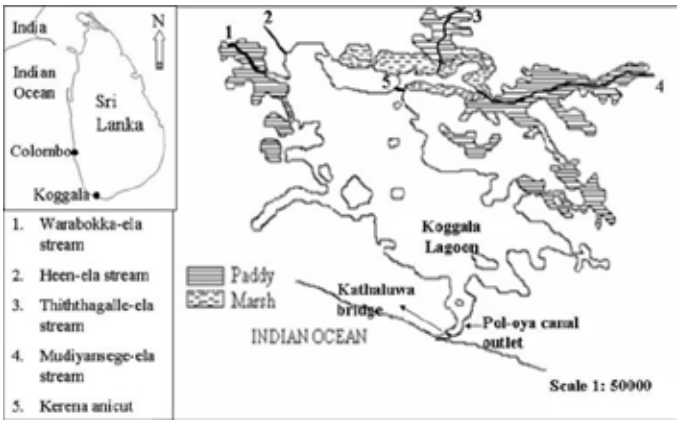


Fig. 1 Map of Koggala Lagoon with the Locations of Outlet and Major Freshwater Inflows (Source: Gunaratne *et al.*, 2010)

This study was conducted to identify the socio-economic situation of community around the Koggala Lake; to identity environmental aspects and issues; to identify the issues related to livelihood and to make appropriate suggestions to overcome the recognized issues

2. Method

The study was conducted in Koggala lagoon in Galle district in the Southern Province Sri Lanka (Fig 1). Peoples who live around Koggala lagoon were interviewed to collect primary data. Additional information was collected through systematic field observation. In addition, past research articles were used to obtain secondary information.

Demographic information on age, education, family size, income, nature of the occupation, experience, major cost components for the occupation, importance of lagoon for livelihood, government and social legislation were collected using pre-tested structured questionnaire.

3. Results

Livelihood around the lake mainly depended on the agriculture, tourism and fisheries. After removal of natural sand barrier, salinization of paddy fields gradually changed livelihood towards tourism and fisheries. Male peoples, age ranging from 20 to 45 years mainly engages with boat riding and fishing. Some 33% from them are boat owners and more than 30 boats work for lagoon tours. Their average family size is determined to be 4 (range 3 - 5). The experience of boat riding people varied from 5-30 years. All boat riders and fishing community indicated that their whole family engaged in similar occupation. Some 75% respondents claimed that over fishing, over tourism, illegal fishing and deforestation are low under society-based regulation

4. Discussion

The lake consists of 14 islets of varying sizes with forest, mangroves and terrestrial shrubs. The largest islet is located in the southeast corner of the lagoon near Gurukande Temple. There are a number of sites/islets of historical and cultural value in the area including Madol Duwa, Thalathuduwaaranyasenasanaya. Other than above sites there are many sites that have been developed for tourism like fish therapy, cinnamon pealing center, bird watching and tours. There are numerous direct and indirect benefits possess from the lake including

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fuel wood, medicinal plants etc.

Tourists both local and foreign varies with time, approximately 50-200 local tourists visit per day (mostly on the weekends) and 50-100 foreign tourists per day (from December to April) (IUCN Sri Lanka and The CEA, 2006). Therefore, income is fluctuating according to the number of tourist and average yearly income claims is about 200,000.00 LKR.

Fishermen involved in Koggala Lagoon claim that present fishing industry mostly depend on brackish waters due to seawater intrusion into the lagoon. Important species for fisheries identified as prawn (*Metapenaeusdobsoni, Penaeusindicus* and *Macrobrachiumrosenbergii*) (IUCN Sri Lanka and The CEA, 2006), brackish water fish species (Parati, Godaya), freshwater fish species (Malkoraly, Thilapia, Lula), (Kithsiri.M.K.U., 2009) and crabs (water/ mud crabs).

Respondents mentioned that, there are number of societies and local governments involved to manage tourist industry as well as environment. They have restricted the harvesting of mangrove for timber and fuel wood as well as deforestation by their societies.

5. Disturbances and Threats

Removal of the natural sand barrier decreased the fish production. The landing of seaplanes in the lagoon is known to affect the bird populations, and cause erosion of the lagoon banks due to the large waves created during landings. Respondents claims that decreasing of biodiversity in lagoon directly affected on their livelihood. Large scale clearing of mangrove trees for construction purposes is another problem. IUCN Sri Lanka and The CEA (2006) showed that growth of invasive plant species within the lagoon (i.e. *Salviniamolesta*) has led to the decrease in other species naturally found in the area. It was identified that boats operated by unskilled person with less safety (i.e. without safety jackets) has had adverse effects on the tourism industry.

6. Future Prospect around the Koggala Lake

It needs urgent government involvement to prepare policies to regulate tourist industry. Improve infrastructure facilities like toilets, vehicle parks, etcetera. Regulate unauthorized construction beside the lagoon and discharge of effluent from free trade zone of Koggala. Sandika and Hirimuthugoda (2012) identified those major cost items of fishing industry as boats, nets, hand nets, snare, floaters and baits.

Conclusion

Koggala Lagoon plays an important role in livelihood development of community in the Koggala area. Brackish water fishing is the main income source followed by tourism industry. It is important the involvement of the government to make policy for developing eco-tourism industry. Rules and regulations should be prepared to regulate unauthorized construction of the lagoon boundary and despotic discharge of effluents from the Koggala industrial zone and domestic waste to the lagoon. Need urgent actions to overcome erosion of the lagoon banks and to increase mangrove population and biodiversity in lagoon area.

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Achievements and Challenges of the World Bank- aided Integrated Coastal Zone Management Project in Odisha

A. K. Pattnaik[19]

1. Introduction

Historically, the coastal zone has been a major focus for the development of human Society. The coastal and marine ecosystems being highly productive attract human settlement and economic activities. Coastal zone ecosystem is important for biological and economic productivity, storm protection, erosion control and most importantly it provides a host of ecosystem services which are crucial for human wellbeing. Despite their ecological richness and the contribution to national economy, the coastal and marine areas have not received adequate protection, and are under stress. Rapid urban-industrialization, maritime transport, marine fishing, tourism, coastal and sea bed mining, offshore oil and natural gas production and aquaculture have led to a significant increase in demand for infrastructure, resulting in the over-exploitation of natural resources. Such rapid depletion and degradation, unless arrested, will impact the livelihood, health and wellbeing of the coastal population; affecting in turn prospects for sustained economic growth.

Odisha is situated at the East coast of India along the Bay of Bengal. Odisha's coast is subject to severe coastal weather events, such as storm, cyclones and tsunami, inflicting great loss of lives and property, especially among the rural coastal communities that always had low resilience & adoption to extreme weather variability. In recent years, the accelerated erosion of coastal land has affected coastal agriculture and built habitats. The returns from traditional fishing are also diminishing due to depletion of stock and over-exploitation. Climate change is likely to further exuberate the risks to coastal communities and infrastructure. Studies reveal a significant potential risk from rise in sea level, increase in the frequency and intensity of extreme weather events, and changes in mean climate variables. Six coastal districts of Odisha account for 36% of state's population. Economic development, rapid population growth, urbanization and migration from inland to coastal areas are exerting increasing pressure on coastal zones. Odisha's coastal zone is endowed with a wide range of mangroves, seagrasses, salt marshes, sand dunes, estuaries, lagoons, and a host of unique marine and coastal flora and fauna. The abundant coastal and offshore marine ecosystems include some 1435 sq. km of mangroves forest in Bhitarkanika with more than 82 species, which are among the most diverse mangrove of the world. There are major stocks of fish, marine mammals, reptiles and Olive Ridley sea turtles, seagrass meadows, and abundant sea weeds.

In this context, the Ministry of Environment, Forest & Climate Change, Government of India, The World Bank and Government of Odisha have come forward with an integrated approach to coordinate activities of various government agencies & departments for the sustainable management and usages of coastal resources maintaining the natural environment. The Integrated Coastal Zone Management (ICZM) Project, on a pilot basis is being implemented in three coastal states i.e. Gujrat, West Bengal and Odisha. The pilot project is funded by the World Bank through the Ministry of Environment, Forest & Climate Change, Government of India. The allocation would be received as grant from the Ministry of Environment, Forest & Climate Change, Government India. The ICZM Project for Orissa was formulated based on multidisciplinary and interactive framework to promote sustainable management of coastal zones through a wide consultative process to make it as inclusive as possible. Considering the dynamic nature of coastal ecosystem an adaptive approach for formulation of the project was followed. A series of grass root level consultation workshops were being organized to get the inputs from the stakeholders. The Project, on a pilot basis is being implemented in two coastal stretches i.e. (i) Paradeep to Dhamra & (ii) Gopalpur to Chilika

2. Project Component

1) Formulation of an Integrated Coastal Zone Management (ICZM) Plan for the State
2) Study of coastal erosion and associated oceanographic processes
3) Vulnerability to disaster
4) Biodiversity conservation
5) Livelihood security of the coastal communities
6) Pollution/ environmental quality management
7) Improvement and conservation of maritime built heritage structure & promotion of heritage tourism
8) Promotion of community-based ecotourism.

The Department of Forest and Environment, Government of Odisha is the nodal Department to coordinate with all the 10 implementing agencies/ departments for implementation and monitoring of activities under the ICZM Project. Further, expert consultancy has been hired from Integrated Coastal & Marine Area Management (ICMAM, Chennai), Department of Marine Sciences, Berhampur University, IIT Madras and Xavier Institute of Management, Bhubaneswar for guiding in techno-environment aspects and socio-economic and cultural aspects. For effective management and implementation of the ICZM Project in Odisha, a separate 'State Project Management Unit' (SPMU) has been created for smooth implementation of the project and inter-sectoral co-ordination, which is the core of the ICZM.

3. Project Executing Agencies and Project Component

1. Department of Water Resources

Based on the shoreline change assessment of Odisha coast made by the National Centre for Sustainable Coastal Management (NCSCM), 39.3 km (about 8.2 percent) is identified as high erosion zone, 51.96 km (10.82 percent) fell under medium erosion zone out of the 480 kilometer coast of Odisha. In order to find a long-term solution to the problem of coastal erosion and also to recover the beach areas that were lost in the past, erosion control measures in the form of a hybrid soft & hard engineering method such as deployment of geo-synthetic tubes at a depth of 4 to 5 m in the sea to dampen the wave force in one of the most erosion prone stretch near village Pentha was piloted under the project. As a result of the deployment of the geo-tubes in the sea, the wave energy at coast is being minimized and settlement of sand is taking place between the stretch of 4 m depth and the shore. Over the years, the lost beach is being regained. This method has been proved to be effective at several locations in the world. Laying of geo-synthetic tubes over a stretch of 700 m after deciding the alignment through modeling studies, was to dampen the wave energy on the coast and also to facilitate settlement of sand between the tubes and the coast. This would act as a first layer defense to the coast against strong wave action which is responsible for erosion. This acts as a last line of defense against sea water intrusion into the highly productive paddy field of more than 20,000 ha and life and property of more than 17 villages.

19 Vice President, WISA

2. Odisha State Disaster Management Authority

A study conducted on the Odisha coast revealed that significant impacts of storms, cyclones and associated floods are experienced up to 10 km from the coast. The OSDMA has constructed a number of cyclone shelters as per the assessment done by the Indian Institute of Technology (IIT), Kharagpur. As an immediate requirement of the people living within 2 km from coast and vulnerable to cyclone, few more shelters are felt necessary to be established to ensure safety of the local communities during the extreme climatic events.

Fourteen Multi Purpose Cyclone Shelters (MPSC) are established at the villages of Pentha, Manjuapalli, Petachhela and Badatubi in Kendrapara District, Samalanasi and Madhurchuan in Ganjam District and at Jamuna, Titipo, Alanda, Jharkota, Khirisahi, Baghamunda, Khatiakudi and Gurubai in Puri District. As per estimate above the MPCS is providing shelter to 14,000 people during the disasters. The shelters are designed to withstand wind velocity up to 300 km per hour and roof load of 500 kg per sq. m. and the entire construction specifications are as per the prescribed standards. The shelters are connected with all weather roads and communication system and have all basic amenities like water, electricity, toilets, kitchen, etcetera.

3. Forest Department Wildlife Wing

3.1 Conservation of Biodiversity

Activities under this component are; protection of Olive Ridley sea turtles, cetaceans, estuarine crocodiles and other aquatic wildlife, construction of research and monitoring center at Rushikulya river mouth, strengthening of crocodile research and rearing center at Dangamal and plantation of mangroves/ mangrove associates and other suitable species.

3.2 Livelihood Security

Community-based participatory eco-tourism activities are promoted under this component to reduce the dependence of local population on forest and fisheries resources. The activities have been renovation of Hukitola colonial building, drinking water facilities, tent accommodation, construction of a kitchen, construction of jetty, tourist complex, provision of mechanized boats, laying down trekking path monitoring and interpretation centers.

4. Fisheries and Animal Resources Development Department

Addressing the cause of securing alternate livelihood of the fisher folk in the project area (coastal stretches from Gopalpur to Chilika and Paradeep to Dhamra) affected due to ban on fishing for conservation has been a major component of the ICZM Project. This component is implemented through the Fisheries and Animal Resources Development Department (F&ARD) and aimed at providing the best alternate livelihood options/ support to 600 Self Help Group's (SHG) of fishing villages comprising above 9,000 families in both the coastal stretches. The Department has initiated fisheries and non-fisheries based alternate livelihood activities to support the local fishing communities during ban on fishing. The major thrust under this component have been providing alternate source of livelihood for local fishing community affected by the ban on fishing during the breeding and nesting of the Olive Ridley sea turtle. The communities through the SHG, supported to do the freshwater carp culture, crab fattening in abandoned shrimp farms and other activities like value addition etcetera. under this component. The alternative livelihood activities carried out by the SHGs have been based on the best practices, best technology and intense capacity development and the handholding of the beneficiaries to make the activities sustainable.

5. Odisha Tourism Development Corporation

Under this component sustainable livelihood through community-based eco-tourism involving the local fisher communities is achieved. The location of the activities has been at Sipakuda, Satapada, Barkul and Rambha along the Chilika Lake. Infrastructure like interpretation center, food court, public conveniences, parking, boating, up gradation of water sports complex development and rescue facility, amusement park, handicraft/ handloom outlets and illumination of water sports complex etcetera. were developed. These infrastructures is being run and maintained by the local communities after proper training for operation and management. Eco-tourism is generating supplemental income for members of the local communities. Local delicacies and handicrafts are also promoted by the communities. Seventeen villages along the outer channel of the Chilika lagoon are immensely benefitted through these activities.

6. Odisha Coir Cooperative Corporation Ltd.

Besides fishery and tourism-based livelihood options, the Project also explored other means of alternate feasible avocations. One locally available resource along the coast is coconut. Extensive coconut plantations are carried out by the local people in the Puri District. The coconut husk after removal is mostly utilized for firewood purposes by the fishers. Looking at the availability of husk in plenty coir making as a means of livelihood for the local people was introduced under the project. For this purpose, training centers with appropriate machinery are established at strategic locations. The capacity building of the women from fisherman communities on coir making has been the major thrust of this component. They are producing quality coir products now and are being marketed by the Odisha Coir Corporation.

7. Odisha State Pollution Control Board

Odisha State Pollution Control Board has set up a Center for Monitoring of Coastal Ecosystem (CMCE) for environmental monitoring (air, water & soil) to create a robust database under the Project. This is also serving as a capacity building center for skill up-gradation for monitoring of the coastal water and pollution and the use of software for preparation of coastal environmental database. The building is a LEED certified platinum green building. A monitoring vessel is also deployed at Paradeep under the Project for monitoring the coastal water. Software is procured to understand the behavior of pollutants in estuarine and coastal waters and use this knowledge to predict eco-toxicological risks posed by their presence in these eco-systems.

8. Paradeep Municipality

In Paradeep 48.00 M.T. of solid waste is being generated per day from various sectors like industry, household, market, commercial establishments & hospital waste. It is estimated that 64.00 M.T. solid wastes would be generated per day by 2021. Since the area is under the rapid state of industrialization the population growth is expected. As a pilot on abetting the coastal pollution, Paradeep Municipality has been supported to set up a proper Solid Waste Management System with larger land fill site. This includes Leachate Management System, Landfill Gas Management System, Surface Water Management System, Groundwater Management System and monitoring of disposed materials.

9. Department of Culture

Based on archaeological, architectural, sculptural and historical importance, the Archaeology wing of the Culture Department has identified seven important monuments along the coast for conservation and renovation. These monuments are at various stages of degradation due to coastal influence. Since these built maritime manmade monuments are situated along the important tourist circuit there is immense potentiality to convert them into heritage tourism sites. Preservation of the above ancient monuments have been its protection, structural conservation, chemical conservation, environmental up gradation (landscaping) and maintenance from time to time with provision of watch and ward for the monuments.

The community participation by way of developing these monuments in heritage tourism sites has been ensuring its sustainability.

10. Chilika Development Authority

The Chilika Lake shelters highest number of Irrawaddy Dolphins an endangered species and is the largest wintering ground of migratory bird of Asian sub-continent. It is a wetland of international importance and a Ramsar site. More than 0.2 million fishers depend on the lake fishery for their livelihood. More than 0.6 million tourist visit the lake for dolphin and bird watching which provide an excellent means of alternate livelihood for the local communities. Therefore, it is highly essential to maintain the ecological integrity of the lake for conservation of the biodiversity and safeguard the ecosystem. In order to expand the present monitoring protocol of dolphin and birds, specialized components under the project, strengthening of the "Wetlands Research and Training Center", monitoring the water quality of the Chilika Lake are accomplished.

4. Project Outputs

The ICZM framework is a paradigm shift from the traditional approach of sectoral management of the coastal resources to a comprehensive, integrated approach for better governance and management. For effective management and implementation of all project activities and coordination with 10 PEAs of the ICZM Project the State Project Management Unit (SPMU) was established. The SPMU adopted the ICZM approach to coordinate activities of various sectors & resource users for the sustainable management and wise use of coastal resources maintaining the integrity of coastal ecosystem. During the course of implementation of the project, critical areas related to conservation of the coastal environment and the conflicting livelihood issues are being put to test the practical application of the ICZM framework in the project area. The project has initiated a number of communication activities including multi-stakeholder workshops to disseminate and gradually focus on capacity building to implement the pilot activities by PEAs adopting the ICZM framework to make them sustainable.

The Project benefitted approximately 2.5 million coastal population of Odisha. In addition to the direct benefit in the form of infrastructure created under the aegis of the Project, capacity building and sensitization of the coastal communities to adopt and cope up to the extreme climatic events like cyclone, tsunami, flood, is achieved. The coastal communities were sensitized on conservation of natural resources (flora & fauna) through the well-structured CEPA activities under each component. Nearly 4 lakh population of 235 coastal villages of Kendrapara, Jagatsinghpur, Puri, Khurda and Ganjam are directly benefitted from the Project activities. Direct employment opportunity for the coastal fisher folks was created through eco-tourism activities. Demonstration investments in critical areas related to conservation of the coastal environment was put to test the practical application of the coastal zone management approach in states.

5. Challenges & Way Forward

Sustainable management of coastal and marine resources is essential for long-term economic growth and to ensure the equilibrium between economic development and the protection of the environment. The major challenge faced during the implementation of the Project was the lack of knowledge, information, skill, capacity & experience to adopt the ICZM framework for the successful co-ordination and implementation of the Project in an integrated manner. During the course of implementation of Phase-I, some significant capacity is built, credible database on coastal processes is generated through regional coastal process studies. One of the major outputs of the Phase-I ICZM Project has been the formulation of the ICZM Management Plan of Odisha. The Plan was formulated with an objective to facilitate the development and implementation of an integrated management strategy for the coastal zone, by adopting a broad perspective and a multi-sectoral approach, ensuring the wise use of coastal resources, perpetual maintenance of high level of biodiversity, conservation of critical habitats and maintaining their ecological integrity including sustainable coastal fishery, protection from extreme weather events, nature-based tourism, and infrastructure development. The major challenge of successful implementation of the ICZM Plan would be effective coordination of various coastal economic sectors towards long-term optimal socio-economic outcomes, the ICZM compliant coastal infrastructures including resolution of sectoral conflicts and mediating beneficial trade-offs. The p\Project on long-term would balance environmental, economic, social, cultural objectives, all within the limits set by natural dynamics and facilitated integration of the terrestrial and marine components of the target territory, in both time and space through the successful implementation of the ICZM Plan.

Biodiversity Value and Challenges of Myanmar's Ramsar Sites

Maung Win[20]

Abstract: Wetlands are one of the most important parts of the natural environment in Myanmar. They play a vital role for the economic development and climate stability. Effective conservation, management and wise use ensure the natural resources and services received from wetlands for future generation. Wetlands play a very important role in Myanmar, which depends mainly on agriculture. Wetlands store water for agricultural lands, improve soil, purify and recycle waste water, buffer and protect from extreme weather events, regulate and cool the climate, and ultimately provide habitat for birds and other species that remove agriculture pests. Climate change is threatening wetlands and their associated species. Climate change affects all ecosystem services including food production and importantly, it disrupts the cooling effect of wetlands, and is challenging the development of the country. Currently, there are threats and challenges to the biodiversity of Myanmar due to climate change. The conservation and wise use of wetlands must become a national priority to mitigate climate change and increase resilience to natural disasters. To do so, the cooperation among the relevant ministries, non-governmental organizations, local communities, and all stakeholders is required.

1. Introduction

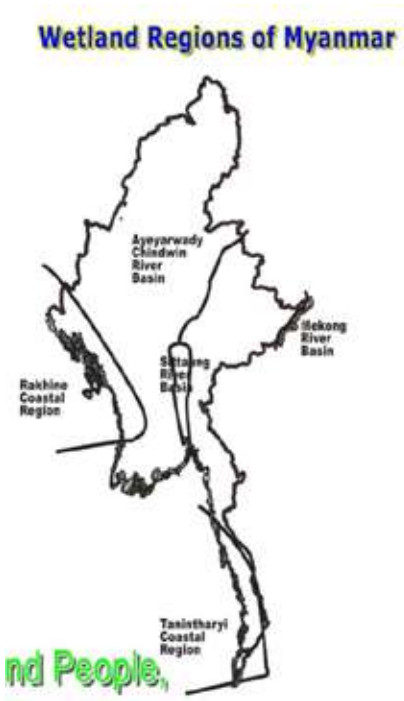
The conservation of natural resources has been a feature of government policy in Myanmar for nearly a century, and the protected areas (PAs) are established to conserve ecosystems and associated biodiversity. Myanmar has a national target of PAs as 10% of country's land area. In the present, 42 PAs representing 5.79% of the country's area have been established across the country. Among these 42 PAs, ten of them are wetlands including Hkakabo Razi National Park, Indawgyi Wildlife Sanctuary, Inlay Lake Wildlife Sanctuary,

Wtethikan Bird Sanctuary, Moeyungyi Wetland Wildlife Sanctuary, Hukaung Valley Wildlife Sanctuary, Meinmahla Kyun Wildlife Sanctuary, Moscos Island Wildlife Sanctuary and Lampi Island Marine National Park.

The 2004 Wetland Inventory for Myanmar classified six wetland regions in Myanmar. Ayeyarwady/Chindwin River Basin, Thanlwin (Salween) River Basin, Sittaung River Basin, Mekong River Basin, Rakhine Coastal Region and Thaninthayi Coastal Region. These regions support a huge diversity of coastal and inland wetlands.

Myanmar became a Contracting Party to the Ramsar Convention on the 17th March 2005. Since its accession, the Forest Department under the Ministry of Natural Resources and Environmental Conservation has been responsible for wetland conservation, as the Administrative Authority of Myanmar for the Ramsar Convention. Five wetlands have been designated as Wetlands of International Importance, commonly called the Ramsar Sites: Moeyungyi (2004), Indawgyi (2016), Meinmahla Kyun (2017), Gulf of Mottama (Mon State) (2017) and Inlay (2018).

On the 30th August 2016, the Myanmar National Wetland Committee was formed to enhance the coordination of wetland conservation and management by notification No. 94/2016 of the Ministry of Natural Resources and Environmental Conservation. This Committee is composed of fourteen senior officials from nine governmental departments related to wetland management, and very recently, the National and Wetland Policy and Strategic Actions was formulated on January 2019.



Wetland Region	No. of Sites
Ayeyarwady/Chindwin River Basin	85
Thanlwin River Basin	6
Sittaung River Basin	5
Mekong River Basin	0
Rakhine Coastal Region	3
Tanintheyi Coastal Region	0
Total	99

Figure 1.Wetland Regions and Recorded Wetlands in Myanmar

2. Threats and Issues to Wetlands in Myanmar

Though wetlands are very valuable, some have been lost and degraded and continue to deteriorate even now. The remaining wetlands are suffering from over-use, misuse, and environmental pollution. The quality and productivity of wetlands are decreasing due to weak or absent management, which results in decreased living standards in the communities that depend upon resources obtained from wetlands.

The implementation of development activities without comprehensive environmental impact assessments damages wetlands and their ecosystem services. For instance, the construction of dams for irrigation, power generation and the conversion of floodplains to paddies without environmental impact assessments and environmental management alter the natural hydrology of rivers and their floodplains and impacts human through declines in fish stocks and difficulties in river navigation.

Land use changes in the proximity also result in impacts on wetlands. All agriculture, industry, mining, and quarry activities degrade the quality of wetlands. For instance, some endemic fish species and aquatic plants have disappeared

20 Park Warden, Indawgyi Wildlife Sanctuary, Myanmar

due to the improper use of chemicals in agriculture. Mineral and resource extraction activities in watershed areas cause sedimentation and pollution in wetlands. The introduction of Invasive Alien Species (IAS) is also an increasing problem at many wetlands.

Another factor affecting wetland is waste disposal. Dumping household waste, without any treatment, directly into streams and rivers overloads their capacity to purify waste and damages wetland ecosystems.

1. Moeyungyi Wetland Wildlife Sanctuary

The Sanctuary is not only the first Ramsar site but also one of the Flyway Network Sites in Myanmar. The Sanctuary covers an area of 104 sq km and is located around an artificial lake constructed in 1904 at Bago and Waw Township in the Bago Region. The lake was created by the construction of a dyke to the north, east and south of the site. A main road is found to the west. The surrounding area, mostly flat become flooded during the raining season and is dry during summer, although some permanent water bodies exist. The main objective is to protect global threatened species such as resident and migratory waterbirds.

There are 17 villages around the area, 9 of which are very close to the Sanctuary. The inhabitants of these villages mainly rely on rice cultivation for their livelihoods, although some villages that are very close to the wetland rely on fishing and duck farming to some extent. Over 50,000 local people are residing and relying on growing paddy and fishing. Wetland is serving as a grazing ground for their cattle and ducks.

The Sanctuary's fauna includes 133 species of birds (Black Headed Ibis, Oriental Darter, Spotted Eagle, Spot-billed Pelican), 44 species of fish, 29 species of amphibian and reptiles and 33 species of butterfly and the flora includes 49 species of aquatic plants.

2. Indawgyi Wildlife Sanctuary

Indawgyi Wildlife Sanctuary covers a total area of 815 sq km, including the Ramsar area proper with 479 sq km plus lakeside grasslands. It is located in Mohnyin Township, Kachin State. The Indawgyi lake stretches 24 km from north to south and 10 km from east to west and one of the largest natural inland lakes in Southeast Asia. This unique wetland system is home to rare bird and wildlife species and is also one of the most important migratory bird locations in Asia. The Indawgyi was designated as ASEAN Heritage Park in 2003, Flyway Site Network in 2014, Ramsar site in 2016 and Biospherd Reserve in 2017.

The area around the Indawgyi is home to 2 small towns and 36 villages organized into 11 village tracts. The villages have some 7,620 households mainly Shan and Kachin ethnic groups, but there are also Bamar households and small numbers of people from other ethnic groups that have moved more recently to the Indawgyi. The livelihood of the predominantly Shan and Kachin communities around the lake are agriculture and fisheries-based. The main objective is to conserve biodiversity and ecosystem services.

The Sanctuary's fauna includes 47 species of mammal, 350 species of forest birds, 109 species of waterbirds (including Lesser Adjutant Stork, Wooly-necked Stork, four species of vulture, Sarus Crane), 93 species of fish, 91 amphibian and reptile and 50 species of butterfly. Some 148 species of tree, 118 species of medicinal plant and 75 species of orchid are recorded.

3. Meinmahla Kyun Wildlife Sanctuary

The Meinmahla Kyun (Island) is situated within the Ayeyarwady delta mudflats. At only a few feet above sea level, the island is approximately 26 km long and 10 km wide (13,600 ha) and located close to the open sea. The water is brackish in nature. And the large section is inundated daily. It is almost entirely covered with lowland mangrove forest, though most of the natural forest is heavily degraded from storm damage (especially due to hurricane Nargis), historical logging, ongoing timber and firewood collection. The main objective is to protect mangrove ecosystem and their fauna. The Meinmahla Kyun was designated as ASEAN Heritage Park in 2003, Ramsar site in 2017 and Flyway Site Network in 2018.

The Sanctuary is covered with mangroves comprising over 40 species, which is dominated by the species of Kanaso, *Heritiera fomes* and Thinboung, *Phoenix paludosa*. The recorded fauna species are 18 species of mammals, 190 species of birds, 38 species of amphibian, 100 species of fish, 6 crab species and 14 shrimp species. Salt-water or Estuarine Crocodile, *Crocodylus porosus*, Irrawaddy Dolphin *Orcaella brevirostris* and Spoon-billed Sandpiper *Eurynorhynchus pygmeus* are the important fauna of the Sanctuary.

4. Inle Lake Wildlife Sanctuary

Inle Lake Wildlife Sanctuary, one of the Ramsar Sites in Myanmar, covers 557 km2 and is located in Nyaung Shwe, Pinlaung and Peh Kon Township of Shan State and the second largest lake in Myanmar. The lake was declared as a Wildlife Sanctuary in 1985 to protect wetland ecosystem. Due to sanctuary's biodiversity, scenic features and the local culture the Inle Lake is a prime ecotourism destination. The Inle Lake is also an important water resource area for electricity and domestic uses. Lake dwellers also practice traditional floating agriculture that deserves to be preserved. The Lake encompasses four cities and innumerable villages. The people living close to the lake are called Intha. The Inle Lake was designated as ASEAN Heritage Park in 2003, Biosphere Reserve in 2015 and Ramsar site in 2018.

The Sanctuary's fauna comprises 191 species of forest birds, 79 species of waterbirds, 34 species of amphibians and reptiles, 43 species of fish, 94 species of butterfly and the species of fauna includes 86 species of trees, 527 species of medicinal plants, 11 species of bamboos and 184 species of orchid.

3. Conclusion

Wetlands are among the most diverse and productive ecosystems. They provide essential services to all our freshwater. However, they continue to be degraded and converted to other uses. The wetlands in Myanmar are degraded and lost due to unsustainable use by humans. The Ministry of Natural Resources and Environmental Conservation is conserving wetlands by establishing PAs (protected areas), promoting the programs related to communication/capacity building, education participation an awareness programs among the communities, promoting ecotourism to provide alternative livelihood and thus increasing the income of local communities. The collaboration among the governmental organizations, local NGOs and INGOs helps fill up the gap and thus achieving the goal of the wise use of wetlands in Myanmar.

Education for Sustainable Development Activities for Rehabilitating Mangrove Forests in Cooperation with Local Communities at the Merbok Mangrove Reserve, Kedah, Malaysia[21]

Takuji Arai[22], Munirah Ghazali, Nurul Salmi Abdul Latip, Mohammad Zohir Ahmad@Shaari

1. Background

Japan-Malaysia Association (JMA) is a public interest corporation authorized by the Cabinet Office of Japan to contribute to strengthen and deepen lasting relationship of friendship and goodwill, and also to promote tourism, economic and personal ties between Japan and Malaysia.

Since 1995, the JMA has been conducting rehabilitation of tropical forests and environmental education project in Sarawak, Malaysia in cooperation with the State Government and local communities.

The JMA has been a Regional Sejahtera Network (RSEN) member of RCE Penang, USM since 2014. The JMA and Regional Center for Expertise (RCE) Penang had jointly coordinated Overseas Training Course organized by the Environmental Restoration and Conservation Agency of Japan (ERCA) in Malaysia in August 2016.

Based on this experience, the JMA has started ESD activities for sustainable rehabilitation program of mangrove forests in cooperation with RCE Penang, USM and communities in the area of Merbok Mangrove Forest Reserve, Kedah Malaysia since 2018.

2. Project Outline

1. Location

The Project is implemented at the Merbok Mangrove Forest Reserve in the area of Kuala Muda District, Kedah, Malaysia.

The Merbok Mangrove Reserve is located about 1 hour drive north from Penang Island. The Merbok Mangrove Reserve which is made up of 18 compartments with a total area of 4,176 ha is under the jurisdiction of the Kedah Forestry Department.

The mangrove forest in Merbok consists of 32 species of trees exclusive to the mangrove ecosystem, and has been considered as one of the most floristically diverse mangrove sites in the world. The Reserve also harbors a wide array of fau na, the most prominent are its bird communities where about 80 species have been recorded including migratory species. Other inhabitants include several species of primates, reptiles and a high number of commercially-important aquatic species, mainly the estuarine river ecosystem.

In the area, the mangroves and river ecosystems play an important role in providing livelihood for fishermen and the surrounding village communities. Some of the villagers and fishermen comprise low income households. However, some parts of mangrove forests have been degrading due to felling of trees, urbanization and development in the area. This situation can leave an impact on the sustainability of ecosystem and biodiversity in the future.

In 2018, the JMA has started a joint project in collaboration with the RCE Penang, the USM to develop ESD activities for sustainable rehabilitation program of mangrove forests at Merbok Mangrove Forest Reserve. This project is participation with local communities, schools and other target groups to conserve the ecosystem and its biodiversity for the people of the area.

2. Core Activities

Major activities include:

1) Reforestation activities at degraded sites with participation of local communities
2) Establishment of mangrove seedling nursery as a stock for mangrove reforestation sites
3) Conducting capacity building programs for local communities in silviculture, tree care, forest management, communication skills and other relevant skills
4) Development and running educational program for local schools, visiting schools, universities and public to learn about mangrove ecosystem, conservation and ecotourism activities
5) Establishment of a mangrove environmental/educational gallery as a centre of the ESD program for the future
6) Holding seminar and symposium to share experience with schools, NGOs and other organization and publication of leaflet

3. The goals established for this project are:

(1) Start up reforestation activities at Merbok

- Making research on the present condition of the forests at the Merbok Mangrove Reserve
- Meeting with stakeholders for consensus building and planning
- Establishment of nursery and raising seedlings for plantation (Target: 4,000 seedlings / year)
- Reforestation activities by local communities (Target: 2ha / year)

(2) Develop an ESD program in conjunction with reforestation of mangroves at Merbok

- Meeting and idea sharing with stakeholders
- Developing ESD program for students and communities
- Conducting tree planting event with USM students and villagers (once in a year)
- Preparation for setting up educational facilities at the Merbok Mangrove Reserve
-

4. The expected duration to complete the project is 3 years (April 2018 - March 2021).

21 Organized by Japan-Malaysia Association (JMA) in collaboration with Regional Centre of Expertise (RCE) Penang, Universiti Sains Malaysia (USM) supported by Keidanren Nature Conservation Fund (Japan)

22 Executive Director, JMA and the other authors belong RCE, USM, Malaysia.

3. Project Result for the 1st Year (April 2018 - March 2019)

1. First Year - 2018

April: To organize MOA, research visit plans to various stakeholder and agencies:
documentations, letters and permissions

May: First project meeting at RCE Penang, USM with a representative of the JMA

June: Site visit and networking with stakeholders and agencies (discuss and plan to start a nursery, identify nursery plot and also the place to house the seedlings)
Establish a working group and appoint a leader from the local village for the project.
Build a nursery and start seed collection and sowing in the poly bag.

July: Nursery upgrading works, seed collection and sowing works by villagers
Experts of RCE Penang, USM visit the project site regularly
Organize a meeting with the Section Heads of the Kedah Education Department (JPNK) with regards to the reforestation project at RCE Penang, USM. The JPNK agreed to become a partner and provide assistance to the project

August: Nursery upgrading works, seed collection and sowing works by villagers
Experts of RCE Penang, USM visit the project site regularly
RCE Fellows attended a discussion about the reforestation project with the Head of Development, Sungai Petani Municipal Council (MPSPK). The Head welcomed the project and gave his full support. The MPSPK has agreed to become a partner and provide assistance to the project.

September: Held discussion with the District Officer of Sungai Petani District
Work in nursery postponed due to monsoon season

October: RCE fellows prepared modules and materials on Ecosystem Sustainability for Mangrove Camp for school children to be conducted in November.

November: Held Mangrove Camp 1.0 – an outdoor camp for primary and secondary schools which introduces the mangrove ecosystem and their importance. In participation were 30 primary and secondary students from the nearby villages, 6 USM students and 5 USM researchers on 23-25 Nov. Several related modules have been delivered by the RCE fellows and students got to participate in outdoor activities in the mangrove environment. Each participant also got to replant mangrove seedlings in the degraded area. Total seedlings planted were 500.

December: Work in mangrove nursery resumed with seed collection and sowing works by villagers.

3. Fiscal Year-2019

January - February

World Wetlands Day celebration with USM students on 2-4 of February, with this year's theme of Wetlands and Climate Change. Our key activity was a movie screening on Climate Change followed by a discussion to engage students on the role of wetlands in mitigating climate issues. Students conducted mangrove replanting (300 seedlings) at the site. Afterwards, we ran a river clean-up of the Sungai Merbok using kayaks and boats. The program finished off with a self-reflection session, followed with a discussion on how each individual can help protect wetlands and mitigate climate change.

This reforestation project has been mobilized since June 2018 with several villagers from Kampung Sungai Batu Besi, Merbok, Kedah. It started with an initial meeting with villagers whereby discussion on the project flow and stages were made. The first stage is to set up a mangrove nursery. At the moment only one species of tree is prepared, *Rhizophora apiculata*. More species will be added to this collection in the near future, including endangered species such as *Bruguiera hainesii*.

The project has received satisfactory cooperation from villagers. Villagers continue to collect seeds, prepare them for the nursery and to care for the seedlings. The villagers involved seemed very busy with the nursery activities, and show optimism.

As of end of January 2019, approximately 1500 seedlings had been raised in the nursery and 1000 seedlings planted by villagers. Presently, most seeds are of *Rhizophora apiculata* trees with some amount of *Rhizophora mucronata.* Other species common to the area such as *Bruguiera* sp, *Xylocarpus* sp, *Avicennia* sp. and *Sonneratia* sp. will be added later when the seeds are available in the season.

4. Project Planning for the 2nd & 3rd Fiscal Year (April 2019 - March 2020)

1. Second Fiscal Year (April 2019 - March 2020)

In the second phase, activities such as continuing reforestation activities, training local communities in silviculture and other skills, carrying out trial ESD program, promoting & encouraging local and visiting schools and societies to take part in the program, etcetera will be undertaken. Project planning includes:

- Refine and improve the project activities based on the two main objectives: reforestation & educational component.
- Increase the number of participants (stakeholders/collaborators) for this project
- Production of educational materials (virtual, printed)
- Project showcase at the site. Compilation of best practices of the start-up activities
- Continuing reforestation activities, training for local communities in silviculture and other relevant skills, carrying out trial ESD program, promoting & encouraging local and visiting schools and societies to take part in the program, etcetera.

2. Third Fiscal Year (April 2020 - March 2021)

Project planning includes:

- Preparation of the final project report
- Monitoring and evaluation of the project
- Carrying out ESD program through the organization of seminar at USM and other places to share the experience with the RSEN members and other related organization, publication of leaflet.
- Establish a centre in one of the schools/ community

Photos

Project team (JMA, USM, Sungai Besi Village)

Mangrove Camp 1.0 (Nov 2018)

Responsible Fisheries in the Bay of Bengal

Tapas Ranjan Chakraborty[23]

Bangladesh owns 118,813 km2 area of territorial sea, 200 nautical miles of Exclusive Economic Zone and all kinds of animal and non-animal resources under the continental shelf up to 354 nm from the Chittagong coast. Bangladesh is extracted in three tiers of marine fisheries:

1) Up to 40 m in depth from the coastline where normal fishing boats operate;
2) From 40 m to 200 m in depth where mid-water trawlers operate; and
3) From 200 m in depth to the end of the Exclusive Economic Zone where long-liner trawlers run (Islam *et al.*, 2017)

Currently, 32,440 km2 starting from the coastline to 40m depth in the Bay are open to around 67,669 unlicensed fishing boats, of which about 51% are non-motorized boats. There are only 242 trawlers that are allowed for fishing in those regions by the government (MoFA, 2014). Total fish production in Bangladesh in 2014-2015 was reported to be 3,684,245 t, of which 1,023,991 t (27.79%) were from inland open waters, 2,060,408 t (55.93%) from inland closed waters and 599,846 t (16.28%) from marine fisheries.

Table 1: Marine Fish Production and Area in Bangladesh

Fisheries sector	Water Area (ha)	Production (ton)
Industrial (Trawl) fishing	12,111,000	84,846
Artisanal fishing		515,000
Total		599,846

Source: (Dept of Fisheries, Bangladesh, 2016)

The Bay of Bengal is hosting a wide range of biodiversity, such as fishes, shrimps, mollusks, crabs, mammals, seaweeds, etcetera. Around 511 marine species are recorded from the Bay of Bengal of Bangladesh.

Table 2: Biodiversity of Bay of Bengal of Bangladesh

Bony fish	475
Cartilaginous (soft-boned) fish	50
Shrimp	56
Crab	50
Lobster	5
Mollusk (Oyster)	336
Algae/Seaweed	168
Coral	66
Starfish/Echinoderms	4
Whale/Dolphin	11
Squids (Cuttlefish)	7 (2)

Marine fisheries production is only 16.28% of the national fish production (FRSS, 2016). The potential of the coastal fisheries sector has not been rationally harvested. Rather the resources have been over-exploited and as a result, the fish stocks declined. The main commercial fishing zones in the Bay of Bengal are Swatch (trough-shaped marine valley) of no Ground, Middle Ground, South Patches and South of South Patches. Artisanal fishing is mostly on near shore coastal areas.

The danger of excessive plastic use and their dumping into the sea is high on the agenda of several countries. The Bay of Bengal countries individually and collectively would have to address this problem. For instance, in Bangladesh, since 2013, under the Project Aware and its 'Fighting Marine debris' program, divers and volunteers engage in survey and removal of marine debris off the Saint Martin's Island. In February 2016, the divers removed 1048 objects and of these, 90.31 per cent were of plastic. It is useful to mention that at least four of the 17 Sustainable Development Goals are closely associated with marine litter and Target 14.1 addresses prevention and reduction of marine pollution, in particular from land-based activities, including marine debris. (Sakhja 2016).

Near-shore fisheries are overexploited. The extensive use of destructive set bagnets is believed to be responsible for this in the estuarine and neritic waters. In the absence of an adequate (3) number of hatcheries, the collection of wild tiger shrimp post-larvae in estuaries and near-shore waters by this fishing method leads to destruction of other shrimp and finfish species. Estimates indicate that more than 1,600 individuals of non-target macro-zooplankton are killed while collecting one single tiger shrimp post-larva. (Holmgren 1994). But the fisheries of the Bay of Bengal have been under pressure for decades and are now severely depleted4. Many once-abundant species have all but disappeared. Particularly badly affected are the species at the top of the food chain (Vivekanandan 2005).

2. Community in Marine Fisheries Conservation in Teknaf, Cox's Bazar

Around 34% household of Teknaf are engaged in fishing. Average earning of a fisherman here is 4,500 Taka/month. The fishers of Teknaf were found fishing in the sea for 10 months except the month June and July because of rough weather. Jelly fish, fingerlings of a number of fish species, shark juveniles, fingerlings (larvae) of different crab and lobster species, etc., were undesirably trapped during different types of fishing practice. Cetaceans and marine turtles are also undesirably trapped by other types of nets.

Since 1st April 2016, Bangladesh POUSH has been implementing a project, "*Community-based Harvest Management by Conserving the Juveniles of Marine Biodiversity in the Bay of Bengal*" in the Bay of Bengal coast line of Teknaf, Cox's Bazar in Bangladesh. With the intervention of the project 500 households releasing juveniles into the sea in living condition has increased the harvest from 30% to 70% but resulted the decrease of fingerlings moderately from 11 to 7 %. It is due to mainly recommended mesh size of nets.

Now 51% of households in the project area is aware of the safe releasing of the juveniles trapped unexpectedly. Present data reveals that significant increase (from 21% to 51%) in releasing juveniles safely into the sea by the fishermen happened due to different activities of POUSH. In the Project area, all fishers know about the breeding season of fish and other marine species but moderate knowledge (33%) was recorded while they were telling about their understanding regarding fishing rules or law of government regarding fishing and marine protected area. Nevertheless, earlier the knowledge of the community regarding fishing law was 2% only. This improvement is due to different awareness, knowledge, demonstration and dissemination activities of POUSH.

23Ph.D. Fellow, Jahangirnagar University, Bangladesh

This fisher community is still reluctant to shift their traditional occupation of fishing. Only 11 households have explored alternative livelihoods. The awareness raising, capacity building, group discussion, providing legal fishing net combining with other demonstrative activities and assistance from the project is bringing significant change in fishing. Seven nets have been given to the community with five groups. Community is recognizing the conservation benefit resulted by the new type of project. The project resulted in protecting 1 km2 of sand dune of the Teknaf Peninsula. In a marine turtle hatchery from the project, eggs of marine turtles were collected for safe incubation and 4,500 baby turtles were released to the Bay.

The community from the intervention villages - Kocchopia, South Shilkhali and Barodail recommended three options to conserve and manage marine biodiversity: (1) stop trawling net, (2) stop current net, (2) abide by fishing law. The fishers from Borodail village also appreciated enforcement measures adopted by government to stop all illegal nets. The awareness raising, capacity building, group discussion, providing legal fishing net combining with other demonstrative activities and assistance from the project is bringing significant change in fishing.

3. Conclusion

The Bay of Bengal has been important for local development as well as for a global perspective. The coastal and marine fisheries have been playing considerable roles, not only in the social and economic development of the country but also in the regional ecological balance. Strengthening blue economy issues in the Bay of Bengal is an initiative for Multi Sectoral Technical and Economic Cooperation (BIMSTEC).

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Group meeting of Community Biodiversity Group(CBG)

A marine turtle hatchery on the beach

Recycling of Fish Waste for Sustainable Conservation of Coastal Eco-System

Binod Bihari Sahu [24]

1. Background

In-discriminatory usage of chemical fertilizers, pesticides, antibiotics, agro-chemicals in agriculture and water bodies has created many environmental and health issues. Culture and capture fishery resource utilizes nutrients from the coastal water bodies which creates pollution in the Bay of Bengal through river systems. Post harvests fish processing waste constitute around 50% in fishery. These wastes are not commonly used in human feeding and are disposed off. Fish waste recycling into organic fertilizers is well in tune with current food production concern, waste disposal, environmental responsibility and supply chain efficiency.

"Fish waste bio-refineries" are defined as sustainable processing of fish waste biomass into a spectrum of marketable products and energy for crop, animal and fish farming. Fish processing waste are promising renewable biomass.

Fish waste bio-refineries have low cost production and easy operation, low cost energy consumption and maintain high productivity of value-added organic fertilizers, bio extracts, amino acids, peptides and bio supplements for increasing primary productivity of soil and aquaculture ponds. Bio-refinery products from fish wastes are plankton and chlorophyll enhancer as well as soil recharger.

Fish bio extracts are liquid organic fertilizers for plants and crops and are used as a foliar spray and drenching. Solid bio-extracts are powdered organic fertilizer used for soil and aquaculture pond recharge.

Shellfish bio-extracts are immune-modulators, plant and animal disease prevention, anti-fungal and anti-bacterial activities. All these products provide resistance to plant and animals against climate change issues such as drought, flood and cyclone.

Participatory bio-refinery projects in two coastal villages of Odisha (India) comprising fisher women Self Help Groups (FWSHG) have been carried out and the results were documented. The FWSHG can prepare this product during their leisure time and enhance their livelihood. This product has been popularized as a brand "Maschhya Gandha" and applied in more than 1000 ha. of agricultural crops like green gram, black gram, potato, rice and various horticultural crops and found increase in production by 25% in Balipatna and Balianta Block of Khurdha District and Satyabadi Block of Puri District, Odisha.

2. Salient features of fish fertilizer

1. Fish hydrolysate is highly bioactive and awesome for promoting plant, animal and fish production
2. It provides amino acids, fatty acid, hormone vitamins and improves health and vigor of fish, plant and animals
3. It is one of the oldest and most effective fertilizers, for centuries it has been recognized as an excellent fertilizer source
4. Convenient, easy to use and environment friendly, it adds organic carbon to soil and water
5. Poor man's fertilizer, non-toxic, it improves soil texture and compost enhancer.
6. Wild and domestic animal, birds and insect, pest repellant, repellant for crop raiders

The novel organic fish fertilizer utilizing fish and prawn processing waste, trash fish, fish processing waste constitutes around 30-40% during primary processing. Huge quantity of waste is also generated during netting, trawling and fish harvesting. Municipality and corporation fish markets also generate huge quantity of waste.

3. Liquid Fish Fertilizers (Fish Hydrolysate)

Aquaculture ponds for plankton production
- 20 liter/acre/meter water bodies 4 equally divided doses in 15 days interval 100 times diluted with water.

Nursery Pond for Seed Production
- 20 liter/acre/meter water bodies 4 equally divided doses in 15 days interval 100 time diluted with water.

Compound Aquaculture Mass Feed
- 50:50:: rice bran: GNOC & Powder, 100kg feed mix properly 1liter fish hydrolysate

Floating/Sinking Fish Feed
- 100 kg compounded feed materials, add 2 liter fish hydrolysate (CIFA-BIND ADD) using pelletization.

Agri-Horti-Vegi-Flori-Lawn Foliar Spray
- 1 ml/liter liquid fish fertilizer (Planktofert) for foliar spraying once in every week

Agri-Horti-Vegi-Flori-Lawn Fertigation
- 20 liter per acre for fertigation/dip irrigation/green house farming

4. Powdered Fish Fertilizer (Fish Bio-fert.)

Pond Fertilization
- 20 kg/acre/meter water bodies, four equally divided doses in 15 days interval, Mixing with 5 times vermin compost sprinkled

Nursery Pond Fertilization
- 20 kg/acre/meter water bodies, Four equally divided doses in 15 days interval, Mixing with 5 time vermin compost sprinkled.

Agri-Horti-Vegi-Flori-Use

Lawn and Landscape
- 6 gm/sq. ft/every 15 days interval, 2 times

Floriculture flower beds
- 6 gm/sq. ft/every 15 days interval, 2 times

Rose plants/flower pots
- 6 gm/flower pot/every 30 days interval, 2 times

Vegetables/Fruits plant beds
- 6gm/sq. ft/every 30 days interval, 2 times

6. Nutritional Composition of Liquid Fish Fertilizer (LFF)

Primary Nutrients

Nitrogen	1.5%
Phosphorus	0.5%
Potash	0.4%
Carbon	33.7%

Secondary Nutrients

Sulphur	1.52%
Magnesium	1.75%
Calcium	2.24%

Micronutrients

Boron	10.4%
Zinc	17.9%
Halm Iron	24.5%
Manganese	5.2%
Copper	3.5%
Choline & Moybdenum	traces

24 Retd. Principal Scientist, ICAR (CIFA), Bhubaneswar, India Email: binodbsahu@gmail.com

5. Benefits of Organic Fish Fertilizers

1. Fish fertilizer is a liquefied organic fertilizer, excellent for fertigation and foliar spray.
2. Pond application promotes phytoplankton, zooplankton, chlorophyll, helpful microbial community development for the use of live fish food
3. Application of 0.35 ml liquid fish fertilizer per pot

Result of Group Discussion

Group 1: Major Issues Affecting the WiseUse

Problem: What are the major issues affecting the wise use of the cross-country wetland such as the Bay of Bengal and their possible solutions?

Group Leader: Mr. Ishtiaq Uddin Ahmad (Bangladesh)

Members

1. Abdur Rahman Rana (Mr.), Director, CAMET
2. Ashit Ranjan Paul (Dr.), Palli Sanchoy Bank
3. Mosaddeque(Mr.) Bangladesh POUSH
4. Mojibur Rahman (Mr.), Bangladesh POUSH
5. Sheikh Nadir Hossain (Mr.), Vice-President, Bangladesh POUSH
6. Tapas Ranjan Chakraborty (Mr.), Oxfam in Bangladesh
7. Uzzal Chondro Shaha (Mr.), Bangladesh POUSH
8. Binod Bihari Sahu (Dr.), Retd. Principal Scientist, ICAR
9. Rajdeep Mukherjee (Mr.), Bay of Bengal Programme Inter-Governmental Organization
10. Wardi Kasinath (Mr.), President, KISSAN
11. Reiko Nakamura (Ms.), Secretary General, Ramsar Center Japan
12. Yukihiro Shimatani (Prof.), Kyushu University, President of Japan Wetland Society
13. Min Thiha Zaw (Mr.), Biodiversity and Nature Conservation Association
14. Bishnu Bhandari (Dr.), President, Nepal Wetlands Society

Burning Issues

1. Overfishing and overexploitation of aquatic resources (bottom trawler/explosion)
2. Mangrove degradation
3. Pollution (plastic disposal, oil, industrial, chemical)
4. Sedimentation/siltation from upstream
5. Sand mining
6. Sea level rising (global warming)
7. Withdrawal of upstream water (transboundary)
8. Deep sea mining
9. Salinity intrusion
10. Lack of integrated resource management policy
11. Excessive utilization of navigation route
12. Lack of biodiversity checklists (inventory)
13. Absence of cross-country cooperation and coordination
14. Lack of awareness among mass people
15. Lack of study on allowable resources
16. Land use change along the coast

Proposed Solutions

1. Appropriate legislation and its enforcement
2. Cross country integrated strategy & action plan
3. Development of biodiversity & coastal resource database
4. Demarcation of fishing zone
5. Alternate income generation for coastal resource dependent community
6. Mass awareness of stakeholders
7. Appropriate land use planning and management
8. Regional/international cooperation
9. Initiation of the regional initiative such as Ramsar Regional Initiative on the Bay of Bengal

Group 2: Policy, Institution & Governance

Problem: What are the issues relating to policy, institution and governance mechanism in the coastal area of the Bay of Bengal & way forward?

Group Leader: Dr. Indika Rohan Palihakkara (Sri Lanka)

Members:

1. A.K. M. Rafiqul Islam (Mr.), Deputy Director, Department of Environment
2. Asaduzzaman Miah (Mr.), Secretary, Bangladesh POUSH
3. M. Fazleah Ali (Prof.), Former Pro-Vice Chancellor, City University, Dhaka.
4. Sanowar Hossain (Dr.), President, Bangladesh POUSH
5. Tapas Ranjan Chakraborty (Mr.), Oxfam in Bangladesh
6. Taslim Uddin, Center for Sustainable Developemtn (CFSD)
7. Durga Prasad Dash (Mr.), Secretary, Pallishree
8. Ritesh Sikka (Mr.), Wetlands International South Asia
9. Emiko Nagakura (Ms.), Wetlands International Japan
10. Takayuki Musha (Mr.), Ramsar Center Japan
11. Norman Ramirez (Mr.), Ramsar Regional Center -East Asia
12. Myo Lwin (Mr.), Joint-Secretary, Myanmar Forest Association

Policy

1. Outdated policies (national and local level)
2. Conflicting policy (inter and intra policies)
3. Involve all the actors
    a. Revise policies with local community participation
    b. Viability/applicability of policies
    c. Consideration of marginal group
    d.

Institution

1. Lack of collaboration (coastal conservation department and wildlife department)
2. Delay of fund flow
3. Lack of capacity to utilize the fund
    a. Capacity building

Governance

1. Overlapping intervention
2. List of priority
3. Lack of community involvement in formulating action.

Issues

1. Central government monitoring local government
2. Frequent meeting with various stakeholders
3. Capacity building
4. Complete within the timeframe
5. Accountability
6. Involve local community in the policy process

Group 3: Means & Ways for Management & Conservation

Problem: What are the means & ways needed to address the issues-related to the management and conservation of the coastal wetland area of the Bay of Bengal on the ground?

Group Leader: Prof. Sansanee Choowaew (Thailand)

Members

1. A. K. M. Hasan Sayed (Mr.), Director, Forestry, Climate Change, DRR, Proshikha
2. Raquibul Amin (Mr.), Country Representative, IUCN Bangladesh
3. Shahad Mahabub Chowdhury (Mr.), IUCN Bangladesh
4. Tapan Kumar Ghosal (Dr.), Bangladesh POUSH
5. Toufic Ahamad Choudhury (Dr.), Former Director General, Bangladesh Institute of Bank Management (BIBM), Mirpur, Dhaka
6. Ange Sanyasi (Mr.), Fisherman
7. Gaval Daneya (Mr.), Fisherman
8. Yugraj Singh Yadava (Dr.), Director, Bay of Bengal Programme Inter-Governmental Organization
9. Naoya Furuta (Prof.), Taisho University
10. Takuji Arai (Mr.), Executive Director, Japan-Malaysia Association
11. Maung Win (Mr.), Forest Department, MONREC, Myanmar
12. Thaw Phoye Shwe (Mr.), Biodiversity and Nature Conservation Association
13. Maneewan Sanlee (Ms.), SaveAndaman Network Foundation

Issues

1. Climate change & sea level rise (SLR)
2. Illegal fishing/ electric fishing
3. Mass tourism
4. Development such as infrastructure (road, port, industry, urbanization)
5. Deforestation (esp. mangroves, upper watershed)
6. Pollution & wastes such as plastic, industrial discharge, chemicals and agricultural runoff)
7. Extreme natural disasters (cyclones, storm surge, Tsunami, floods)
8. Coastal erosion/flood

Ways & Means

A. For Climate Change, Disasters, Extremes, Coastal Erosion and Floods, nature-based solution such as DRR- EbA (eco-system based adaptation) is strongly recommended. Other ways and means are suggested below.

(1) Appropriate land use planning/zoning
(2) Appropriate combination of Gray-Green infrastructures (Engineering + natural)
(3) Maintain healthy coastal ecosystem e.g. mangroves, sea grasses, coral reef, estuaries, sand dunes and their ecosystem services
(4) Participatory community-based approach
(5) CEPA (Communication/capacity building, education, participation and awareness)
(6) Enhanced participation of women group and young generation.

B. For the development of infrastructure (road, port, industry, urbanization, mass tourism), the following suggestions were put forward.

1. Appropriate coastal zone management plan such as ICZM
    a. Needed an effective implementation
    b. participatory planning processes)
2. Participatory monitoring (ecological characteristics) by communities & schools.
3. Effective EIA process and implementation
4. Raising awareness of local government, communities and stakeholders.
5.

Closing Session

Rapporteur's Report: Dr. Tapan Kumar Ghosal

Dr. Tapan Kumar Ghoal, the rapporteur of the Symposium, said that wetlands are valuable resources but should not be exploited at any cost. Rather, they should be used sustainably. The sea, ocean and the Bay of Bengal support human beings and the environment. Therefore, it is our collective duty to protect, conserve and manage them and their associated resources. As a rapporteur, an overall gist of the presentation should have been prepared by this time, but it is not possible to do so due to the constraint of time. The participants' suggestions and advices are welcome. The ideas, experiences and examples that have been presented and discussed here are very valuable and will be incorporated in the final report. He extended his gratitude to Dr. Sanowar Hossain and the Bangladesh POUSH for giving him this opportunity.

Closing Remarks: Ms. Reiko Nakamura

Ms. Reiko Nakaura thanked all the participants for their hard work and patience in the symposium. She said that she had been very enlightened by the presentation made by 20 authors in a short period of 6 hours. She said that the symposium has given her so many insights into the inner dynamics of the BoB. Thanks to all. RCJ, an NGO based in Tokyo, has dedicated itself to the sustainable and resilient development of wetlands in the region. The experience of 25 years of working in the region boils down to a single point that the macro-management of wetland resources is much more important and effective than their micro management on the ground. Therefore, the Wetland Partnership Program views the BOB as a single whole. In this regard, she said that the good examples would be documented from the region and disseminated to other areas as much as possible. This is what is intended to achieve through the BOB Wetland Partnership Program. The Wetland Partnership Program is a loose network of stakeholder and partners in the region. To some extent, the BOB has been succesful and we hope to continue our journey into the future. She thanked all the concerned for their kind support and cooperation.

Closing Remarks: Dr. Sanowar Hossain

Dr. Sanowar Hossain offered his deepest gratitude to the Chief Guest Dr. S.M. Munjurul Hannan Khan, Additional Secretary of the Ministry of Environment, Forest and Climate Change for his kind address to the symposium. He also put on record the hard work, patience and active participation of the participants in the symposium. He further said that water-induced disasters in the region are the outcome of the impact of climate change and the interaction of various anthropogenic factors. Therefore, the papers on disaster risk reduction presented in the symposium are very relevant to the situation of the Bay of Bengal. He said that all need to study wetlands *vis-a-vis* disaster risk reduction in the region and share the results. Once again he thanked all the participants, organizers and supporters and said so long.

Vote of Thanks – Bishnu Bhandari

The remark on the vote of thanks was made by Dr. Bishnu Bhandari saying that this International workshop was a historic moment for the RCJ and it attempted to cover some papers, activities and sessions in a short period of time. Some 20 presentations were made covering a wide range of subjects, practices and issues. Without the active support of all the partners and participants, this Symposium would not have been possible at all. Therefore, he offered his vote of thanks to all of them.

He offered his "Big Thank You" to the entire family of Bangladesh POUSH for taking all the pains in organizing this symposium. Without their whole-hearted support, this would not have been possible at all. He offered his heart-felt thanks to them. Also, a special thank was given to Dr. Sanowar Hossain, Mr. Asadzzaman Miah and Dr. Tapan Kumar Ghosal for their kind hospitality, cordiality and generosity. Although challenging, they made the symposium a joyful event.

He also gave a "big thank you" to a special person who was the roller and driver of the idea of BoB since its inception in 2016 and its evolution at this stage. The person is none other than Ms. Reiko Nakamura, the Secretary–General of the Ramsar Center Japan. She was the key person to push this very idea of the Bay of Bengal as a single wetland.

He also offered his "thanks" to all chairpersons, group leaders and authors for their professional support to the symposium. Without their full understanding, patience and punctuality, this symposium would not have been possible at all to take off this way. They all deserve the organizer's "big thank you". A mention is needed at this time the valuable presence of two fishermen from India as well.

Finally 20 presentations would not have been possible at all in 6 hours without the proper attention and cooperation of two time-keepers; Ms. Emiko Nagakura and Mr. Takuji Arai. They came all the way from Japan along with their stop watch and bell to ensure that the symposium runs according to the clock and observe the punctuality. This was made possible by these young and energetic time-keepers, who certainly deserve our "Biggest Thank You". Last but not least, logistic support was provided from behind. The synchronization of uploading, displaying and coordinating with the presenters was done by Mr. Takayuki Musha. No one can skip to say "*Dhanyobad*" to him.

Lastly, Dr. Bhandari wished all of them a safe trip back home and promised to meet again and again somewhere, sometime for the genuine cause of wetland conservation in the region.

International Symposium on the Conservation of the Coastal Wetlands of the Bay of Bengal

7 March 2019
Venue: YWCA of Bangladesh, 2/23 Iqbal Road, Mohamadpur, Dhaka-1207, Bangladesh
Organizers: Bangladesh POUSH & Ramsar Center Japan
in collaboration with Wetlands International Japan

Proposed Program

Objectives

1. Appraise the participants of the outcomes of the RCJ-KNCF project "Building an international wetland cooperation network across the countries sharing the coast of the Bay of Bengal (FY2016-2018)
2. Assess the current status and challenges of conservation of wetland biodiversity in the Bay of Bengal region
3. Highlight the importance of ecosystem services of wetlands particularly for Eco DRR and climate change
4. Develop a networking of NGOs/CBOs working on biodiversity conservation in the BoB region
5. Compile the good practices (examples), success/failure stories for publications on Wetland Biodiversity Conservation in the BOB region
6. Sum up the 3-year POUSH-JFGE Project "*Community-based harvest management by conserving the juveniles of marine biodiversity in the Bay of Bengal*" & move forward the RCJ/POUSH TOYOTA project "*Achieving the SDG No. 14 through community-based resource management & conservation of coastal and marine biodiversity of the Bay of Bengal in the Teknaf Peninsula, Bangladesh (2019-2020)*"

Expected participants:

Officials, scholars, academia, NGOs, CBOs, local stakeholders and students from India, Myanmar, Nepal, Korea, Sri Lanka, Thailand, Japan and Bangladesh.

Output: Symposium Proceeding and dissemination

Supported by:

1. Japan Fund for Global Environment of Environmental Restoration and Conservation Activities
2. Keidanren Nature Conservation Fund
3. Toyota Environmental Activities Grant Program

Schedule of Activities

Session 1: Inaugural Session

9:20-9:25 **Welcome Address** – Dr. Sanowar Hossain, President, Bangladesh POUSH
9.25-9.30 **Remarks** -- Ms. Reiko Nakamura, Secretary General, RCJ
9.30-9.35 **Remarks** -- Prof. Yukihiro Shimatani, President, Japan Wetland Society
9.35-9.50 **Keynote** -- The Bay of Bengal Wetlands Partnership: A New Initiative for the Conservation of a Transboundary Wetland Ecosystem - Dr. Bishnu Bhandari, President, Nepal Wetlands Society
9:50-10:00 **Inaugural Speech** -- Chief Guest Dr. S.M. Munjurul Hannan Khan, Additional Secretary,
Ministry of Environment, Forest and Climate Change, Government of Bangladesh
10.00-10.05 **Chairperson's Remarks**- Mr. Sheikh Nadir Hossain, Vice-President, Bangladesh POUSH

10.05-10.20 Tea Break

Session 2: International Cooperation and DRR in Wetlands
(12 min presentation + 2 min Q&A)

Chair: Mr. Rquibul Amin, CR IUCN Bangladesh
Rapporteur: Dr. Tapan Kumar Ghosal (Bangladesh POUSH) & Ms. Emiko Nagakura (WIJ, Japan)
10:20-10:35 **(2.1)** International cooperation on environment of the Bay of Bengal in the BOBP-IGOPerspective -- Dr. Yugraj Singh Yadava, BONP-IGO
10:35-10:50 **(2.2)** The work of RRC-EA and plan for the Bay of Bengal-- Mr. Norman Ramirez, RRC-EA
10:50-1:05 **(2.3)** The Role of wetlands for disaster risk reduction -- Prof. Naoya Furuta, Taisho University
11:05-11:20 **(2.4)** Urban wetlands for DRR in Japan -- Prof. Yukihiro Shimatani, Kyushu University
11:20-11:35 **(2.5)** Ecosystem Management & DRR: Lessons from the Mahanadi Delta -- Dr. Ritesh Sikka, WISA
11:35-11:50 **(2.6)** Community-based coastal wetlands management under the Mangrove for the Future (MFF) Initiative -- Shahad Mahbub Chowdhury, Bangladesh
11:50-12:05 **(2.7)** Conservation of wetlands and DRR in Bangladesh -- Dr. Sanowar Hossain, Bangladesh POUSH

12.05-12.10 Short Break

Session 3: Successes and Challenges of Wetland Conservation

(12 min presentation + 2 min Q&A)

Chair: Chair: Mr. Ishtiaq Uddin Ahmad, Bangladesh
Rapporteur: Dr. Tapan Kumar Ghosal (Bangladesh POUSH) & Ms. Emiko Nagakura (WIJ, Japan)

12:10-12:25 **(3.1)** Management of Koggala lagoon for sustainable livelihood development – A case study in Sri Lanka -- Prof. Indika Rohan Palihakkara, Rufuna University
12:25-12:40 **(3.2)** Achievements and challenges of the World Bank aided Integrated Coastal Zone Management (ICZM) Project in Odisha -- Dr. Ajit Pattnaik, WISA
12:40-12:55 **(3.3)** Community-based sustainable management of wetland resources for ecotourism -- Dr. Sansanee Choowaew, Mahidol University
12:55- 1:10 **(3.4)** Biodiversity value and challenges of Myanmar's Ramsar Sites -- Mr. Maung Win, Forest Department, Myanmar
1:10- 1:25 **(3.5)** Education for Sustainable Development (ESD) activities for rehabilitating mangrove forests in cooperation with local communities at Merbok Mangrove Reserve, Kedah, Malaysia -- Mr. Takuji Arai, Japan-Malaysia Association
1:10- 1:40 **(3.6)** Responsible Fisheries in the Bay of Bengal -- Mr. Tapas Ranjan Chakraborty

1:40- 2:40 Lunch Break

Session 4: Successes and Challenges …… (Continued)

Chair: Dr. Sanowar Hossain, President, Bangladesh POUSH
Rapporteurs: Dr. Tapan Kumar Ghosal (Bangladesh POUSH) & Mr. Takuji Arai (Japan)

2:30-2:45 **(4.1)** Sustainable forest conservation and livelihood support through community-Based activities at U Tu Village, Rakhine Coast, Myanmar--Mr. Myo Lwin, Myanmar Forest Association
2:45-3:00 **(4.2)** Community participation in the Gulf of Mottama Ramsar site, Myanmar -- Mr. Min Thiha Zaw, BANCA
3:00-3:15 **(4.3)** Building resilience capacity of the local communities along Bahuda Estuary area in India -- D. P. Dash, Pallishree
3:15-3:30 **(4.4)** Community-based sea turtle conservation along the coast of the Bay of Bengal, India – Wardi Kasinath, KISSAN
3:30-3:45 **(4.5)** Efforts of people for conservation of dugong, sea-turtle and seagrass bed in Trang province, Thailand -- Ms. Maneewan Saniee, SaveAndaman Network Foundation
3:45-4:00 **(4.6)** Discovery of the benefits of fish waste recycling for sustainable conservation of coastal eco-system: A participatory approach -- Dr. Binod Bihari Sahu
4:00-4:15 **(4.7)** Geomorphological evolution and coastal dynamics along the coastal shoreline of the Bay of Bengal in relation to climate induced disaster: Fifty

years of human-nature Interaction – Mr. Muhammad Abdur Rahaman

4:15- 4:30 Tea Break

Session 5: Break out Session (4:30-6:00)

Chair: Prof. Naoya Furuta (Japan)
Rapporteur: Dr. Tapan Kumar Ghosal (Bangladesh) & Ms. Emiko Nagakura (WIJ, Japan)

The participants will be divided into three groups. The list of the participants will be prepared by the Secretariat. The Group Leader will select the rapporteur and discuss the issue. The Group Leader will make a short presentation in the plenary. Each group needs a clip board, brown sheets and sign pens.

4:45- 5:40 - Group Discussion

Group 1: What are the major issues affecting the wise use of the cross-country wetland such as the Bay of Bengal and their possible solutions? (Group Leader: Mr. Ishtiaq Uddin Ahmad (Bangladesh)

Group 2: What are the issues relating to policy, institution and governance mechanism in the coastal area of the Bay of Bengal & way forward? (Group Leader: Prof. Indika Rohan Palihakkara, India)

Group 3: What are the means & ways needed to address the issues-related to the management and conservation of the coastal wetland area of the Bay of Bengal on the ground? (Group Leader: Prof. Sansanee Choowaew, Thailand)

5:30- 6:00 Group Presentations at the plenary (5 minutes each).

Session 6: Closing Session (6:00)

6:10-6:15 Rapporteur's Report – Dr. Tapan Kumar Ghosal (Bangladesh)
6:15-6:20 Vote of thanks – Dr. Bishnu Bhandari (Nepal)
6:20-6:30 Closing Remarks

1. Ms. Reiko Nakamura, Secretary-General, RCJ
2. Dr. Sanowar Hossain, President of Bangladesh POUSH

Farewell Dinner 6:30 onward

Secretariat

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Annex 2: List of Participants

Bangladesh

1. Abdur Rahman Rana (Mr.), Director, CAMET
2. Ashit Ranjan Paul (Dr.), Palli Sanchoy Bank.
3. Akash Alam (Mr.) Dhaka University
4. A.K. M. Rafiqul Islam (Mr.), Deputy Director, Department of Environment
5. A. K. M. Hasan Sayed (Mr.), Director, Forestry, Climate Change, DRR, Proshikha
6. Asaduzzaman Miah (Mr.), Secretary, Bangladesh POUSH
7. Habibullaha Md. Mahafuzur Rahman (Mr.) Former Additional DG, Planning Academy, Dhaka
8. Ishtiaq Uddin Ahmad (Mr.), Former CCF & CR of IUCN, Bangladesh Country Office, Dhaka
9. Jebina Tanvir (Ms), Basundhara Group
10. Mosaddeque(Mr.) Bangladesh POUSH
11. M. Fazleah Ali (Prof.), Former Pro-Vice Chancellor, City University, Dhaka.
12. Mojibur Rahman (Mr.), Bangladesh POUSH
13. Raquibul Amin (Mr.), Country Representative, IUCN Bangladesh
14. Sanowar Hossain (Dr.), President, Bangladesh POUSH
15. Shahad Mahabub Chowdhury(Mr.), IUCN Bangladesh
16. Sheikh Nadir Hossain (Mr.), Vice-President, Bangladesh POUSH
17. S.M. Munjurul Hannan Khan (Dr.), Additional Secretary, Ministry of Environment, Forest and Climate Change, Government of Bangladesh
18. Tapan Kumar Ghosal (Dr.), Bangladesh POUSH.
19. Tapas Ranjan Chakraborty (Mr.), Oxfam in Bangladesh
20. Taslim Uddin (Mr.), Center for Sustainable Development (CFSD)
21. Toufic Ahamad Choudhury (Dr.), Former Director General, Bangladesh Institute of Bank Management (BIBM), Mirpur, Dhaka.
22. Uzzal Chondro Shaha (Mr.), Bangladesh POUSH

India

23. Ange Sanyasi (Mr.), Fisherman
24. Binod Bihari Sahu (Dr.), Retd. Principal Scientist, ICAR
25. Durga Prasad Dash (Mr.), Secretary, Pallishree
26. Gaval Daneya (Mr.), Fisherman
27. Rajdeep Mukherjee (Mr.), Bay of Bengal Programme Inter-Governmental Organization
28. Ritesh Sikka (Mr.), Wetlands International South Asia
29. Yugraj Singh Yadava (Dr.), Director, Bay of Bengal Programme Inter-Governmental Organization
30. Wardi Kasinath (Mr.), President, KISSAN

Japan

31. Emiko Nagakura (Ms.), Wetlands International Japan
32. Naoya Furuta (Prof.), Taisho University
33. Reiko Nakamura (Ms.), Secretary General, Ramsar Center Japan
34. Takayuki Musha (Mr.), Ramsar Center Japan
35. Takuji Arai (Mr.), Executive Director, Japan-Malaysia Association
36. Yukihiro Shimatani (Prof.), Kyushu University, President of Japan Wetland Society

Korea

37. Norman Emmanuel C. Ramirez (Mr.), Ramsar Regional Center -East Asia

Myanmar

38. Maung Win (Mr.), Forest Department, MONREC, Myanmar
39. Min Thiha Zaw (Mr.), Biodiversity and Nature Conservation Association
40. Myo Lwin (Mr.), Joint-Secretary, Myanmar Forest Association
41. Thaw Phoye Shwe (Mr.), Biodiversity and Nature Conservation Association

Nepal

42. Bishnu Bhandari (Dr.), President, Nepal Wetlands Society

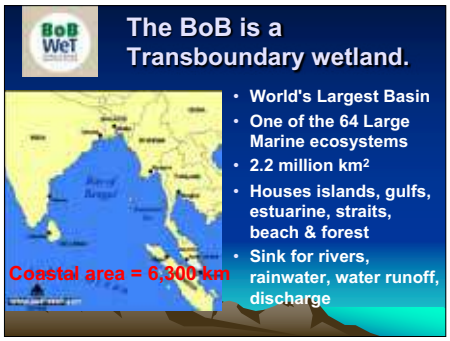
Sri Lanka

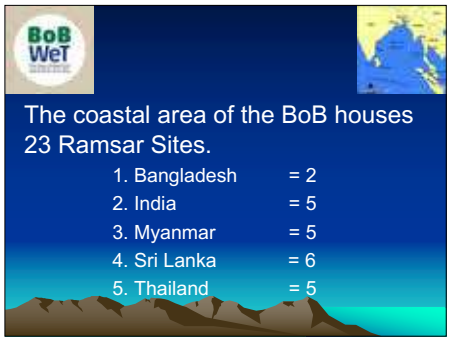
43. Indika Rohan Palihakkara (Dr.), Rufuna University, Sri Lanka

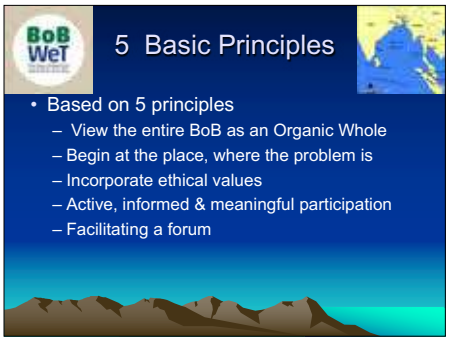
Thailand

44. Maneewan Sanlee (Ms.), Save Andaman Network Foundation
45. Sansanee Choowaew (Dr.), Senior Advisor, Mahidol University

KeyNote:
Bishnu Bhandari







Community Sharing Workshop in Cox's Bazaar





International Symposium

Overall Objective

Its overall objective is to share our experiences, knowledge & opportunities in the Bay of Bengal

2. Road Map

- **Strengthening the current network**
- **Continue community sharing workshop**
- **Develop innovative project**
- **Mount the demonstration project**

Thank you for your kind attention

Part I
Yugraj Singh Yadava

International Cooperation on the Environment of the Bay of Bengal in the BOBP-IGO Perspective

International Symposium on the Conservation of Wetland Biodiversity along the Coast of Bay of Bengal
07 March 2019, Dhaka, Bangladesh

Yugraj Singh Yadava
Yugraj.yadava@bobpigo.org

Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO)

- A four-country regional fisheries advisory body.
- Members: Bangladesh, India, Maldives, Sri Lanka.
- Cooperating countries: Myanmar, Thailand, Indonesia, Malaysia
- Institutionalized in 2003 from erstwhile Bay of Bengal Programme of FAO which started in 1979.

What is regional cooperation in the context of the seas?

Cooperation: an act or instance of working or acting together for a common purpose (1) or benefit (2).

1. **Purpose**: Sustaining the gain from economic uses **(*e.g.* food, livelihoods, healthy stocks, foreign exchange)**
2. **Benefit**: Complementary policies, knowledge base – better governance

Plan of the Presentation

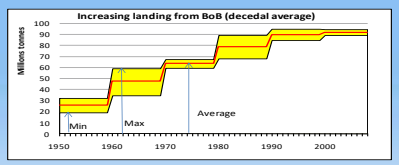
- **Objective**: To share cross-sectoral learning on regional cooperation (Marine fisheries & environment)
- Wetlands are highly important for marine ecosystem. However, they are not covered here as they are covered in other presentations.
- **Section 1**: State of Fisheries and Environment in Bay of Bengal
- **Section 2**: Institutional and Governance framework for regional cooperation
- **Section 3**: Example of regional cooperation and achievements
- **Section 4**: Lessons learned and way forward

Section 1: The Bay of Bengal – Stylized Facts

- **The Bay of Bengal number of countries**- 8
- **Combined coastal population**- 185 million
- **Tropical coral reefs** – 3.65% of the world
- **Number of fishers** - 3.7 million
- **Number of boats**- 415 000
- **Annual catch**- 6 million tonnes /US$ 4 billion
- **Value of marine and coastal ecosystem service: >** US$ 72 billion a year
  - **Aquaculture** US$ 9.4 billion
  - **Fisheries** US$ 32.4 billion
  - **Tourism** US$ 18.7 billion

Source: BOBLME 2015

Unplanned growth leading to stock depletion



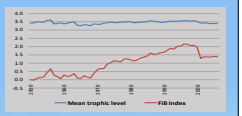
Future of the Bay as our common heritage is increasingly getting questionable?

Fishing down the food chain.

Of the 46 commercially important species, 11 species are fully exploited and 4 are fully or over-exploited.

Fleet over capacity.

Use of highly efficient and harmful gear.



Section 2: Institutional & Governance Framework for Regional Cooperation

- Regional Geopolitical Organizations
- Regional Economic Organizations
- Regional Sectoral Organizations
- International Sectoral Agreements
- International Organizations

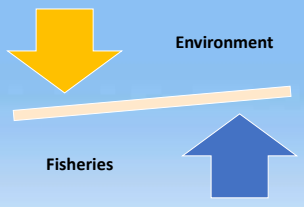
Regional Geopolitical Organizations

- **South Asian Association for Regional Cooperation (SAARC)**
  - SAARC Environment Ministers meet periodically to take stock of and further regional cooperation on environmental issues.
  - In October 1997, during Third Meeting of the SAARC Ministers, SAARC Environmental Action Plan was adopted.
  - Climate Change and sea level rise were flagged as areas of concern.
  - SAARC Coastal Zone Management Centre (hosted by Maldives) was created.
  - **However, SAARC Environmental Ministers have not met since 2011.**
- **Association of Southeast Asian Nations (ASEAN)**

Regional Economic Organizations

- **Bay of Bengal Initiative for Multi-sectoral and Economic Cooperation**
  - Bridge between South Asia and Southeast Asia.
  - In 2005, during 8th BIMSTEC Meeting in Dhaka, environment and disaster management were identified as priority areas.
  - Fisheries is another focal point of BIMSTEC (led by Thailand).
  - Ecosystem-based Fisheries Management in the Bay of Bengal was proposed in the first meeting of BIMSTEC Fisheries Committee in 2001.
  - **Regular activities and cooperation are missing.**

Regional Sectoral Organizations



Regional Environmental Organizations

- **South Asian Association for Regional Cooperation (SACEP)**
  - Part of Regional Seas Programme of UN Environmental Programme.
- **International Union for Conservation of Nature - Mangroves for the Future (IUCN-MFF)**

Regional Fisheries Organizations

- **Asia-Pacific Fishery Commission (APFIC)**
  - Policy advocacy
  - Umbrella organization
- **BOBP-IGO**
  - Bottom-up capacity building,
  - policy advocacy and regional synergy.
  - Technology diffusion
- **South-East Asian Fisheries Development Centre (SEAFDEC)**
  - Capacity Building
  - Policy support
  - Technology development
- **Indian Ocean Tuna Commission**
  - Stock Management
- **Bay of Bengal Large Marine Ecosystem Project**

International Instrument for Regional Cooperation

"It is one of the advances in maritime international law, resulting from the intensification of fishing, that the former *laissez faire* treatment of the living resources of the sea in the high seas has been replaced by a recognition of a duty to have due regard to the rights of other States and the needs of conservation for the benefit of all."

(ICJ, Fisheries Jurisdiction Case, 1974)

United Nations Convention on Law of the Sea

Article 64: Highly migratory species

- The coastal State and other States whose nationals fish in the region for the highly migratory species…shall cooperate directly or through appropriate international organizations…to ensuring conservation and promoting the objective of optimum utilization…

United Nations Convention on Law of the Sea

- ***Article 118: Cooperation of States in the conservation and management of living resources***
- ***Article 119: Conservation of the living resources of the high seas***
- ***Article 123: Cooperation of States bordering enclosed or semi-enclosed seas***

Convention on Biological Diversity

- **Article 5. Cooperation**
  - Each Contracting Party shall…cooperate…, in respect of areas beyond national jurisdiction and on other matters of mutual interest.
- **Article 17. Exchange of Information**
  - The Contracting Parties shall facilitate the exchange of information…
- **Article 18. Technical and Scientific Cooperation**
  - The Contracting Parties shall promote international technical and scientific cooperation…

Code of Conduct for Responsible Fisheries

- **Article 6: …**In recognizing the transboundary nature of many aquatic ecosystems, States should encourage bilateral and multilateral cooperation in research, as appropriate.
- **Article 7: …**States in the case of straddling and highly migratory stocks, should cooperate to ensure effective conservation and management of the resources (on transboundary stocks).
- **Article 10**: States with neighbouring coastal areas should cooperate …to facilitate the sustainable use…

The UN Fish Stocks Agreement

- Focuses on conservation and management of straddling and highly migratory fish stocks;
- Introduces precautionary approach to fisheries management;
- Specifies obligation of flag states – innovative enforcement provisions;
- Promotes special needs of developing countries;
- Paves the way for regional fisheries management organizations.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

- To ensure that international trade in specimens of wild animals and plants does not threaten their survival.
- Provisions for penalizing non-complying parties.

Convention on the Conservation of Migratory Species of Wild Animals (1979)

- Aims to conserve terrestrial, marine and avian migratory species throughout their range.

The 1992 Earth summit

- **The Rio Declaration** put 'human' at the centre of concern for sustainable development and acknowledged the sovereign right and responsibility of states to ensure controlling of damage to the environment.
- **Agenda 21** calls for international co-operation needed for sustainable development, conservation and management of resources, strengthening of stakeholders and governance issues.

Sustainable Development Goals

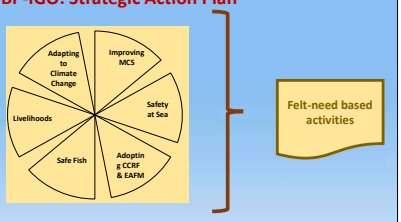
- **Goal 14: Life Below Water**
  - Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- **Goal 15: Life on Land**
  - Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- **Goal 17: Partnership for the Goals**
  - Strengthen the means of implementation and revitalize the global partnership for sustainable development

International Organizations

- Food & Agriculture Organization of United Nations
- Other UN Organizations
  - Umbrella bodies
  - Larger policy direction
  - National level capacity building
  - Technology and knowledge transfer
- Recently there is concern that UN bodies are moving toward policy direction only while there field presence is reduced!

Section 3: Examples of Regional Cooperation

BOBP-IGO: Strategic Action Plan



Adopting CCRF

- A regular training programme instituted in 2008
- Targets junior and middle-level officials
- Covered: Bangladesh, India, Maldives, Sri Lanka, Myanmar, Indonesia
- 6 programmes; 120+ trained.

Promulgating EAFM

- Started in collaboration with BOBLME. Carried forward by BOBP-IGO
- 2 Regional Programmes; several national programmes; 70+ trained.
- Strategy: To develop both in-country trainers and practitioners

Capacity building in data collecting, collation and analysis

- **During regional and subsequent national MCS meeting, data collection and reporting was identified as a major short-comings**
  - Lack of fund, wherewithal and trained manpower.
  - Lack of private-public partnership
  - Lack of involvement of general academia
- **This need was again reflected during CCRF and EAFM training programmes**
  - There is also a lack of demand for data and a national level plan on utilization of data.
  - Data and analytical reports are often not timely available.
  - A administration+ R&D Institution Dialogue is often missing on developing an effective data collection and reporting mechanism

Bay of Bengal Large Marine Ecosystem Project

- Funded by GEF
- Implemented by FAO from 2009-2015. Next phase under progress. Likely to start by 2020.
- Adopted transboundary diagnostic approach
- Major threats:
  - Over-exploitation of fish stocks
  - Habitat degradation
  - Pollution

BOBLME Phase 1 was a foundational Project

- **Based on the need to lay the foundations for change,**
  including demonstrations of transboundary cooperation, before implementing a second phase action programme that will lead to the long-term goal relating to an improvement in the health of the Bay of Bengal and its fisheries.
- **BOBLME focused on:**
  - increasing capacity in natural resources management,
  - increasing knowledge about the ecosystem,
  - developing indicators for tracking changes, and
  - starting to improve ecosystem health through transboundary demonstration activities.

Two major outputs

A Transboundary Diagnostic Analysis – TDA

- Review and analysis of the major transboundary issues and their causes

A Strategic Action Programme – SAP

- A (strategic action) plan for addressing the major transboundary issues and their causes

Section 4: Lessons Learned and Way Forward

- Countries are more forthcoming in recognizing and discussing transboundary issues!
- However, actual and effective on-field examples of regional cooperation is scant!

Challenges in moving towards a regional cooperative arrangements

Regional cooperation is costly…

- Countries need to adjust their priorities and policies.
- The nature of commitment of the Government also changes under a regional framework – became more binding!
- From data to research to policy and action – more transparency becomes necessary (owing to sharing information and knowledge).

Moving towards cooperation

- **Primary level:** Cooperation in research and information sharing
  - informal and non-binding.
- **Secondary level:** Cooperation in primary level + implementation & enforcement.
  - Formal & binding .
    - *Its effective*

Thanks!

Norman Emmanuel C. Ramirez

The Ramsar Regional Center – East Asia and plans for the Bay of Bengal region

Norman Emmanuel C. Ramirez
Program Officer, Ramsar Regional Center – East Asia

Contents

- **Introduction**
- **Main RRC-EA activities**
  - CEPA
  - Network
  - Wetland Fund
  - Implementation of Ramsar Convention
- **Planned activities**

History

- NOV 2008 Proposed to the Ramsar Convention (Res X.32)
- MAY 2009 Endorsed by Ramsar SC41
- JUL 2009 Inaugurated in Changwon City
- DEC 2015 MOU between RRC-EA, MOE Korea and Suncheon
- JAN 2016 Inaugurated new office in Suncheon

Ramsar Regional Center – East Asia
(Suncheon, Republic of Korea)

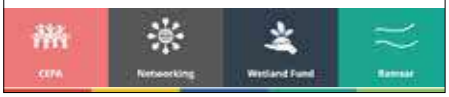
Regional boundary

Governance and Institutional Arrangements

- **RRC-EA Steering Committee**
  - provides guidance in the development of policies and programs for the Center
  - Heads of the Ramsar Administrative Authorities or their appointed representatives from RRC-EA countries
- **RRC-EA coordination with the Ramsar Secretariat and Ramsar Administrative Authorities**
  - to ensure complementarity of RRC-EA activities with national initiatives and the Ramsar Strategic Plan

Areas of work

1. promoting communication, capacity building, education, participation and awareness (CEPA)
2. maintaining networks of wetland managers and wetland education centers
3. managing the RRC-EA Wetland Fund
4. supporting the implementation of the Ramsar Convention



CEPA

Regional Training Workshop for Wetland Managers in East, Southeast and South Asia

- annual event offered to all RRC-EA Member Countries
- 11 regional training workshops (by 2019)
- designed to include:
  - special lectures aligned with the World Wetlands Day theme (e.g. disaster risk reduction, sustainable urban wetlands, climate change)
  - Information sharing session by the countries
  - Rapid Assessment of Wetland Ecosystem Services (RAWES)
  - Ramsar Site Management Effectiveness Tracking Tool (R-METT)

CEPA

National Training Workshop for Wetland Managers

- annual event offered to interested RRC-EA Member Countries
- provides complementary support to address the priority capacity building needs of one country (based on national wetland action plans or related policy documents)
- approach to use the national language as the medium of communication during trainings
- venue to promote Ramsar Convention tools and approaches (RAWES, R-METT, Designation and Management of Ramsar Sites)
- host countries: Bangladesh, Bhutan, Cambodia, Indonesia, Mongolia, Myanmar, Thailand and Viet Nam

CEPA

Subregional Training Workshop for Wetland Managers

- capacity building support in between the regional and national levels
- to target transboundary wetlands beyond national borders, e.g. Yellow/West Sea, Lower Mekong River, and Bay of Bengal

CEPA

- **Youth Model Ramsar Convention**
  - aims to raise the awareness of the youth and future generations on wetlands
  - designed to simulate the basic proceedings of a Ramsar COP
- **World Wetlands Day promotion**
  - producing and distributing posters, pins, brochures, hand fans and eco-bags that promote the WWD and the Ramsar Convention
  - the RRC-EA collaborates with the Kia Tigers professional baseball team to promote the WWD by hosting a nationally televised ceremonial pitch and hit

CEPA

World Wetlands Day promotion

CEPA

- **Training module development**
  - RAWES and R-METT video lectures have been developed
  - accessible through YouTube and the RRC-EA website

CEPA

- **Translation of Ramsar Guidebook**
  - translated into nine (9) languages of the countries: Cambodia, China, Indonesia, Republic of Korea, Lao PDR, Mongolia, Myanmar, Nepal and Viet Nam

CEPA

RRC-EA website and web magazine

- www.rrcea.org
- quarterly web magazine

Network of wetland managers and wetland education centers

Wetland Link International - Asia

- MOU signed between RRC-EA and WLI Headquarter
- Organized 5th and 6th WLI-Asia Conference\
- Inventory of Wetland Education Centers in Asia
- Cooperative Fundraising, Exhibition Exchange, Twinning WECs

Network of wetland managers and wetland education centers

Network: Inventory of WECs in Asia

"Wetland Centers in Asia"

RRC-EA Wetland Fund

- Financial support for wetland conservation activities
- 4 projects for wetland conservation (USD 10,000 / year)
- 3 projects for WWD promotion (USD 5,000 / year)
- as of 2018, a total of 46 projects from 14 countries in East, Southeast and South Asia

Implementation of Ramsar Convention

- the RRC-EA maintains cooperation and linkages with the Ramsar Secretariat and with Ramsar National Focal Points
  - to ensure that the initiatives of the RRC-EA are in sync with global and national commitments and developments
- the RRC-EA contributed to the development of:
  1. R-METT
  2. RAWES approach
  3. Wetland City Accreditation of the Ramsar Convention

Planned activities (2019-2020)

1. **Regular activities**
   - regional, subregional (Lower Mekong River and Bay of Bengal) and national trainings (Malaysia, India or Philippines)
   - youth program and WWD promotion
   - development and translation of training modules and Ramsar Guidebooks
   - RRC-EA website and web magazine
   - WLI-Asia Secretariat and RRC-EA Wetland Fund
2. **Special events**
   - 2019 Society of Wetland Scientists – Asia Chapter Meeting
   - 7th Wetland Link International – Asia Conference
   - Inaugural Wetland City Mayors' Round Table
   - Workshop of the Independent Advisory Committee
   - 2020 Asian Wetland Symposium

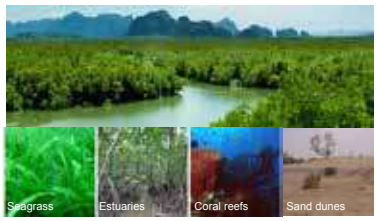
Thank you for your attention

Raquibul Amin & Shahad Mahbub Chowdhury

Community based coastal wetlands management under the Mangroves for the Future (MFF) initiative

Raquibul Amin
Shahad Mahbub Chowdhury
IUCN Bangladesh

Mangroves are a flagship ecosystem, but MFF is inclusive of all coastal ecosystems

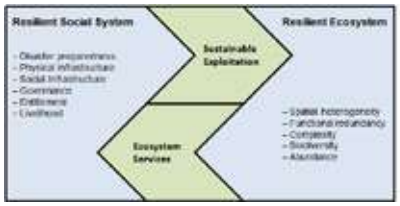


Where MFF works (geographical scope and countries)

Members: Bangladesh, Cambodia, India, Indonesia, Maldives, Myanmar, Pakistan, Seychelles, Sri Lanka, Thailand, Viet Nam
Outreach: Malaysia

MFF is co-chaired by IUCN and UNDP, and is funded by Danida, Norad and Sida.

The Social Ecological System (SES)



MFF in Bangladesh

- Bangladesh joined MFF as outreach country on 2009
- Later formed a functional National Coordinating Body (NCB) which starts operation since October 2011
- GoB has approved the National Strategy and Action Plan (NSAP) in 2012
- Bangladesh became a member country of MFF since November 2012 (in RSC 09)
- NCB is chaired by the Secretary, MoEFCC
- Chief Conservator of Forests is the Member Secretary
- NCB Bangladesh is a multi-stakeholder body comprising of GOs, NGOs, academia, scientists, coastal experts and private sectors, and this body consists of total 35 members.
- Implemented 17 grant projects in the selected coastal sites

Project sites: Bangladesh

Example # 01

Improved natural resource governance through planting mangroves at the riverine chars: Innovation in Climate Change Adaptation.

Resilience Analysis in Shyamnagar

Identified issues

- Salinity ingression, fresh water scarcity, limited livelihood opportunities, high dependence on Sundarban mangrove forest, vulnerability to climate variability, river erosion and tropical cyclones

Priority issues for Call

- Initiative for livelihoods diversification and security of forest dependent and fisher communities
- Freshwater conservation for agriculture
- Community based climate change adaptation
- Introduction of adaptive agriculture and aquaculture to cope with the changing climate
- Support to community based eco-tourism initiative

NCB

Vision: Golden Shyamnagar 2050

- Dependency on Sunderbans will decrease, People will come forward to conserve Sundarbans.
- All development activity will be better integrated by Local Govt.
- Water management system will be established through the initiative of BWDB and others.
- Shaymnagar people will be skilled on disaster management. They will turn around after disaster.
- Mangrove conserved through co-management will be grown outside the river embankment and accreted land
- Business centers will flourished
- People will be professional on eco-tourism based business and livelihoods.

Mangrove rehabilitation

- Started with 25 Hectare Mangrove plantation in 2013-14
- Union Parishad shares responsibility with a 35 member forest management committee
- Community gets 40% of benefits (fruits, honey, nursery), UP gets 40% and 20% used to maintain the forest

Impacts: Natural Resource Governance and Resilience

Results:

- MFF supported rehabilitation of 100 ha so far through its grant projects.
- CREL/FD/USAID leveraged their investment and rehabilitated more than 300 ha.
- The mangroves now look like a natural forest and provides shelter of fishes and birds.
- The village Gabura has now become less vulnerable to erosion and tidal surges.
- MFF-VCF earned BDT 0.25 million by selling mangrove saplings to CREL project in 2014.
- Illegal entry to Sundarban has decreased.
- An average person (usually women) catches post-larvae of fish, crabs and shrimp worth about BDT 200/day - this income is well comparable with what they use to get from the Sundarbans.

Lesson Learned

- The institutional arrangement for a shared governance mechanism is a new lesson learned from the MFF intervention.
- Involvement of local communities along with Union Parishad were the key to develop local ownership and ensure the sustainability of the initiative.
- On the technical side, Assisted Natural Regeneration (ANR) of mangroves was found cheaper and more efficient method compared to seedling raising and planting.
- The MFF mangrove rehabilitation model should be adopted as a best practice of Ecosystem based Adaptation (EbA) and disaster risk reduction strategy in char land.

Example # 02

Common pool: Equitable water governance brings prosperity to Sabkhali, Shyamnagar.

Two consecutive cyclones in 2007 and 2009 worsened the situation of Sakhali. There is severe shortage of freshwater. Farmers could grow one rain-fed rice with the little water that could be stored in the only remaining natural canal that flows through the village. Most part of the canal was silted up and illegally occupied by local elites.

2 km long and 30 meter wide canal was re-excavated. The canal water helped the farmers to grow round the year crops in 120 ha land, giving them more than 60% increase in production; Farmers have also done livestock rearing, fish farming and poultry.

Innovations

Gender equity: Total beneficiaries 360 (M 180, F 180)

Efficient and judicious use of surface water: Entire water is not irrigated to crop fields, water kept for fish farming also.

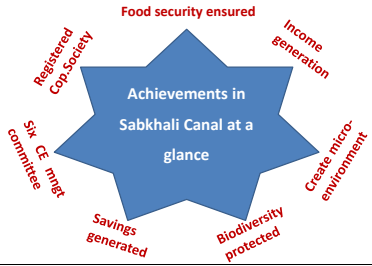
Social Harmony: Munda, Hindu and Muslim members are in SCMC.

Innovations

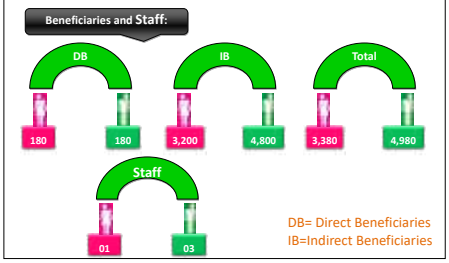
Introduce climate resilient crops: Water melon, Wheat, Maize, Sunflower.

Established equity: Land owner and land less farmers can cultivate rice in 16 decimal land using canal water.

Results in Sabkhali Canal at a glance



Results in Sabkhali Canal at a glance



DB= Direct Beneficiaries
IB=Indirect Beneficiaries

Moving towards sustainability

Linkage with GO & other service providers

Seed preservation

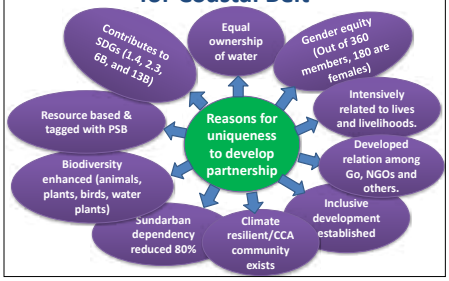
Sustainability

Group unity; no outsider muscleman benefitted from the resource

Savings from production and contribution from PSB

PSB= Palli Sanchoy Bank

Sabkhali Canal, a unique Model for Coastal Belt



Lesson Learned

- It has demonstrated how coordinated action at the community level can be successful and sustainable.

- The MoDMR has already recognised this model as a disaster risk reduction strategy and requested that two UDMC's in Shyamnagar to scale up their interventions.

Thank you

Muhammad Abdur Rahaman, Arifur Rahman Ovi, A S M Imrul Kayes & Md. Nazimuzzaman

Geomorphological evolution and coastal dynamics along the coastal shoreline of Bay of Bengal in relation to climate induced disaster: Fifty years of human-nature interaction

Muhammad Abdur Rahaman
Arifur Rahman Ovi
A S M Imrul Kayes
Md. Nazimuzzaman

Contact: rana.bries@gmail.com

Background of the study

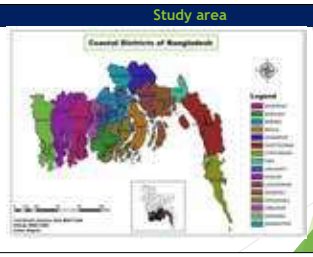
- The coastal regions of Bangladesh are disaster prone due to its geographical location.
- Climate induced natural disasters like severe cyclone, shocking tidal surges, severe floods, underhanded river erosion, excessive rainfall, overwhelming salinity intrusion, sea level rise etc. are occurring more frequently in greater intensities along with prominent human activities.

Background of the study

- Coastal shoreline is geologically dynamic in terms of subsidence and uplifting characteristics.
- Sea level rise, bank erosion overlaying with subsidence and uplifting coastal shoreline along the Bay of Bengal is changing continuously and
  - Forming diverse new land forms
  - Changing land use patterns
  - Changing vegetation coverage
  - Changing river morphology as well as river trajectory

Resulting fragile natural resource base, socio-economy as well as human displacement

Study area



Study elements

- Coastal erosion and deposition
- Dynamics of vegetation coverage
- Changing land use pattern
- Changing settlement pattern
- Changing river trajectory

Analysis of sea level data of Hiron Point, Bakkhali and overlaying with subsidence and uplifting rate

Methodology

Analysis of Landsat satellite images for the period of 1994 to 2019 for land cover mapping, land use changes, changes of human settlement pattern, dynamics of vegetation coverage (NDVI) and changing characteristics of water bodies. The Landsat data (1994 and 2019) have been acquired from the U.S. Geological Survey Earth explorer interface.

Satellite/Sensor	Date of acquisition	No. of bands	Resolution(m)
Landsat-7, ETM+	January 1994	8	30
Landsat-8, ETM+	January 2019	8	30

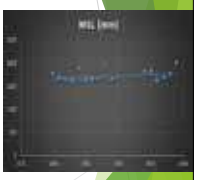
Methodology

- Sea level data for the same period was analyzed for the Hiron Point, Charchenga and Bakkhali river point extracting from University of Hawai Sea Level Center and Bangladesh Inland Water Transport Authority (BIWTA) for the period of 1977 to 2019.
- The study as made overlaying seal level data with geological subsidence and uplifting information of coastal area of Bangladesh for the three coastal regions namely western coastal region, central coastal region and eastern coastal region.

Result and Discussion

Sea level rise, geological uplifting and tidal inundation at Charchenga, Hatiya

- Average sea level rising trend of Charchenga point of Hatiya is 11.8 mm for the period of 1983-1999.
- Geological uplifting was observed in this point is .018 mm for each year which account of 8.36 mm for this same period (Bramar, 2017).
- As a result, in the last 20 years, net sea level rise observed in this point is 2.94 mm which causes regular tidal flooding in Hatiya along with river bank erosion at increasing rate.



Result and Discussion

Land use changes in Saint Martin Island

- In 1994 there was 230 ha of vegetation but it stands at only 125 ha in 2019 as well as in each year Saint Martin Island is losing vegetation coverage at a rate of 4.2 ha. If the island lose by this rate then within 30 years as well as at 2050, Saint Martin Island will be a barren Island.

Result and Discussion

Land use changes in Saint Martin Island

- At 1994 there was 85 ha water bodies inside the island which stands at 30 ha in 2019.
- At the same time, sandy beach reduced 15.2 ha for each year on an average in the last 20 years but settlement is increasing at the rate of 8.4 ha in each year in the last 20 years and it may be concluded that within 50 years the island would be full of human settlement if the settlement increasing rate continues at this rate

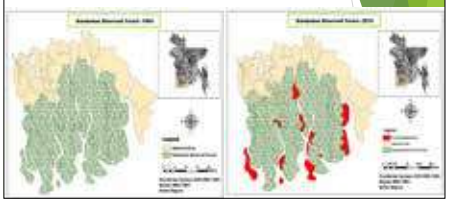
Result and Discussion

Land use change in Saint Martin Island

Land Use	1994 (Ha)	2019 (Ha)
Vegetation	230	125
Water bodies	85	30
Sandy Beach	560	256
Settlement	22	190

Result and Discussion

Vegetation coverage changes in Sundarbans



Result and Discussion

Vegetation coverage changes in Sundarbans

Land Type	Area (Ha) in 1994	Area (Ha) in 2019
Forest Area	6,01,700	5,40,005
Forest adjacent Area	6,26,140	6,03,074
Forest depleted Area		61,695
Lost adjacent area		23,066

In each year, Sundarbans is losing 2467.8 ha of forest on an average

Part II
Sanowar Hossain

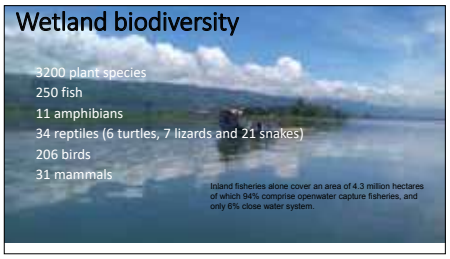
Conservation of wetlands and Disaster Risk Reduction in Bangladesh

Sanowar Hossain
Bangladesh POUSH

Wetland in Bangladesh

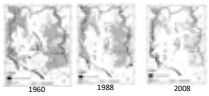
Water-body	Hector
(a) Inland open water	
(1) Rivers (During dry sea)	
Ganges	27,165
Padma	42,325
Jamuna	73,666
Meghna (upper)	33,597
Meghna (lower)	40,407
Other rivers and canal	262,580
Sub-total	**479,735**
(2) Estuarine area	551,828
(3) Beels and haor	114,161
(4) Kaptai lake (man-made)	68,600
(5) Inundable floodplains (seasonal)	5,486,609
Sub-total	**6,221,398**
(b) Close water-body	
(i) Ponds and tanks	146,890
(ii) Oxbow lakes	
(iii) Brackish water farms	260,378
Sub-total	515,268
(c) Marine-water Exclusive Zone	7,000,000

Wetland biodiversity



Threats to Wetlands

1. Disappearing
2. Pollution
3. Over harvesting of the natural resources
4. Land use conflict
5. Lack of up stream water flow in winter
6. Over flow of water in monsoon
7. Increase risk of flood
8. Entrance of saline water due to lack of water flow in winter.



Degradation of wetlands

- extinction and loss of wildlife,
- extinction of many indigenous wild and domesticated rice varieties,
- loss of many indigenous aquatic plants, herbs, shrubs and weeds,
- loss of natural soil nutrients,
- loss of natural water reservoirs and of their resultant benefits,
- increasing the frequency and intensity of flooding
- threat to occupations, socio-economic institutions and cultures.

Climate Change and Disaster Impact in wetlands

- **Extreme weather**
- **Drought**
- **Salinity Intrusion**

- ❑First rain by early April
- ❑Prolonged Rainy season
- ❑Excess rainfall
- ❑Extreme cold weathers
- ❑High temperature

Climate Change impact in Sundarbans

Increasing salinity
Changes in Habitat
Habitat loss
Loss of Biodiversity

Cyclone SIDR – Nov 15, 2007

Cyclone Aila - May 25, 2009

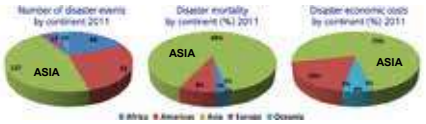
Naoya Furuta

The Role of Wetlands for Disaster Risk Reduction

Naoya Furuta
Coordinator, Japan Liaison Office
IUCN (International Union for Conservation of Nature)
/Taisho University

Disasters are on the rise

Disasters by region in 2011, EM-DAT



EM-DAT CRED, newsletter 2012

Publications on DRR following Western Indian Ocean Tsunami

Ecosystem-based Disaster Risk Reduction – more sustainable approach to DRR and Climate Change Adaptation

Eco-DRR " is the sustainable management, conservation, and restoration to reduce disaster risk, with the aim of achieving sustainable and resilient development" (Estrella and Saalismaa 2013)

Global Partnership– Partnership for Environment and Disaster Risk Reduction (PEDRR)

http://www.pedrr.net/

Global advocacy for ecosystem-based strategies for DRR and CCA

-> Integrating DRR issues into global conservation policy frameworks

-> Integrating ecosystem-based solutions into global DRR, CC and sust. dvlpt frameworks

Ramsar COP12 (2015)

CBD Voluntary Guidelines on EbA and Eco-DRR

CBD Voluntary Guidelines on EbA and Eco-DRR

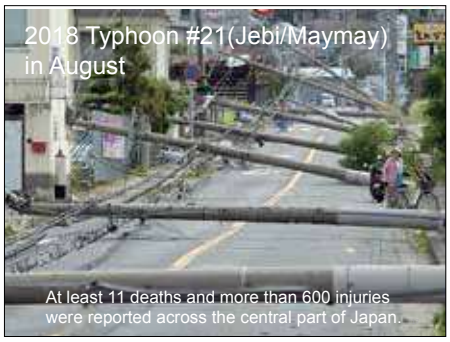
Principles for building resilience and enhancing adaptive capacity through EbA and Eco-DRR	
1	Consider a full range of ecosystem-based approaches to enhance resilience of social-ecological systems as a part of overall adaptation and disaster risk reduction strategies.
2	Use disaster response as an opportunity to build back better for enhancing adaptive capacity and resilience and integrate ecosystem considerations throughout all stages of disaster management.
3	Apply a precautionary approach in planning and implementing EbA and Eco-DRR interventions.
Principles for ensuring inclusivity and equity in planning and implementation	
4	Plan and implement EbA and Eco-DRR interventions to prevent and avoid the disproportionate impacts of climate change and disaster risk on ecosystems as well as vulnerable groups, indigenous peoples and local communities, women and girls.
Principles for achieving EbA and Eco-DRR on multiple scales	
5	Design EbA and Eco-DRR interventions at the appropriate scales, recognizing that some EbA and Eco-DRR benefits are only apparent at larger temporal and spatial scales.
6	Ensure that EbA and Eco-DRR are sectorally cross-cutting and involve collaboration, coordination, and cooperation of stakeholders and rights holders.
Principles for EbA and Eco-DRR effectiveness and efficiency	
7	Ensure that EbA and Eco-DRR interventions are evidence-based, integrate indigenous and traditional knowledge, where available, and are supported by the best available science, research, data, practical experience, and diverse knowledge systems.
8	Incorporate mechanisms that facilitate adaptive management and active learning into EbA and Eco-DRR, including continuous monitoring and evaluation at all stages of planning and implementation.
9	Identify and assess limitations and minimize potential trade-offs of EbA and Eco-DRR interventions.
10	Maximize synergies in achieving multiple benefits, including for biodiversity, conservation, sustainable development, gender equality, health, adaptation, and risk reduction.

Safeguards for effective planning and implementation of EbA and Eco-DRR	
Applying environmental impact assessments and robust monitoring and evaluation	1. EbA and Eco-DRR should be subject, as appropriate, to environmental impact assessments including social and cultural assessments (referring to the Akwé: Kon guidelines) at the earliest stage of project design, and subject to robust monitoring and evaluation systems.
Prevention of transfer of risks and impacts	2. EbA and Eco-DRR should avoid adverse impacts on biodiversity or people, and should not result in the displacement of risks or impacts from one area or group to another.
Prevention of harm to biodiversity, ecosystems, and ecosystem functions and services	3. EbA and Eco-DRR, including disaster response, recovery and reconstruction measures, should avoid the degradation of natural habitat, loss of biodiversity or the introduction of invasive species, and should not create or exacerbate vulnerabilities to future disasters. 4. EbA and Eco-DRR should promote and enhance biodiversity and ecosystem functions and services, including through rehabilitation/restoration and conservation measures, as part of post-disaster needs assessment and recovery and reconstruction plans.
Sustainable resource use	5. EbA and Eco-DRR should neither result in unsustainable resource use nor enhance the drivers of climate change and disaster risks, and should strive to maximize energy efficiency and minimize material resource use.
Promotion of full, effective and inclusive participation	6. EbA and Eco-DRR should ensure full and effective participation of the people concerned, including indigenous peoples and local communities, women, minorities and the most vulnerable, including the provisioning of adequate opportunities for informed involvement.
Fair and equitable access to benefits	7. EbA and Eco-DRR should promote fair and equitable access to benefits and should not exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups. EbA and Eco-DRR interventions should meet national labour standards, protecting participants against exploitative practices, discrimination and work that is hazardous to their well-being.
Transparent governance and access to information	8. EbA and Eco-DRR should promote transparent governance by supporting rights to access to information, providing all stakeholders and rights holders, particularly indigenous peoples and local communities, with information in a timely manner, and supporting the further collection and dissemination of knowledge.
Respecting rights of women	9. EbA and Eco-DRR measures should respect the rights of women and men from

2018 Japan floods in July

More than 220 people died in the extreme heavy rain in the western part of Japan

2018 Typhoon #21(Jebi/Maymay) in August



At least 11 deaths and more than 600 injuries were reported across the central part of Japan.

2018 Eathquake in Hokkaido in September

Large scale landslides occurred partly due to a heavy rain fall in the previous month. More thank 40 people died and many buildings were destroyed.

2018 Typhoon #21(Jebi/Maymay) in August

An offshore international airport constructed by landfill had to be closed by the sea water intrusion and fuel tanker crash. It took more than two weeks for recovery.

2018 Eathquake in Hokkaido in September

A large scale liquefaction occurred in some of the residential areas that were develop by landfill of wetlands.

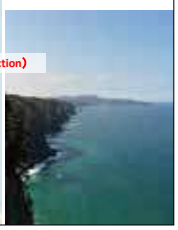
2011 Great East Japan earthquake/tsunami

© REUTERS/KYODO

Workshop on Ecosystem-based DRR (Eco-DRR) Sendai July 2012

Sanriku Fukko (reconstruction) National Park

Designated on May 24, 2013



International Symposium on Ecosystem-based Disaster Risk Reduction

12 November 2013, Tokyo, Japan

IUCN World Parks Congress (Sydney)

National Spatial Development Plan and National Infrastructure Development Plan

- Ministry of Land, Infrastructure and Transport
- National Spatial Development Plan
  - Approved by the cabinet in Aug 2015
  - Recognizing the important role of ecosystems for DRR and CCA
- 4th National Infrastructure Development Plan
  - Approved by the cabinet in Sep 2015
  - Addressing the necessity to promote "Green Infrastructure"

Eco-DRR implementation guideline

- Ministry of the Environment developed a handbook for local governments how to implement Eco-DRR activities on the ground (March 2016)

Eco-DRR in JICA (Japan International Cooperation Agency)

A recommendation by Science Council of Japan

In September 2014, the Science Council of Japan published a recommendation on Encouragement of the Use of Ecological Infrastructure in Reconstruction and National Resilience

Research projects on Green Infrastructure/ EcoDRR

- A multi-disciplinary group of researchers for Green Infrastructure formulated since 2014
- A feasibility Study on Green Infrastructure research project, funded by GOJ under Future Earth Programme, ICSU since 2015
- Two EcoDRR related research projects funded by MOEJ are underway since 2015
- More research projects to come….

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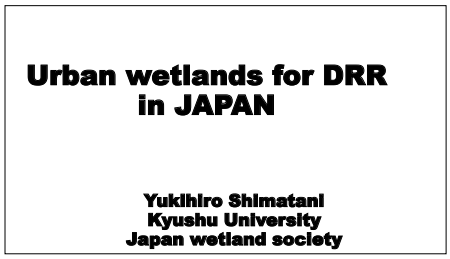
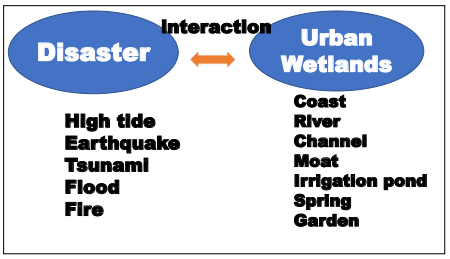
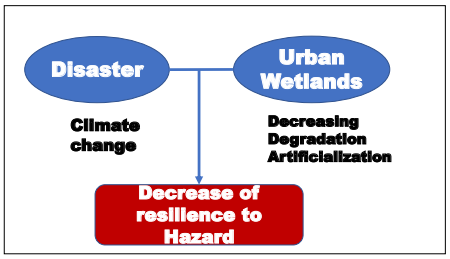
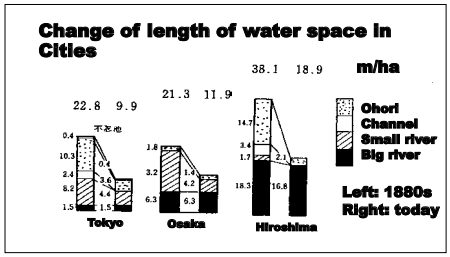
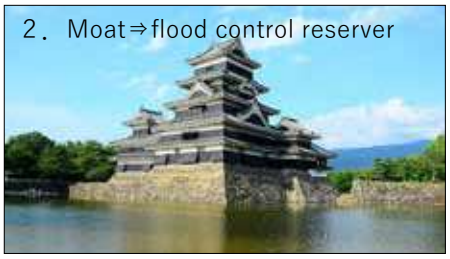
Yukihiro Shimatani

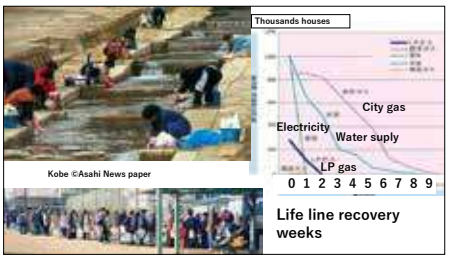


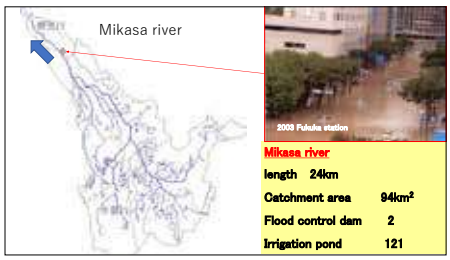


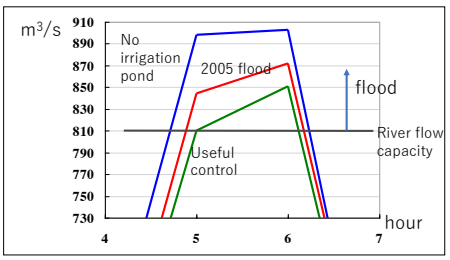






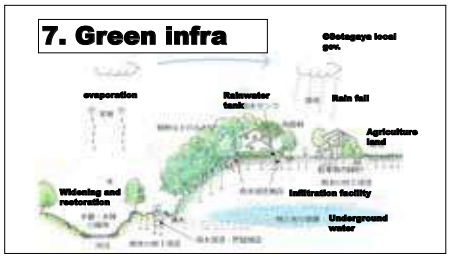


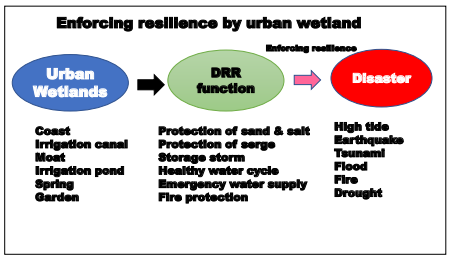




5.Spring

Spring water was used as emergency water when the water supply stopped





Conclusion

There are many types of disaster and wetlands in Japan.

We recognize that good wetlands also have good DRR functions.

We must raise awareness of the disaster prevention function of wetlands and strive to conserve and restore wetlands.

Ritesh Sikka

Ecosystem Management and DRR, Lessons from Mahanadi Delta, Odisha

Ritesh Sikka, Wetlands International South Asia

Ecosystems and Disaster Risk

Social construction of risk, confounded development choices

Risk embedded in landscape structure and way of management

Ecosystems as buffers for several disasters

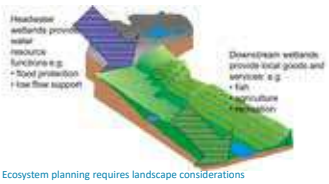
The challenges of linking scales

Disaster Risk Reduction planning begins with the household

Interventions are focused on the ways communities can mitigate, avoid or prepare for disaster risk

Planning and implementation using administrative scales

The challenges of linking scales

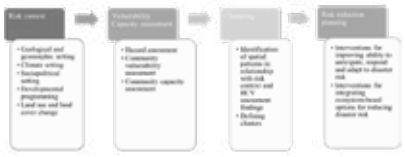


Ecosystem planning requires landscape considerations

The cluster approach

- Multi-scale framework for identifying ecosystem-based intervention needs and opportunities to support DRR
- Based on knowledge of landscape-scale drivers of disaster risks
- Organises risk reduction interventions in 'clusters'
  smaller landscape units comprising communities facing similar patterns of risks from natural hazards
- Complements community-level risk reduction actions with multi-scale interventions to benefit from ecosystem services that reduce disaster risk
- Enables blending administrative and landscape scales

Approach



PfR: Strategic Partnership in India

Support implementation of Sendai Framework of Action to ensure that vulnerable people are more resilient to crises in the face of climate change and environmental degradation enabling sustainable inclusive economic growth.

- Shift from disaster mitigation to disaster risk reduction
- Proactive use of integrated management approaches
- Focus on water mediated risks and use of natural solutions as wetlands

Mahanadi Delta, Odisha

Mahanadi Delta

Geophysical set up

Risk context

Landscape extensively fragmented for water resources development projects

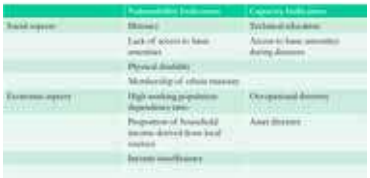
Risk context

Flood dependent economy has turned flood vulnerable

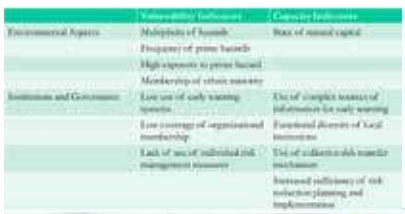
Risk context

Over 30% of wetlands converted in last three decades

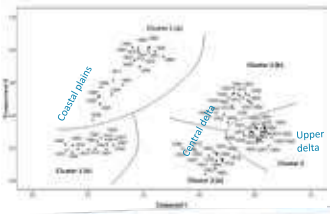
Vulnerability – Capacity Assessment



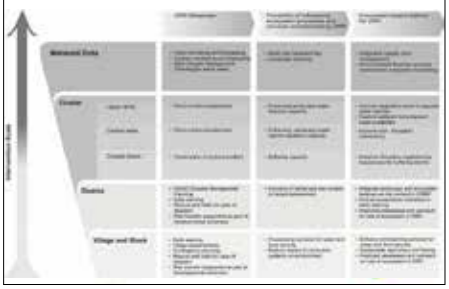
Vulnerability – Capacity Assessment



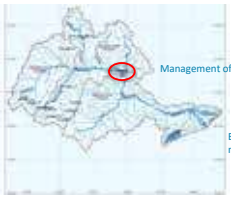
Clustering



Risk reduction planning



Influencing critical risk drivers



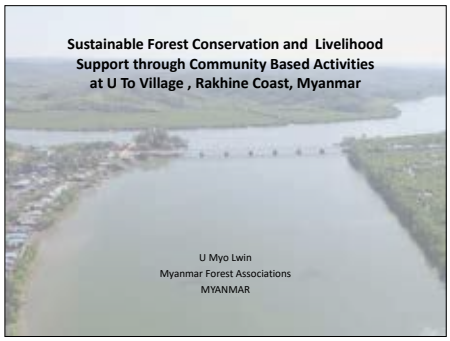
Lessons

Societies accumulate risks as landscapes and ecosystem functioning degrades

Spatial approaches required to address landscape dimensions, complementing household risk reduction approaches

Ritesh Sikka
Technial Officer
Wetlands International – South Asia

Part III
Myo Lwin




U TO village situated at BOB


U TO village Mangrove Conservation project Site, near Chaung Thar Beach


MFA and RCJ Teams Visited the Proposed Project Area and Conduct Meeting with Community


Village Mangrove Nursery establish and raised the seedling *(Kandelia candel, Baugulera gymnorhiza and ceriops decandra)* Species.


Warning Sign boards protection and concrete posts show the boundary of conservation areas.


Three plantation ceremony


2017, Mangrove gap plantation


2018, Mangrove New Plantation


Crab and clam (Mollusk) fattening training and crab cage


Awareness Raising Posters for Mangrove Conservation


Neighboring country study visit. Crab Bank Program


Quality Vegetable Seeds Distribute at Seik Kyi Village


Myanmar Television Program broadcasting the news of U To Mangrove Conservation project


R.C.J Team Visit the Project Site and meeting with Villagers

Ecotourism Training at U To Village

Ministry of Natural Environment and Resources Conservation(MONERC), Minister's Observation Tour at Project Site

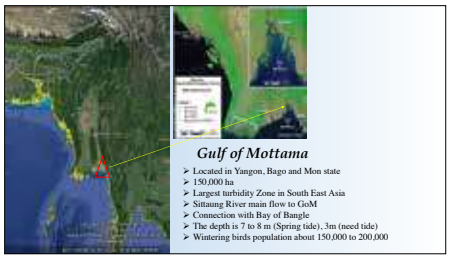
Mangrove Nursery and Wooden Board walk

Min Thiha Zaw

"Community Participation in Gulf of Mottama Ramsar Site"

Min Thiha Zaw& Thaw Phyoe Shwe

Biodiversity And Nature Conservation Association (BANCA-BirdLife Myanmar)



Gulf of Mottama

- Located in Yangon, Bago and Mon state
- 150,000 ha
- Largest turbidity Zone in South East Asia
- Sittaung River main flow to GoM
- Connection with Bay of Bangle
- The depth is 7 to 8 m (Spring tide), 3m (need tide)
- Wintering birds population about 150,000 to 200,000

- IUCN Red list is Critically Endangered (2008)
- Population is under 500
- Migratory Shore bird
- Breeding in North East Russia (Chukota)
- Breeding Seasons (Last week of May to June)
- Wintering ASIA and South East Asia countries
- Fly over 8000 km on EAAFP flay-way
- 50% of Global population wintering in GoM
- Wintering October to April in Myanmar

Spoon-billed Sandpiper (*Calidris pygmaea*)

The threatens on Spoon-billed Sandpiper and Wintering Birds in Winter Countries

- Birds hunting
- Habitat loss

Bird hunter's status

Bird hunters

- **Professional** – Rely mostly on bird hunting for their daily family livelihoods. No opportunity.
- **Opportunistic** -Work together with fishing and hunting/income of bird hunting is lower than fishing
- **Occasional** -Works as fishing, sometime caught bird want to consume.

Region	Professional	Opportunistic	Occasional	Total
East GOM	6	10	11	26
West GOM	4	3	30	37
Total	10	13	41	64

Hunting Techniques

Mist net

Use chemical (Potassium Cyanide)

Use with pesticide liquid and rice

Snares

Supports alternative livelihood

Bird hunters give back hunting equipment to BANCA

Negotiation Village Authorities, BANCA and Bird Hunters agreement Singed

Changed Livelihood

Past time Present time

❖ **Formed (7) Local Conservation Groups (2013)**

❖ **Some of former hunters are leader in LCGs**

Birds Watching Training to LCG Members

Capacity Building training to LCG Members

Environmental Education and Awareness to Students (CEPA)

Environmental Education and Awareness to Local Community (CEPA)

Displaying Education and Awareness Signboards at villages

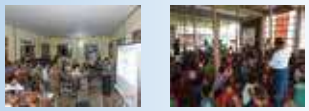
Develop Community Programme

The Location of Ramsar Site and to extension Ramsar Site of Map

- **Designed Ramsar Site**
- **(1) Extension Ramsar Site**
- **North East of Gulf of Mottama (Ramsar Site)**
- **10th May, 2017**
- **42,500 ha**
- **Six out of Nine Ramsar Criteria**
- **1,2,4,5,6,8**
- **Site number 2299**

Children Release SBS in Chaung Zone (Successful CEPA)

Village level signed for extension Ramsar Site designation



Township level singed for extension Ramsar Site designation


Patrolling on Biodiversity by using SMART Software
SMART Patrolling Group
Illegal fishing Net
Monitoring on Shore Birds Survey Team
Birds Survey Team
Using Boat


Thank you very much for your kind attention!

Sansanee Choowaew

MAHIDOL UNIVERSITY

Community-based management of wetland resources for ecotourism

Sansanee Choowaew
Wetlands Management Research and Training Center
Faculty of Environment and Resource Studies
Mahidol University, Thailand
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The International Symposium on the
Conservation of Wetland Biodiversity along the Coast of the Bay of Bengal
7 March 2019, YWCA Bangladesh, Dhaka, Bangladesh

1

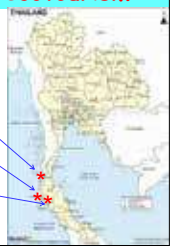
Objectives

- To introduce some good case examples of community-based management of wetland resources for ecotourism along the coast of the Bay of Bengal in Thailand
- To compile / present some key contributing factors leading to possibilities and positive outcomes of wise use and community-based management of wetlands and wetland resources for ecotourism

2

Some case examples of community-based management of wetland resources for ecotourism

- Case example # 1 : Laem Nao village, Ranong province
- Case example # 2 : Koh Yao Noi community, Phang-Nga province
- Case example # 3 : Tha Pom Klong Song Nam, Krabi province



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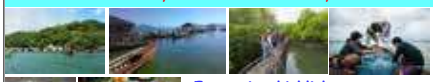
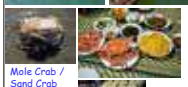
Case example # 1 : Laem Nao village, Nakha sub-district, Suksamran district, RANONG





Mole Crab / Sand Crab

Wing Shell

Ecotourism highlights :

- Community-based management, shared roles/responsibilities
- Learning experience : local livelihoods, subsistent fisheries, hands-on participation in conservation activities including Crab Bank, Wing Shell release
- Species indicator of maintained ecological character

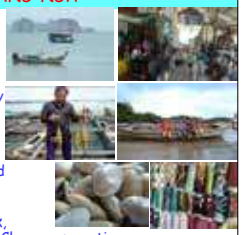
4

Case example # 2 : Koh Yao Noi community, Koh Yao Noi island, Koh Yao Noi sub-district, Koh Yao Noi district, PHANG-NGA

- Group of Local Traditional Fishers and Fund for Small-scale Fisheries Promotion
- Group of Ecotourism by Communities, shared roles/ responsibilities

Ecotourism highlights :

- Conservation activities – coastal & the whole island ecosystems
- Learning experience : local livelihoods, Tree Bank, subsistent fisheries, Surf Clam conservation



5

Case example # 3 : Tha Pom Klong Song Nam, Ban Nong Jik village, Khao Kram sub-district, Muang district, KRABI

- Sub-district based management – Community Forest for Ecotourism
- Participation of villagers, local schools/universities TAT

Ecotourism highlights :

- The Canal of 2 waters and 3 forests
- Code of Conduct for visitors, managers

*** Nature Interpretation Guide : Take experience from amazing nature

6

Some key factors leading to possibilities and positive outcomes of wise use and community-based management of wetland resources for ecotourism

- Diversity, uniqueness, quality of wetlands and wetland resources → ecotourism resources
- Diversity of ecotourism activities
- Combination of inland-coastal-marine ecotourism, nature- livelihoods-health-culture-conservation based activities
- Ecotourism management capacity, leadership, teamwork, interest/willingness/readiness of community members, shared roles/responsibilities, rules for responsible tourism, code of conduct

7

Some key factors leading to possibilities and positive outcomes of wise use and community-based management of wetland resources for ecotourism

- Local wisdom, knowing/using eco-indicators
- Ecotourism facilities and basic facilities
- Knowledge/experience sharing and transfer
- Technical and financial support
- Benefits gained – benefits sharing
- In-coming tourists
- Promotion and marketing channels

8

Conclusion

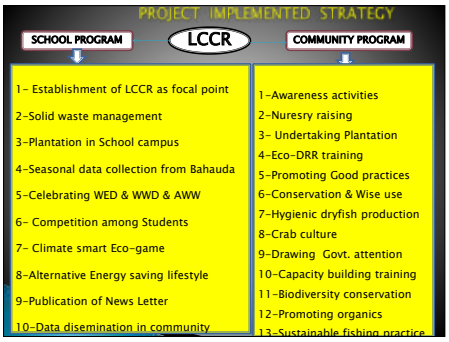
- At several sites on Thailand's coastline along the Bay of Bengal, community-based management of wetland resources for ecotourism is possible and effective.
- Local livelihood activities, ecotourism activities, and conservation activities can be combined, providing great benefits to local economy and overall ecosystems.
- Various many factors contribute and lead to possibilities, opportunities, good practices, and positive outcomes.

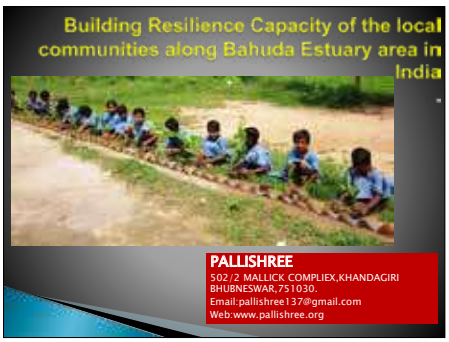
9

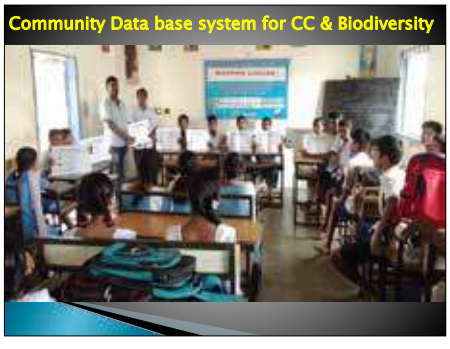
THANKS

10

Durga Prasad Dash







Wise Use Workshop:

Garbage pit management

Knowledge exchange programme

Seasonal Monitoring by students

Crab culture and conservation:

Out come & Way Forward:

1-School got State level prestigious award "*Prakruti Mitra*".
2-8 nos. of fish species could identified by the students.
2-2500 families followed adaptation to CC Challenges.
3-38 ha. of Plantations with 1,05,000 plants organised.
4-Capacity of 375 PFCS members enhanced.
5-10 tons of waste plastic garbage per year managed.
6-5 m. of crablings released to natural wetlad ecosystem.
7-Income of USD300 increased through dryfish by women SHG.
8-Eco-system Health Report Card of Balurals released.
9-Community based database established for CCR & BDR.
10-10 nos. of LCCR that act as focal point established.

THANK YOU

For your kind attention

Wardi Kasinath

Community based sea turtle conservation along the coast of Bay of Bengal in India

Wardi Kasinath
- *KISSAN,*
- *Odisha, India*

Mass Nesting sites in Odisha of India

2

Olive Ridley Sea Turtle (Lepidochelys olivacea) is ecological importance oceanic species in the world. As per IUCN red list, they are marked as 'Vulnerable'.

One of the main causes is the loss of breeding habitats of this turtle due to repeated cyclone.

Sea Turtle eggs destroyed after cyclone

5

Nesting sites in India

In India there are 3 mass nesting sites of these turtle like the Rushikulya rookery in Ganjam, Gahirmatha in Kendrapada and Devi rookery in Puri. Each year millions of these sea turtle come to these places exclusively for mating and mass nesting.

Every year, from November to the end of January, the ridley turtles mate in these coastal waters and anytime from January to early April, lakhs of mother turtles come shoreline beach in mass to lay their eggs.

1 mother turtle can lay around 80-160 eggs at a time. After a 45-50 day incubation period, baby hatchlings emerge from the sandy nests to crawl into the ocean.

8

The threats :

Apart from fishing related mortality, turtles face multiple problems while they are on the coastal landscape. Polluted beaches are no longer suitable for mass nesting. Apart from human poaching, dogs, jackals, birds are the threat to the eggs and the juvenile turtles. It has estimated that 1 from 1000 eggs really survives and returned back to ocean.

Eggs are being eaten by the Predators like dogs, crow, jackel & kite.

3/14/2019

Community based 'protection and conservation of ecosystem' has been playing very important role
- in the protection of this species during mating in the nearby sea,
- lying of eggs on the shore,
- hatching of eggs and
- juveniles returning back to the sea.

Community led conservation:

- In support of PALLISHREE (NGO) a CBO namely KISSAN "Kruma Iswaram Sangham" (Turtle-God Association) during 2007 was developed. The members are now taking all the responsibility till from mating of the turtle to release of hatchlings to Bay of Bengal from November to the next year June along with the Forest Dept.

The community worship as God, because in Hindu mythology the Supreme Lod God Bishnu has come to safe this mother earth in the form of Turtle. So community has an emotion for worshiping turtle.

Other community based groups:

- KISSAN has promoted women SHG in different hamlets of 12 coastal villages. The members of the SHG are organised to take lead roles in conservation of mangrove plants and turtles eggs.
- Rushikulya Sea Turtle Protection Committee (RSTPC), with the assistance of the local youth. They are also participating in the conservation efforts with KISSAN.

Now the CBOs like KISSAN and Rushikulya Sea Turtle Protection Committee (RSTPC) work directly with the communities and the stakeholders. The process has got success and became a community led conservation process.

The success:

One of the success indicators of this work is that, last year (in 2018), the mass nesting / Arribada activities have happened two times in this rookery. Since the turtle felt that the nesting site is safe, clean and other favourable conditions motivated them to come twice in the year.

The hatchlings are going to sea after 45-60 days of the mass nesting. The duration depends upon the weather condition. The rate of female turtle hatchlings increases, if the temperature goes up.

The school children are also facilitated to participate in the process. This helps them to learn from the actions taken by the elders.

At present Rushikulya sea beach along the coast being world's 2nd largest rookery attracts over half a million female olive ridley sea turtles for mass nesting/ egg lying.

The community understood the importance of the work. Community will continue working for the conservation of the turtle, eggs and beach habitat in future also.

Thank you for your kind attention

Maneewan Sanlee

'Efforts of people for conservation of Dugongs, dolphins, sea-turtles and seagrass beds in Trang province, Thailand'

By
Miss Maneewan Sanlee

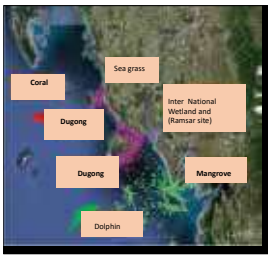
Save Andaman Network Foundation (SANF)
THAILAND

Trang Province

Trang is a province in the southern part of Thailand on the coastline of the Andaman Sea, between Krabi and Satun provinces.

Trang has 119 km coastline.

There are diverse natural marine and coastal ecosystems including the Ramsar site : Had Chao Mai NP – Koh Li Bong NHA – Trang River Estuary.
Ecosystem highlights : mangrove, seagrass, coral reef and important marine species i.e. Dugongs, Dolphins and Sea turtles



Flagship species

150 Dolphins
- 70 of Indo-Pacific Hump-backed Dolphins
- 40 Irrawaddy Dolphin
- 30 Bottlenose Dolphin
- 10 Finless Dolphin

1,000 of sea turtles

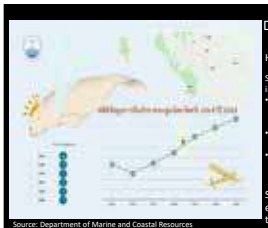
160 – 180 Dugongs (the biggest school; out of 200 dugongs found in Thailand)

Seagrass beds

Had Chao Mai NP - Koh Libong NHA – Trang River Estuary :
11 seagrass species; 2,000 hectares

High diversity of seagrass beds → Dugong's habitat

Dugongs migrate along the coastline of Trang, Krabi and Satun.



Dugong Situation in Thailand

High risk of extinction

Statistics from the aerial survey of Dugongs in Trang Province during 2012 – 2018 :
- Dugongs population decreased in 2013 due to high mortality rate (13 Dugongs)
- Since 2014, dugong population is continuously increasing
- In 2018, there are 160-180 Dugongs in Trang province

Still, dugongs are at high risk of extinction. Mortality rate is more than 5 per year.

Source: Department of Marine and Coastal Resources

Dugong Situation in Thailand

Continuous survey : 12 years in Trang
1 March 2019. Aerial survey of Dugongs at Koh Libong. There were many pairs of mothers and calves

Source: Phuket Marine Biological Center (2019)

Participatory involvement of local communities

Habitats of Dugongs, Dolphins and Sea Turtles are the same area of fishery and tourism zones.

Dugong, Dolphin and Sea Turtle coexist with fishing and boat-tourism activities.
Dolphins eat mackerels in fishing nets and may destroy fishing nets.
Fishers allow them to eat fish and feel sad whenever dolphins were killed by fishing gears. Villagers are friendly with dolphins and dugongs.

Causes of dugong mortality

- Traps, nets, illegal fishing gears
- Marine transportation
- Disturbance from increase of tourist boats and speed boats

Participatory efforts and actions of local communities

Key Concept :

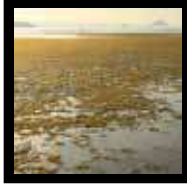
Communities love Dugongs

→ → → Seagrass conservation

Key Concept :

Members of communities love and are friendly with Dugongs : the first important step and a key to success of the conservation campaign.

Communities love Dugongs – Seagrass Conservation



- To raise awareness of communities about the importance and value of Dugongs
- Increase of habitats and feeding grounds of dugongs, aquatic species and juveniles
- Communities gain benefits from abundant fishery resources, ecotourism
- Seagrass beds are well-maintained
- Seagrass helps absorb carbon dioxide
- Dugongs feed on seagrass and their excretes are natural fertilizer.

Communities love Dugongs –Seagrass Conservation

- Control speed of boats while passing seagrass beds
- Not fishing in seagrass zones
- Not using inappropriate fishing tools and methods harmful to dugongs
- Commercial fishing vessels zones were shifted away in order to protect seagrass beds
- Communities' conservation efforts are widely recognized
- Save Andaman Network Foundation works closely with communities for seagrass-dugong conservation

- Support / strengthen coastal community organization and community network in Trang province

Monthly Meeting : Urgent Agenda – Dugongs and marine resource conservation

- Enhance knowledge and understanding of Youth and public about dugong conservation and coastal ecosystems
  - Marine Conservation Learning Centre established in Communities
  - Marine and coastal resources conservation activities
  - Set up 'Fund for Sea and Dugong Conservation'

"Dugong is the Indicator of Abundance of Marine Life"

- Support communities to set up rule and regulation related to marine and coastal conservation zoning and rare species conservation i.e. Dugongs, Dolphins and Sea Turtles
  - Zoning Aquatic larvae conservation areas in 4 village (2007)
  - Bor Hin Subdistrict Administrative Organization's legislation concerning Marine and Coastal Resources Conservation and Sustainable Use. (2010)
  - Koh Libong Subdistrict Administrative Organization's legislation concerning Dugong and Seagrass conservation (2011)
  - Seagrass conservation zoning, Boon Kong Bay – Pru Jood, Mai Faad, Sikao district.
  - Koh Sukorn Subdistrict Administrative Organization's legislation concerning Dolphin and Seagrass conservation (2015)
  - Wing Shells conservation zoning, Baan Koh Mook
  - Marine and Coastal Resources Conservation and Sustainable Use Zoning Map, Boon Kong Bay Zone, Sikao, Trang Province

Dugong and Marine Ecosystem Conservation Zones

Dugong and Marine Ecosystem Conservation

- Support Youth and Women's Fisherfolk Network to participate in conservation and restore natural resources
  - Women's Fisherfolk Network Meeting
  - Support Vocational Career, Marine Processing

Jobs / income generation : ecotourism, fishery products

Education

Marine Conservation Learning Center

Crab Bank

Marine Conservation Learning Center

mangrove forest planting

Squid breeding

Seagrass breeding

Marine Conservation Learning Center

Study visit

Practict

Ecotourism

Started since December 2017
- Good practices
- > 2,000 tourists/year
- Conservation Fund established

Ecotourism

Climbing small mountain , Viewpoint

On the beach

Suggestions/Comments

- More funding support from the Government for community-based marine and coastal resources management
- Specific policy to conserve seagrass beds and overall ecosystems and dugong conservation is needed

Thank you for Attention

Part IV
Indika Rohan Palihakkara

Management of Koggala lagoon for Sustainable Livelihood Development - Case study in Sri Lanka

I.R.Palihakkara and A.J.M.C.M.Siriwardana
Department of Crop Science, Faculty of Agriculture, University of Ruhuna – Sri Lanka

Introduction

- Poor people are particularly dependent on natural resources and its ecosystem services for their livelihoods.
- Rapid deforestation and biodiversity losses are depriving people of valuable mangrove based water resources,
- Identified as fuel wood, fish, shrimp, food, medicine, and ecosystem based services such as bird watching, boat riding etc..
- Water pollution and degradation of mangrove based eco system is a major threat to the livelihoods of number of people who lives in and around of these areas.

Introduction…

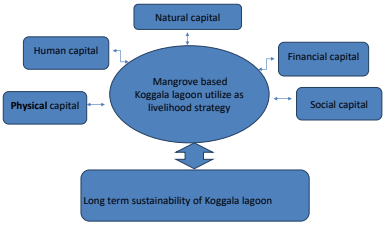
- The livelihood framework identifies five core capitals.
- These are natural, social, human, physical and financial capital.
- Improving capital assets is a primary strategy for improving rural people's livelihood from a given livelihoods strategy.

Introduction…

- **Koggala lagoon**
  - **Located southern coast of Sri Lanka**
  - **Total water spread area of 7.27 km²**
  - **Water depth of lagoon ranges from 1.0 to 3.7 m**
  - **Catchment area of 60 km²**
- **Consists 14 islets with,**
  - **Forest**
  - **Mangroves**
  - **Terrestrial shrubs**

Study site

Analytical framework of the study



Main livelihood activities around the Koggala Lagoon

01. Fisheries

02. Tourism and

03. Agriculture/Labor work/etc.

Objectives

- This study was conducted
  - To identify the socio-economic situation of community around the Koggala Lake
  - To identity environmental aspects and issues
  - To identify the issues related to livelihood
  - To make appropriate suggestions to overcome/manage the identified issues

Methodology

- Location - Koggala lagoon
  - 5º 59' - 6º 02' N and 80º 18' - 80º 21' E
  - Galle District, of the Southern Province Sri Lanka
- Data collection → pre-tested structured questionnaires were used.
  - Demographic information on age, education, family size, income, nature of the occupation, experience, major income sources, importance of lagoon for livelihood, government and social interactions were observed.

Methodology…

- Data were collected based on five livelihood capitals.
- Data were analyzed using R statistical software and percentages.

Personal interviews

Results and Discussion

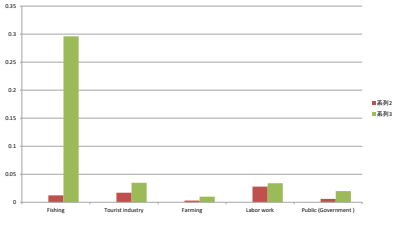
Human capital around Koggala lagoon

GS Division	Total Population	Female	Male
Koggala	798	414	394
Koggala (Additional) ll	1294	668	626

Human, Physical and Financial Capitals

Variable	Distribution
Average family size	3-5 members
Average number of boats	30
Boat owners	33%
Age	20 – 45 years
Job experience (Engage with fishing and tourism)	5-30 years
Average income (per annum)	200,000.00 LKR

% Types of livelihood (Female & Male)



Natural Capitals of Koggala Lagoon

1. Shallow water body with total area → 7.27 km^2
2. Important species for fisheries
   i. Prawn → *Metapenaeus dobsoni, Penaeus indicus and Macrobrachium rosenbergii*
   ii. Brackish water fish → Mullet (*Mugi cephalus*), Parati
   iii. fresh water fish → Tilapia (*Oreochromis niloticus*), Malkoraly *(Etroplus maculates)*, Lula *(Ophiocephalus striatus)*, Magura *(Clarias brachysoma)*
   iv. Crabs → *Scylla serrata* and *Portunus pelagicus*

Natural Capital…..

- The lagoon located in a popular tourist destination in Sri Lanka (Galle).
- Fresh, brackish, saline water levels provides good background for fishing.
- Transport facilities for farmers.

Natural Capital…….

Financial Capital

- 33% of boat owners provide employment opportunities for others for fishing as well as for tourist industry.
- Loan schemes from government bank and financial support from private and NGOs base formal institutes were given for the villagers.

Disturbances and threats

- Removal of the natural sand barrier of lagoon mouth → decreasing of the fresh water fish and mud crab population.
- The unregulated landing of seaplanes → erosion of the lagoon banks and shifting of bird population.
- Large scale clearing of mangroves for construction → decrease biodiversity.
- Illegal discharge of effluents into the lagoon from villagers and near by free trade zone.

Cont..

- Fluctuation of income with the time.
- Growth of invasive plant species → decrease in natural plant species.
- Operate boats by unskilled person with less safety → decrees tourist attractions.

Future prospect to develop livelihood

- Improve infrastructure facilities related to tourist industry → Sanitary facilities, vehicle parks.
- Government intervention to tourist and fishing industry.
- Regulate unauthorized construction beside the lagoon and discharge of effluent from free trade zone koggala.
- Financial assistant, with low interest rates for development of fishing and tourist industry.

Conclusions

- **Koggala lagoon play an important role in livelihood development of community in the area.**
- **Brackish water fishing is main income source followed by tourist industry.**
- **Government intervention is important →**
  - **To make policy for develop eco-tourism industry**
  - **To regulate unauthorized construction of the lagoon boundary and despotic discharge of waste matter from koggala industrial zone.**

Conclusions…

- **To minimize the risk of depending on one or few livelihood capitals, it is very much need to develop and implement combine policy decisions by state and privet sector to increase the living stands of the people in these area.**

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Maung Win

BIODIVERSITY VALUES AND CHALLENGES OF MYANMAR'S RAMSAR SITES

Mr. Maung Win
Park Warden
Indawgyi Ramsar Site
Nature and Wildlife Conservation Division
Forest Department
Myanmar

CONTENT

- Introduction
- Threats and issues to Wetlands in Myanmar
- Moeyungyi Wetland Wildlife Sanctuary
- Indawgyi Wildlife Sanctuary
- Meinmahla Kyun Wildlife Sanctuary
- Inlay Lake Wildlife Sanctuary
- Current conservation activities in Wetland Protected Areas
- Conclusion

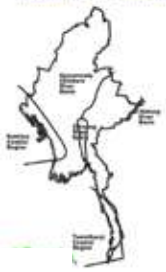
Introduction

Wetlands Protected Areas

Established 42 Protected Areas

1. Hkakaborazi National Park
2. Indawgyi Wildlife Sanctuary
3. Inlay Lake Wildlife Sanctuary
4. Wethikan Bird Sanctuary
5. Moeyungyi Wetland Wildlife Sanctuary
6. Hukaung Valley Wildlife Sanctuary
7. Meinmahla Kyun Wildlife Sanctuary
8. Thamihla Kyun Wildlife Sanctuary
9. Moscos Island Wildlife Sanctuary
10. Lampi Marine National Park

Wetland Regions of Myanmar



Country's total wetlands – 99 Nos.

- FD & BI , MoE (Japan) Project:
- A Wetland Inventory for Myanmar

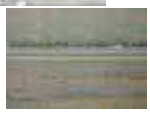
Ayeyarwady /Chindwin River Basin (85)
Thanlwin River Basin (6)
Sittaung River Basin (5)
Coastal Area (3)

Ramsar Convention and Myanmar

Ratified Ramsar Convention in 2005
Ramsar Sites

The first in 2004

Second in 2016



Third in 2017

Fourth in 2017

Fifth in 2018

Ramsar Convention Implementation in Myanmar

- Integrating action plans for wetland conservation and management in Myanmar's National Biodiversity Strategy and Action Plan (NBSAP)(2011)
- Conserving important wetlands under protected areas
- Strengthening communication of World Wetlands Day from national level sites level
- Preparing Ramsar Information Sheet (RIS) for nominating new Ramsar Site Designation
- Member of East Asian-Australian Flyway Partnership (EAAFP)
- Member of Indo-Burma Ramsar Regional Initatives (IBRRI)
- Cooperating with Ramsar Regional Center- East Asia (RRC-EA)

EAAFP

Ramsae Convention Implementation in Myanmar

National Wetland Committee in Myanmar (30 Aug 2016)

Director General	Forest Department Ministry of Natural Resources and Environmental Conservation	Secretary (Head of the Ramsar Administrative Authority)
Deputy Director General	Forest Department Ministry of Natural Resources and Environmental Conservation	Joint Secretary (National Focal Point)
Director	Watershed Management Division Forest Department Ministry of Natural Resources and Environmental Conservation	Member
Director	Forest Research Institute Forest Department Ministry of Natural Resources and Environmental Conservation	Member

Ramsae Convention Implementation in Myanmar

National Wetland Policy and Strategic Actions (Published in 2019)

Chapter 1: Rationale for the Development of National Wetland Policy
Chapter 2: Wetlands and Values
Chapter 3: Wetland Policy and Strategic Actions
Six wetland Policy Imperatives

- **Protection, Wise Use,**
- **Mainstreaming Wetlands Values in Development Plans,**
- **Participations,**
- **Raising Awareness,**
- **Collaborating in International and Regional Wetlands**
- **Eighteen Objectives**
- **Seventy-three Strategic Actions**

Threats and Issues to Wetlands in Myanmar

Land use change

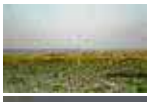
Water pollution

Moeyungyi Wetland Wildlife Sanctuary

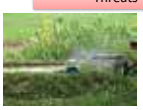
The First Ramsar Site
Site No (1431)
Designated 17-11-2004
104 sq km
Bago and Wow Township

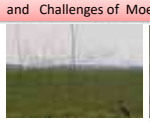
Unique Fauna and Flora of Moeyungyi

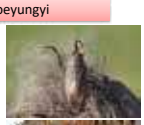
Resident bird	- 84
Migratory bird	- 49
Fish	- 46
Amphibian	- 8
Reptile	- 21
Small mammal	- 12
Butterfly	- 33
Aquatic plant	- 74



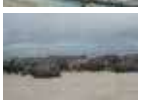
Threats and Challenges of Moeyungyi







Electro fishing
Duck farming
Grazing
Over use of water (for agriculture)
Insect collecting
Invasive species
(Sucker mouth catfish, Talabia, Golden apple snail,

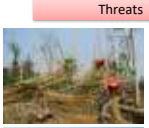


Quality Vegetable Seeds Distribute at Seik Kyi Village

Unique Fauna and Flora of Indawgyi

Mammal	- 47
Forest birds	- 350
Water birds	- 109
Fish	- 93
Amphibian and Reptiles	- 91
Butterfly	- 50
Tree	- 148
Medicinal plant	- 118
Orchid	- 75

Threats and Challenges of Indawgyi



- Illegal land use (Cultivation, Gold mining)
- Over use of resources (Logging and firewood harvesting)
- Over fishing

Meinmahla Kyun Wildlife Sanctuary

Third Ramsar Site
Site No (2280)
Designated 2-2-2017
508 sq km
Bogalay Township

Unique Fauna and Flora of Meinmahla Kyun

- Mammal - 18
- Amphibian and reptile - 36
- Fish - 112
- Bird - 190
- Crab - 14
- Shrimp - 6
- Mangrove - 29
- Medicinal plant - 53
- Orchid - 6

Threats and Challenges of MeinmahlaKyun

- Firewood extraction
- Illegal fishing
- Inoperative

Gulf of Mottama (Mon State)

Fourth Ramsar Site
Site No (2284)
Designated 10-5-2017
Kyaikhto Township

Inlay Lake Wildlife Sanctuary

Fifth Ramsar Site
Site No (2356)
Designated 2-2-2017
533.7 sq km
Nyaung Shwe and Pe Kon Township, Shan State

Unique Fauna and Flora of Inlay Lake

- Mammal - 9
- Bird - 352 (water bird - 92, Forest bird -260)
- Fish - 61
- Amphibian and Reptile - 23
- Butterfly - 94
- Tree - 108
- Orchid - 184
- Medicinal plant - 527
- Bamboo - 11
- Aquatic plant - 61

Threats and Challenges of Inlay Lake

- Deforestation in catchment area
- Land use conflict and habitat lost
- Water pollution
- Tourism bombing and pocketed habitat
- Biodiversity decrease

Current conservation activities in Wetland Protected Areas

- Patrolling to prevent hunting of wetland species
- Regular Survey on water birds
- Monitoring the occurrence of migratory birds
- Education and public awareness
- Capacity building program
- Promoting community base tourism in important wetland areas
- Research on wetlands and water birds collaborating with universities, NGOs and INGOS

Conclusion

- ❖ Collaboration of relevant stakeholders in the wise use of wetlands are needed.
- ❖ Rural population increase and growing demand of fresh water resources, there is a heavy pressure on the long term conservation and wise use of Myanmar.
- ❖ Both local and international collaboration are needed.
- ❖ Myanmar needs assistance from Ramsar and related organization in the promotion of wetlands conservation and management.
- ❖ Let the people know themselves to protect and care for wetlands where there are near by.

Takuji Arai

Education for Sustainable Development (ESD) Activities
For Rehabilitating Mangrove Forests
In Cooperation with Local Communities
At Merbok Mangrove Reserve, Kedah, Malaysia

Organized by
Japan-Malaysia Association (JMA)
In Collaboration with
Regional Centre of Expertise (RCE) Penang
Universiti Sains Malaysia (USM)

Supported by
Keidanren Nature Conservation Fund (Japan)

Presenter

Takuji Arai
Executive Director
Japan-Malaysia Association

Contents

Background

Japan-Malaysia Association (JMA) is an authorized public interest corporation by the Cabinet Office of Japan to contribute to strengthen and deepen lasting relationship of friendship and goodwill, and also to promote tourism, economic and personal ties between Japan and Malaysia.

Since year 1995, JMA has been conducting rehabilitation of tropical forests and environmental education project in Sarawak, Malaysia in cooperation with the State Government and local communities.

JMA has been **a Regional Sejahtera Network (RSEN) member of RCE Penang, Universiti Sains Malaysia(USM)** since 2014. JMA and RCE Penang had jointly coordinated Overseas Training Course organized by the Environmental Restoration and Conservation Agency of Japan (ERCA) in Malaysia in August 2016.

Based on this experience, JMA has started ESD activities for sustainable rehabilitation program of mangrove forests in cooperation with RCE Penang, USM and communities in the area of Merbok Mangrove Forest Reserve, Kedah Malaysia since 2018.

Project Outlines

1. Location

This project is conducted at **Merbok Mangrove Forest Reserve in the area of Kuala Muda District, Kedah, Malaysia**.

Merbok Mangrove Reserve is located about 1 hour drive north from Penang island. Merbok Mangrove Reserve which is made up of 18 compartments with a total area of 4,176 ha, is under the jurisdiction of the Kedah Forestry Department.

Mangrove forest in Merbok consists of 32 species of trees exclusive to the mangrove ecosystem, and has been considered as one of the most floristically diverse mangrove sites in the world.

The Reserve also harbors a diverse array of fauna, most prominent are its bird communities where about 80 species have been recorded including migratory species. Other inhabitants include several species of primates, reptiles and a high number of commercially-important aquatic species occupy the estuarine river ecosystem.

In the area, the mangrove and river ecosystems play an important role in providing livelihood for fishermen and the surrounding village communities. Some of the villagers and fishermen comprise of low income households.

However some parts of mangrove forests have been degrading due to felling, and urbanization and development in the area. This situation can leave an impact on the sustainability of ecosystem and biodiversity in the future.

In 2018, JMA has started a joint project in collaboration with RCE Penang, USM to develop ESD activities for sustainable rehabilitation program of mangrove forests at Merbok Mangrove Forest Reserve.

This project is with participation of local communities, schools and other target groups to conserve the sustainability of the ecosystem and its biodiversity for the people in the area.

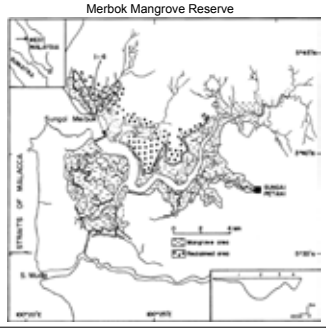
Bay of Bengal and "Malay Peninsular"

Merbok, Kedah, Malaysia

Peninsular Malaysia

Merbok Mangrobe Reserve, Kedah, Malaysia（google map）

Merbok Mangrove Reserve



2. Core activities:

(1) Reforestation activities at degraded sites with participation of local communities.
(2) Establish mangrove seedling nursery as a stock for mangrove reforestation sites.
(3)Conduct capacity building program for local communities in silviculture, tree care, forest management, communication skills, and other relevant skills.
(4) Develop and conduct educational program for local schools, visiting schools, universities and public to learn about mangrove ecosystem and conservation and also ecotourism activities.
(5) Establish a mangrove environmental/educational gallery as a centre of ESD program in the future.
(6) Hold seminar and symposium to share experience with schools, NGOs and other related bodies and print leaflet for publication.

3. The goals

(1)Start up reforestation activities at Merbok
・Making research on the present condition of the forests at Merbok Mangrove Reserve
・Meeting for consensus building and planning with stakeholders
・Establish nursery and raise seedlings for plantation (Target: 4,000 seedlings / year)
・Reforestation activities by local communities (Target: 2ha / year)
(2)Develop ESD program in conjunction with reforestation of mangroves at Merbok
・Meeting and idea sharing with stakeholders
・Develop ESD program for students and communities
・Conduct tree planting event with USM students and villagers (once in a year)
・Prepare for setting up educational facilities at Merbok Mangrove Reserve

4. The expected duration of the project is 3 years (April 2018 - March 2021)

Project Result for the 1st Fiscal Year (April 2018 - March 2019)

2018
April: To organize MOA, research visit plans to various stakeholder and agencies: documentations, letters, and permissions
May: 1st project meeting at RCE Penang, USM with a representative of JMA
June: Site visit and networking to stakeholders and agencies
Establish a working group and appoint a leader from the local village for the project.
Build a nursery and start seed collection and sowing in the polybag.
July: Nursery upgrading works, seed collection and sowing works by villagers
Experts of RCE Penang, USM visit the project site regularly
Held a meeting with the Section Heads of Kedah Education Department (JPNK) with regards to the reforestation project at RCE Penang, USM. JPNK agreed to become a partner and provide assistance for the project
August: Nursery upgrading works, seed collection and sowing works by villagers
Experts of RCE Penang, USM visit the project site regularly
RCE Fellows attended a discussion about the reforestation project with the Head of Development, Sungai Petani Municipal Council (MPSPK). The Head welcomed the project and gave his full support. MPSPK has agreed to become a partner and provide assistance for the project.

September: Held discussion with District Officer of Sungai Petani District.
November: Held Mangrove Camp 1.0 – an outdoor camp for primary and secondary schools which introduce the mangrove ecosystem and their importance. In participation were 30 primary and secondary students from the nearby villages, 6 USM students and 5 USM researchers on 23-25 Nov.
Several related modules have been delivered by RCE fellows and students got to participate in outdoor activities in the mangrove environment.
Each participant also got to replant mangrove seedlings in the degraded area. Total seedlings planted were 500.
2019
February: World Wetlands Day celebration with USM students on 23 & 24 of February, with this year's theme of Wetlands and Climate Change. Our key activity was a movie screening on Climate Change followed by a discussion to engage students on the role of wetlands in mitigating climate issues. Students conducted mangrove replanting (300 seedlings) at the site. Afterwards, we ran a river clean-up of the Sungai Merbok using kayaks and boats. The program finished off with a self-reflection session, followed with a discussion on how each individual can help protect wetlands and mitigate climate change.

This reforestation project has been mobilised since June 2018 with several villagers from Kampung Sungai Batu Besi, Merbok, Kedah. It started with an initial meeting with villagers whereby discussion on the project flow and stages, were made. The first stage is to set up and the mangrove nursery. At the moment only one species of tree is prepared, *Rhizophora apiculata*. More species will be added to this collection in the near future, including endangered species such as *Bruguiera hainesii*.

The project has received satisfactory cooperation from villagers. Villagers continue to collect seeds, prepare them for the nursery and to care for the seedlings. The villagers involved seemed very engaged with the nursery activities, and show optimism.

As of end of January 2019, approximately 1500 seedlings has been raised in the nursery and 1000 seedlings replanted by villagers. Presently, most seeds are of *Rhizophora apiculata* trees with some amount of *Rhizophora mucronata*. Other species common to the area such as *Bruguiera* sp, *Xylocarpus* sp, *Avicennia* sp. and *Sonneratia* sp. will be added later when the seeds are available due to seasonality.

Project planning for the 2nd and 3rd Fiscal Year (April 2019 - March 2020)

2nd fiscal year (April 2019 - March 2020)
Project planning
- ✓ Refine and improvement of the project activities based on the two main objectives which are: reforestation and educational component.
- ✓ Increase the number of participants (stakeholders/collaborators) for this project
- ✓ Production of educational materials (virtual, printed)
- ✓ Project show case at the site. Compilation of best practices of start up activities
- ✓ Continuing reforestation activities, training for local communities in silviculture and other relevant skills, carrying out trial ESD program, promote & encourage local and visiting schools and societies to take part in the program, etc.

3rd fiscal year (April 2020 - March 2021)
Project Planning
- ✓ Project final report
- ✓ Monitoring and evaluation of the project
- ✓ Carrying out ESD program, organize seminar at USM and other places to share the experience with RSEN members and other related bodies, publish leaflet, etc.
- ✓ Establish a centre in one of the schools/ community

Photos

Project Area
Recent Activities

Degraded area

Proposed educational center for reforestation and conservation activities

Raising mangrove seedlings by local community

Raising mangrove seedlings by local community

Mangrove Camp 1.0 (Nov 2018)

Dialogue session with villagers

Mangrove Camp 1.0 (Nov 2018)

Learning value of conserving mangrove forest and ecosystem

Mangrove Camp 1.0 (Nov 2018)

Learning value of conserving mangrove forest and ecosystem

Mangrove Camp 1.0 (Nov 2018)

Kayaking to correct rubbish in the river

Mangrove Camp 1.0 (Nov 2018)

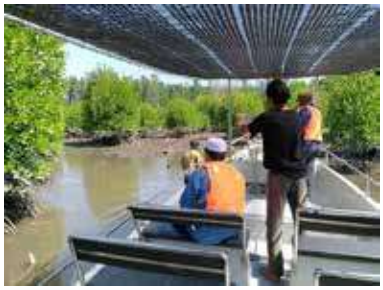
Planting and correcting mangrove seedlings

Mangrove Camp 1.0 (Nov 2018)

Planting and correcting mangrove seedlings

Photos

6 March 2019
At
Merbok Mangrove Reserve



Topics

Historical and Cultural Relation

Geographical Features

JERAI GEOPARK

JERAI Geopark has been proclaimed as a National Geopark in conjunction with the coronation of the 29th Sultan of Kedah on 22nd Oct 2018.

Jerai Geopark, covering an area of 800 sq km, encompassing two districts, namely Yan and Kuala Muda, was chosen for geopark development because it was scientifically located in the high rock geodiversity area of the Jerai formation, Mahang formation and Jerai granite.

Jerai has been a trade route guide since the golden age of the old Kedah civilization. These geological and archaeological evidence shows the progress of the iron-based industry in Jerai which had become the focus of trade and the world's supply of iron at that time.

The biological diversity, namely, the richness of flora and fauna at different altitudes also complements Jerai as a potential geopark to be recognized as a global geopark in the future.

Jerai Mountain

Surrounded by race field

Ancient tomb temple at Bujang Valley

Tsunami hit coastline of Kuala Muda, Kedah (Dec 2004)

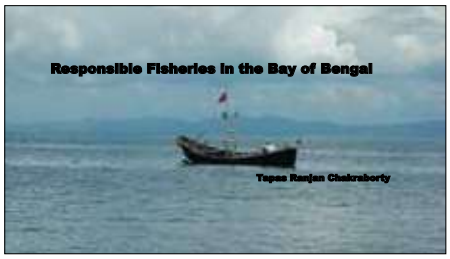
Tsunami gallery in Kuala Muda Town

Tsunami Monument in Kuala Muda Town

Topics

Social Value for Conservation and Restoration

Tapas Ranjan Chakraborty



Bangladesh's sovereign right on more than n 8000 sq km, 200 nm of Exclusive Economic Zone;

Sundarbans is the largest block of tidal halophytic mangrove ; Cox's Bazar is the longest straight beach in the world;

Prone to severe natural disaster, such as cyclones, storm surges and floods

Threats to the Biodiversity

- declining at an unprecedented rate due to many reasons.
- cutting of mangrove and sand dune vegetation
- conversion of mangrove and mudflat habitat into crop field
- aquaculture and salt pans
- the harvesting of turtles and turtle eggs; destructive fishing methods including shrimp fry collection; indiscriminate exploitation of marine resources along with juveniles of different species and hunting of shorebirds;

Bay of Bengal Fisheries

- Bangladesh owns 118,813 km² area of territorial sea, 200 nautical miles of Exclusive Economic Zone and all kinds of animal and non-animal resources under the continental shelf up to 354 nm from the Chittagong coast.
- Marine fisheries contributes 16.28% of the national fish production.
- The potential of the coastal fisheries sector has not been rationally harvested, rather the resources have been over-exploited and as a result, the fish stocks declined.

Community based Harvest Management by Conserving the Juveniles of Marine Biodiversity in Bay of Bengal

Barodail, Teknaf Peninsula

April 2016-March 2019

- Conserve the biodiversity of the marine ecosystem by reducing the volume of harvesting
- Minimizing the accidental catch, and release the juveniles and non commercial species in the sea immediately
- Awareness raising about the value of the biodiversity and the practices of sustainable harvesting and conservation
- Build up the capacity of the community practicing marine biodiversity conservation through harvesting management

Major Activities

(1) Biodiversity Conservation Group formation and involved them into Project
(2) Conduct Baseline Survey in the Site
(3) Awareness Raising and Knowledge Development
(4) Conduct training for the fishing community on the process and practice of immediate release
(5) Assessment of Sea Fishing Net and Distribution of Legal Fishing Net
(6) Livelihood diversification to reduce the pressure on marine resources
(7) Skill building training to undertake AIGA
(8) Visit to potential marine biodiversity conservation area, Orissa, India
(9) Biodiversity Habitat Conservation & Turtle Hatchery Development
(10)Result Sharing and Dissemination

Group Formation & Awareness

5 group [20 members each] > a series of meeting to aware them

Baseline Survey fishing assets, sea going fishing community, loss of juveniles and non-commercial species from the sea, community occupation and income, food security, alternative livelihoods etc

Non-target Catch

Training for the fisherman

100 sea going fishers are trained on " immediate release of accidental catch"

immediate release of accidental catch> 21% to 60%.

The Training module have been developed in Bangla language for be better understanding for the participants on Alternative livelihoods Homestead vegetable gardening and duck poultry rearing.

Fifty youth was identified based on their requirement for diversified the livelihood options training.

Fishing Net Distribution

❑Importance of non-commercial juveniles in ecology, ecosystem and economy is well understood by the community.
❑The fisherman used harmful zero net for fishing.
❑ motivated them to change the zero net for fishing and use cotton net which is Bio-degradable
❑9 recommended cotton nets were distributed among the fisherman.

Aware community on the breeding season of marine biodiversity

Community is aware on the breeding season of all most all the fishes including commercial fishes found in the sea. Population dynamics of non-fish species known.

❑Around 2 k.m of turtle breeding ground is graded by the community.
❑The community has reducing the use of light in the adjutant areas.
❑Community is using red color light if crossing of turtle ground by walk.
❑community is highly motivated on keeping their house dog away from sand dune area.

Established during October-November 2016
12000 eggs were collected for safe incubation.

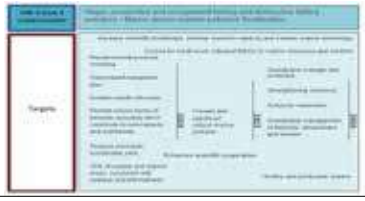
50-57% hatch success

Conservation Board Game

Fishing of a responsible fisher

Workshop
3 local level learning sharing workshops
SDG14 in action

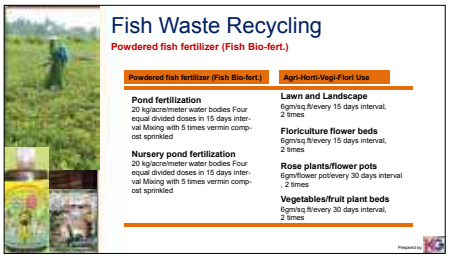
SDG14- Conserve and sustainably use the oceans, seas and marine resources for sustainable development

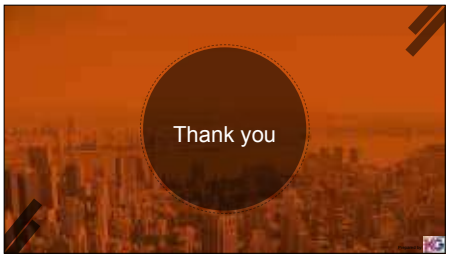


Activity Metrex

SL	Activities	Year-1	Year-2	Year-3	Total
1	Training	10 days	10 days	20 days	40 days
2	Field Survey	3600 HH	3600 HH	3600 HH	3600 HH
3	Survey for Juvenile catch	50 days	-	-	50 days
4	Market Price Survey	-	-	120 days	120 days
5	Regular Use Fishing Net	2	4	3	9
6	Turtle hatchery/aquatic & terrestrial habitat	1	1	1	3
7	Poster	1000 Copies		-	1000 Copies
8	National/International Workshop	1	1	1	3
9	Lecture Book	100 Copies		-	100 Copies
10	Printing Game Item	-	-	100 Copies	100 Copies
11	Focus Group Discussion (FGD)	-	-	4	4
12	Group Meeting	5	5	5	15
13	Billboard	-	5	-	5
15	Exposer Visit	-	4 person	2 person	6 person
16	Position paper			1	1

Binod Bihari Sahu






RCJ