



# BLUE SOLUTIONS

FROM ASIA AND THE PACIFIC



On behalf of:



Federal Ministry  
for the Environment, Nature Conservation,  
Building and Nuclear Safety

of the Federal Republic of Germany

implemented by:



# BLUE SOLUTIONS FROM ASIA AND THE PACIFIC

## REGIONAL FORUM ON SOLUTIONS FOR OCEANS, COASTS AND HUMAN WELL-BEING IN ASIA AND THE PACIFIC

1

This Regional Forum was organized by the Blue Solutions Initiative of the German Environment Ministry (BMUB), implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), GRID-Arendal, the International Union for Conservation of Nature (IUCN), and the United Nations Environment Programme (UNEP), together with the World Future Council and the Lighthouse Foundation. It was convened in collaboration with the Sustainable Ocean Initiative (SOI) of the Secretariat of the Convention on Biological Diversity (CBD) and in partnership with the Biodiversity Management Bureau (BMB) of the Department of Environment and Natural Resources, Philippines (DENR).





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6 INTRODUCTION

7 Solutions – approaches that work

8 Solutions exchange

BLUE SOLUTIONS FROM ASIA AND THE PACIFIC

10 Adaptive, community-driven and resilient co-management plan – CAMBODIA

12 Community-based ecosystem approach to fisheries management – FEDERATED STATES OF MICRONESIA

14 Nasoata Island co-management – FIJI

16 Integrated mangrove fishery farming – INDIA

18 Preparing for disasters and building livelihood resilience – INDIA

20 Community-based conservation at scale – the Bird’s Head Seascape – INDONESIA

22 Integrating terrestrial and marine spatial planning in Bontang City – INDONESIA

24 Marine protected area learning site for the Coral Triangle – INDONESIA

26 Palau’s Protected Areas Network Act – PALAU

28 Connectivity of marine protected areas – PHILIPPINES

30 Fisheries co-management through FARMCs – PHILIPPINES

32 Mangrove conservation and rehabilitation – PHILIPPINES

34 Mangrove rehabilitation and income diversification – PHILIPPINES

36 Social Marketing Lite – PHILIPPINES

38 Strengthening governance of small-scale fisheries – PHILIPPINES

40 Tubbataha Reefs Natural Park Act – PHILIPPINES

42 Luru ridges to reefs protected area network – SOLOMON ISLANDS

44 Green Fins: responsible diving – SOUTHEAST ASIA

46 Strengthening capacities in coastal spatial planning – SOUTHEAST ASIA

48 Regional strategy on coastal erosion management – SOUTHEAST ASIA

50 Community-based ecological mangrove restoration for natural mangrove recruitment – THAILAND

52 Best management practices for silvo-aquaculture – VIETNAM

54 Co-management of mangrove forests – VIETNAM

56 Community-initiated Trao Reef Locally Managed Marine Area – VIETNAM

58 Ecosystem-based coastal protection through floodplain restoration – VIETNAM

60 Supporting the development of the resilient eco-city Hoi An: the Cham Islands Marine Protected Area – VIETNAM

62 Water and fire management of a peat swamp forest – VIETNAM

64 IMPRINT

Our oceans and coasts are the origin of life on earth, an important food source, and crucial for the global ecological equilibrium. Humans depend on oceans and coasts for their well-being and economic development. Healthy marine and coastal ecosystems are highly productive and provide us with a multitude of valuable goods and services. These range from food, medicine, climate regulation and coastal protection to recreational opportunities and spiritual benefits.



Despite their global significance, marine and coastal ecosystems face a wide array of threats – mainly due to anthropogenic causes. Habitat loss and degradation, overfishing and destructive fishing methods, eutrophication and pollution deteriorate the state of oceans and coasts. In addition, the impacts of climate change are heavily affecting these unique ecosystems. Response to these threats is often limited due to the lack of regulation and enforcement, insufficient management and governance as well as limited awareness. More than half of the world’s population currently lives within 100 kilometers of the coast. There are projected to be more than nine billion people on the planet by 2050, adding further strain to already stressed marine ecosystems.



World leaders agreed to aim for a balance between using and preserving our marine and coastal resources for the benefit of all of us: the conservation and sustainable use of marine and coastal biodiversity is one of the priority areas of action under the Strategic Plan for Biodiversity of the UN Convention on Biological Diversity (CBD). To halt the loss of biodiversity and ecosystem services, it is crucial to make enhanced concerted efforts at the global, regional, national and local levels.

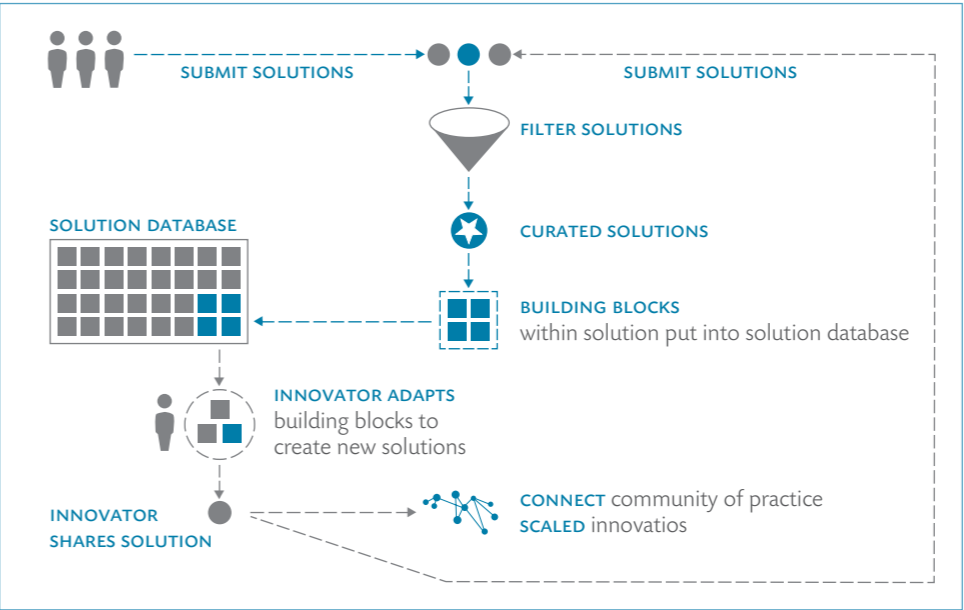
Therefore, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) established the Blue Solutions Initiative, implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in direct partnership with GRID-Arendal, IUCN and UNEP. Blue Solutions provides a global knowledge network and capacity development platform to collate, share and generate solutions for effective management and equitable governance of our planet’s marine and coastal living spaces.

SOLUTIONS – APPROACHES THAT WORK

Across our blue planet, multiple examples of inspiring solutions exist which successfully help overcome challenges to sustainable development and human well-being in the marine and coastal realm. Blue Solutions exist at all levels – from local to global – which address challenges in a variety of ways, from technical infrastructure and co-management to policy-making or law enforcement. These Blue Solutions...

- are effective: they are applied solutions with demonstrated impact
- are scalable: elements of the solutions have the potential to be up-scaled and/or replicated in other contexts
- address marine and coastal challenges

We believe that solutions are composed of essential elements that determine their success – we call them building blocks. These building blocks may be adapted and recombined with others to address new challenges in other socio-cultural and ecological contexts, sectors or geographies. [This is the Blue Solutions approach:](#)



Adapted from  
The Resilience Exchange

### 8 INTRODUCTION

#### SOLUTIONS EXCHANGE

The Blue Solutions Initiative identifies, distills and promotes successful solutions and the essential elements that determine their success - their building blocks - for practitioners, decision-makers and policy makers. This supports inter-sectoral knowledge transfer and enables mutual learning across borders. Our aim is to inspire action towards effective management and equitable governance in marine and coastal contexts. The focus lies on holistic solutions for the sustainable use of marine and coastal resources – because only healthy and productive marine and coastal biodiversity will continue to benefit human well-being for generations to come. The Blue Solutions Initiative uses different formats to facilitate exchange of successful approaches. Solution exchange can be applied in face-to-face meetings and through an online platform.

#### FACE-TO-FACE SOLUTIONS EXCHANGE

In face-to-face meetings participants have the opportunity to engage with solution providers, as well as experience how building blocks can be used, recombined and adapted to create new solutions in *solution-ing* workshops.



The Blue Solutions Initiative held its first regional *solution-ing* event on Mactan Island, Cebu, Philippines in May 2014. This 4-day forum applied the Blue Solutions approach to facilitate knowledge transfer and exchange with a focus on local marine area management and governance, ecosystem based approach to marine and fisheries management, as well as ecosystem-based adaptation and disaster risk reduction. Throughout the event vibrant discussions took place and a positive spirit of sharing and learning from one another united the participants.

“We need to avoid re-inventing the wheel” is a notion that was frequently heard during the *Regional Forum on Solutions for Oceans, Coasts and Human Well-Being in Asia and the Pacific*. The forum addressed practitioners and decision makers from local communities, civil society, parliaments and government officials from all levels involved in marine and coastal development planning, management and governance. More than 100 participants from 17 countries in Asia and the Pacific met to exchange their experiences. Moreover, many participants used the opportunity of the forum to document their own experiences as Blue Solutions using a template developed by the Blue Solution Initiative. Twenty-seven solutions that were exchanged during this forum are presented in this publication.

#### ONLINE SOLUTIONS EXCHANGE

In addition to the face-to-face exchange, the Blue Solutions Initiative is creating a web-based platform for the exchange of successful solutions. The efforts of the Blue Solutions Initiative are embedded into a larger initiative: the Resilience Exchange, a collaboration of ten conservation and development organizations that are joining forces to accelerate the pace of social change. The online Blue Solutions, focusing on success stories in the marine and coastal realm, will become part of a larger pool of solutions and building blocks from different sectors.

This web-based and interactive platform allows solution providers to easily submit their experience on the one hand while on the other, users can get inspiration for the challenges they are facing. Users can enter a challenge, browse through suggested building blocks and create a new solution based on existing, adapted or newly created building blocks.

The solutions presented during the Regional Forum are the first to be fed into this platform, thus initiating a global exchange between practitioners and policy makers who wish to learn what has proven to be successful elsewhere.



[www.bluesolutions.info/exchange](http://www.bluesolutions.info/exchange)

ADAPTIVE, COMMUNITY-DRIVEN AND RESILIENT CO-MANAGEMENT PLAN

10 SOLUTION

The Peam Krasop Wildlife Sanctuary in Kho Kong Province, Cambodia, is one of the largest and most undisturbed re-generated mangrove forests in Southeast Asia. In order to address the need for climate change adaptation in the area, a co-management plan was developed for the sanctuary with participation of local communities.



Areal view of the Peam Krasop Wildlife Sanctuary

**Mr Veng Somsak, Deputy Chief of Koh Sralao Community Protected Area:**

»From my understanding every protected area should have zoning to reduce conflicts between the Protected Area Authority and the users and to make it easy for the local community to participate in natural resources conservation. It is easier if people know where they can collect natural resources and where they cannot.«



Sharing knowledge in a community workshop

The co-management plan will support ecosystem and social resilience through maintenance and restoration of mangrove areas, the implementation of a zoning system that regulates use of and movement in the sanctuary, the development of livelihood diversification and adaptation techniques for local communities, as well as the conservation of key species.

BUILDING BLOCKS Solution components for replication

11

**Understanding local impacts and threats**

Detailed studies and surveys are undertaken to gain improved understanding of the vulnerability of the site to climate change and human-related threats.

**Creating ownership**

To build a long-term and lasting management plan, all perspectives, uses and needs are taken into account. Provincial workshops facilitate a collective understanding. Community input is ensured through the use of participatory risk assessments, among others.

**Testing of conservation and rehabilitation techniques**

Feedback from efficiency tests (waterway rehabilitation inside the mangrove/canal dredging, re-planting) is used to develop and improve the management plan. A zoning system regulates uses and movement in the site.

**Developing a management plan of shared solutions**

The joint identification of priority areas for intervention and solutions, using already existing (local) ideas and set-ups, is key: for example, making existing livelihoods more resilient, creating new income sources and strengthening local enforcement groups (park rangers).

**National upscaling and trans-boundary exchanges**

A platform is established to share effective solutions, good practices and lessons learned at the regional level. High level national officials are involved in field visits and local discussions to bring community-led climate change adaptation examples to national attention.

This solution is being implemented by IUCN’s project Building Coastal Resilience to Climate Change Impacts in Southeast Asia, funded by the European Union.



COMMUNITY-BASED ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT

12 SOLUTION

The Pacific Islands region is among the world’s most vulnerable regions in the face of climate change. This also applies to Yap State, one of the four states making up the Federated States of Micronesia. This solution addresses the problem of declining fish and shellfish populations through effective management as well as enhancing community capacity to adapt to climate change in the State of Yap.



FADs attract tuna and other pelagic fish making it easier to catch them

The community-based ecosystem approach to fisheries management (CEAFM) tackles these challenges by raising awareness on different fishing practices, developing community-owned management and conservation measures, and by introducing Fish Aggregating Devices (FADs) that attract pelagic fish to offshore areas in order to alleviate fish pressure on inshore areas. This management helps to improve catch rates and provides alternative livelihood options for local communities.

The Yap Department of Resources & Development Director comments:

»I am very happy about how CEAFM has turned out in Yap. The Fish Aggregating Devices activity has provided the general public not only the choice for alternate food and income source, but also the opportunity to look at how other activities may help and promote the management of our marine resources and our communities simultaneously not only for the future but today as well.«



Community consultations



School children presenting their posters on „Climate Change, Coastal Fisheries and Communities“

BUILDING BLOCKS Solution components for replication

13

Community management plans

Communities analyse their fishing practices and develop community-owned management plans. This is supported by awareness raising programs as well as technical advice.

Fish Aggregating Devices (FADs)

These devices attract pelagic fish to a certain offshore area and therefore facilitate offshore fisheries. This alleviates fishing pressure on inshore areas and provides alternative livelihoods for the local community. Communities receive in depth training on the construction, maintenance and monitoring of these devices.

Capacity building of stakeholders

The Secretariat of the Pacific Community offers a number of regional and local capacity building programmes for national and state government officials as well as community representatives. These teach management and specific skills at all levels of expertise.



Community members are trained in construction, deployment and maintenance of FADs

This solution is being implemented through the regional programme Coping with Climate Change in the Pacific Island Region (CCCPIR), a joint initiative of the Secretariat of the Pacific Community (SPC), the State of Yap, the national government of the Federated States of Micronesia and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for the Economic Cooperation and Development (BMZ).

NASOATA ISLAND CO-MANAGEMENT

14 SOLUTION

Nasoata Island in Fiji belongs to the people of Nakorovou village. It was in 1970 when the villagers bought back the island that, during colonial times, belonged to coconut plantation owners. Today, people living on the island do not have to fight colonisers, but people from outside who access the island illegally and poach its resources in an unsustainable way.



Nakorovou Village consultations

Mr. Seru Serevi, renowned artist and composer in Fiji and the South Pacific region:

»Nasoata is important to us because it is our ‘ikanakana’, meaning our breadbasket, where we get our crabs and fish from. We have in our own ways been protecting the natural resources on the island, such as declaring taboo zones for



Mr. Seru Serevi, artist and composer

Nasoata Island’s co-management is a solution that bridges biodiversity conservation and fishing rights through an effective management framework. It was developed in a consultative process, bringing different stakeholders from the national, provincial and local level. The solution considers traditional fishing rights, modern monitoring and law enforcement techniques. The management plan will enhance the chances of Nasoata being chosen as the second Ramsar site in Fiji, meaning that it might become a certified Wetland of International Importance. The application is on-going.

certain periods and this has contributed to the pristine state of the mangroves to date. Our people have respected the need to protect the island, it is people from outside who are not respecting our taboos. Through the consultative process we went through, strong cooperation between the villagers, the Provincial Office and the relevant government departments is now evident. The future of Nasoata is brighter. The protection of Nasoata, the inclusion into Ramsar and also the addition of some eco-tourism activities will be the best outcome for the island.«

BUILDING BLOCKS Solution components for replication

15

Providing the scientific and legal evidence base

National plans and policies relating to mangrove management are reviewed and integrated into the development of an adequate management plan. Biodiversity assessments provide the scientific basis for the plan.

Facilitating multi-input management plan

Government authorities, conservation groups, community and international stakeholders jointly develop co-management plan that protects the island and its fragile resources.

Repeated community consultations

Repeated consultations with relevant government departments, the provincial authorities, researchers and the local community are important to reach agreement on management practices desirable to all stakeholders. They also help to understand island dynamics and structures like the land tenure systems.

Witnessing challenges and visualising solutions

Relevant stakeholders witness and discuss existing challenges and possible solutions for a more sustainable use and extraction of the island’s resources on site.

Ensuring endorsement of end-product

The community endorses and the paramount chief of the province approves the management plan. This ensures adequate engagement for the implementation of the plan.

Seeking international management status

The management plan enhances the chances of Nasoata being chosen a Ramsar site, a certified Wetland of International Importance.

This solution is being implemented by the MESCAL project - a joint initiative of the Department of Environment, Fiji, the University of the South Pacific and IUCN.



INTEGRATED MANGROVE FISHERY FARMING

16 SOLUTION

In India's state Tamil Nadu almost half of the population lives in coastal areas and depends heavily on the resources that the coast provides. However, these resources are at risk due to a number of climatic and non-climatic stresses, such as cyclones, floods, land and groundwater salinity, water pollution, or siltation of creeks in mangroves.



Two year old Integrated Mangrove Fishery Farm

This solution helps to turn saline areas into productive land again by introducing brackish-water fishery farming. This in turn helps to secure people's incomes and livelihoods and to reduce migration to urban areas. Integrated Mangrove Fishery Farming includes building ponds and bunds, planting mangroves and halophytes on the bunds and introducing new salt-tolerant fish and plant species. What makes this solution "integrated" is not only the fact that it combines income generating activities with protection measures, but also that it is science- based and community-centred at the same time.

Indrani Pakri Samy, living in a coastal village in Tamil Nadu:

»Fishing was never easy for us. Very often we used to spend the whole day submerged in creeks or mangroves to hand-pick fish and crab. And very often this caused health problems like wounds in legs and hands, skin diseases, colds or fever. Plus, our fish catch decreased with time. With this project, things have become better. We set up a nursery, raised mangroves and planted them along the bunds and mounds of the ponds that we created. Today, I can earn money by selling fish which grows in our pond again since we use salt tolerant fish varieties now.«



Villagers planting mangroves that were grown in the village nursery. The mangroves provide protection against upcoming cyclones and other natural disasters.



BUILDING BLOCKS Solution components for replication

17

Situation analysis and vulnerability assessment

Participatory rural appraisals help to draw a picture of the socio-economic and environmental situation and to identify the project area and risk zones that are affected most by climate change impacts like sea level rise and salinity.

Village level institutions

These local management committees develop rules, regulations and micro plans for all activities and are responsible for their implementation. They try to consider the concerns and priorities of different stakeholders. Training allows them to also take into consideration new climate change findings.

Construction of fish ponds and bunds

Ponds with salt tolerant fish species provide new sources of income and nutrition. Bunds around these ponds planted with mangroves and halophytes protect the coast from natural hazards.

Participatory monitoring

A team of representatives of the target community, non-governmental organisations and government agencies monitors the progress of all activities. If necessary, plans and activities are adapted.

This solution was implemented by M S Swaminathan Research Foundation (MSSRF) in cooperation with GIZ'S project Climate Change Adaptation in Rural Areas of India (CCA RAI), on behalf of the German Federal Ministry for Economic Cooperation and Development.



PREPARING FOR DISASTERS AND BUILDING LIVELIHOOD RESILIENCE

18 SOLUTION

Since 1969, Mousuni Island in the Indian Sundarbarns has shrunk by one sixth due to coastal erosion. In the same time the island’s population has tripled. With breaches in the island’s embankments, saline water keeps flowing onto the mainland. Especially before and after the monsoon, when most of the storms occur, vast areas of the island are under water.



Prone to flooding and salt water intrusion: agricultural land close to the embankment on Mousuni Island.

With the expected sea level rise, the threat of damage to agricultural land, property and human and animal life will most likely increase. This solution prepares island communities for an uncertain future, enabling them to adapt to climatic changes. Its two core activities are preparing people for extreme weather events and disasters and introducing suitable salt-tolerant paddy and fish varieties in flood prone areas.

Mostafa Khan, farmer on Mousuni Island:

»Breach of embankment has become a regular phenomenon on our island. When a breach occurs, our agricultural land and our ponds are flooded with brackish water. What has made the situation worse is that many farmers decided to go for high yielding varieties that are not only more expensive, but also more sensitive to brackish water than traditional varieties.



Mostafa Khan checking his ready to harvest salt-tolerant paddy.

Today, paddy cultivation with high yielding paddy varieties has more or less become impossible. This project has provided me with seeds of Lalgetu, a salt-tolerant paddy variety that was cultivated in the old days. I have been cultivating this variety on my land for three years now and have started to share it with other farmers. Unfortunately, brackish water can still destroy very young seedlings. But on my plot of land, the growth of paddy has been very good to date.«

BUILDING BLOCKS Solution components for replication

19

Vulnerability assessment

This assessment helps to identify the physical and socio-economic vulnerabilities of the island’s communities and to locate low-lying areas that are particularly prone to coastal flooding. In order to identify appropriate salt-tolerant species, data on soil and salinity is collected.

Disaster preparedness training

Capacity building of community members and the formation of disaster response teams enable people to better cope with disasters. The disaster response teams consist of young local volunteers who are trained and well equipped to act on relief and rescue operations before, during and after an emergency.

Adaptation Centre

This centre provides broad information on climate change adaptation and serves as nodal point for disaster response teams. Data and experiences that are collected here are made accessible to all community members and different agencies.

Awareness campaigns

These campaigns inform and sensitise the target community on climate change, its impacts and effects on livelihoods, and on the need to adapt.

Institutional arrangements

Strong links with local government disaster management bodies ensure dialogue and mutual support as well as efficient planning, implementation and follow-up on appropriate activities.

Climate adaptive livelihood options

The introduction of salt-tolerant paddy and fish varieties provides new livelihood options. It is accompanied by training, visits of experts, exchange of experiences between community members and monitored progress.

This solution was implemented by the West Bengal University of Animal and Fishery Sciences (WBUAFS) and the World Wildlife Fund (WWF) India in cooperation with GIZ’S project Climate Change Adaptation in Rural Areas of India (CCA RAI), on behalf of the German Federal Ministry for Economic Cooperation and Development.



COMMUNITY-BASED CONSERVATION AT SCALE –  
THE BIRD’S HEAD SEASCAPE

Bird’s Head Seascape, with its highly productive waters and diverse habitats including coral reefs and mangroves is the life support system of the people of West Papua in Indonesia. Ecosystem health is crucial to sustainable natural resource industries such as fisheries, tourism and aquaculture. After a decade of conservation efforts, the Bird’s Head Seascape is



A Marine Protected Area in the Bird’s Head Seascape

**Lukas Rumetna, the Bird’s Head Portfolio Manager at The Nature Conservancy:**

»After years of building the skills and commitment of the people in West Papua, they are now ready to continue the conservation efforts on their own. Most of them have understood their important role in managing Marine Protected Areas and have been equipped with the necessary know-how. There may only be a few tasks remaining that still need our assistance. Once we have left, local people will work together with the technical control unit from the local administration that will replace our work here.«



© Keith Ellenbogen



© Keith Lawrence

left: Law enforcement officers  
right: Students on the Kalabia, a floating marine school in the Bird’s Head Seascape

**Science-based management**

Scientific investigations provide a clear understanding of the seascape and are the basis for its management. They include natural and social science as well as the rich traditional knowledge of the local people.

**Co-management planning**

Extensive consultations with local community leaders, governmental and non-governmental agencies provide the basis for a management plan that is, in a second step, approved by the responsible government ministry.

**Adequate co-management institutions**

Local communities manage the Bird’s Head Seascape. Community leaders are trained in the protection and sustainable use of marine resources.

**Social and political support and partnership**

Innovative outreach and communication strategies build social and political support as well as trust and ownership among communities. This leads to reliable collaboration between international and local partners.

**Sustainable financing**

A combination of government allocations, tourism user fees, payment for ecosystem services and a multi-sector capitalised conservation trust fund cover all core MPA management costs.

**Private sector engagement**

Tourism in the Bird’s Head Seascape is developed together with the tourism industry and with a focus on eco-tourism. A tourist user fee system supports marine conservation and community development.

This solution is being implemented by Conservation International (CI), The Nature Conservancy (TNC) and the World Wildlife Fund (WWF) Indonesia.



INTEGRATING TERRESTRIAL  
AND MARINE SPATIAL PLANNING IN BONTANG CITY

22 SOLUTION

In many spatial planning processes, the use of land and marine areas is treated separately, which often leads to conflicts in economic use and environmental protection. This applies especially for areas that are highly populated and intensive-ly used. Bontang City in Indonesia is such an area. The coastal zones around Bontang City feature human settlements, power plants, oil and gas industries, ports, aquaculture, marine transportation, fisheries and tourism.

In order to prevent the degradation of biodiversity and ecosystems around Bontang City and to address existing and potential spatial conflicts in an adequate and effective way, a number of mid-level government officials initiated the development of an integrated spatial plan. This new plan, for the first time, includes both land areas and marine areas with its mangroves, coral reefs and seagrass beds. It is the first example of the implementation of the Indonesian Law No 26/2007 on Spatial Planning and Law No 27/2007 on Coastal Area and Small Islands Management to be applied in coastal districts/cities in Indonesia.

**Dr. Ario Damar, Vice Director for the Natural Resources and Environmental Program at the Center for Coastal and Marine Resources Studies – Bogor Agricultural University:**

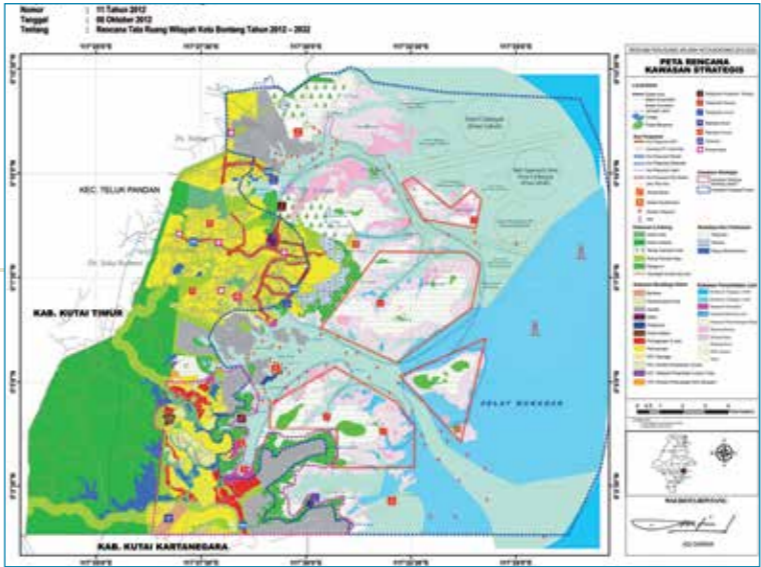
» This approach that synchronises land, coastal and marine spatial planning is novel for us. It was initiated by a group of young and enthusiastic middle level governmental officials of Bontang City who were partly trained in Integrated Coastal Zone Management and were keen to introduce and apply it. Very consciously we selected representatives from various other relevant stakeholder groups, people who were open minded and willing to cooperate. Together with them and the government officials we were then able to develop the new integrated spatial plan. I think having this human capital and openness for new experiences was the main pre-condition for the successful development of this new ‘solution’ that may even serve as a model for other coastal districts in Indonesia.«

BUILDING BLOCKS Solution components for replication

23

**Multi-sectoral stakeholder committee**  
Key persons from all stakeholder groups, including governmental staff, discuss spatial conflicts in a series of meetings and agree on a zonation scheme.

**Ecosystem-based spatial analysis and planning**  
Environmental and socio-economic profiles of the coastal zone are analysed. Based on ecosystem-based management principles, land, coastal and marine systems are integrated into one single spatial plan.



Integrated Spatial Plan, taken from the official „Local Regulation of Bontang City No.11 year 2012, about Spatial Planning of Bontang City Area year 2012–2032”

This solution is being jointly implemented by the Centre for Coastal and Marine Resources Studies – Bogor Agricultural University, Indonesia (CCMRS – IPB), the Bontang City Government, and strong contribution from Bandung Institute of Technology (ITB).



MARINE PROTECTED AREA LEARNING SITE FOR THE CORAL TRIANGLE



Mola mola, flagstone species



Planting mangroves



In the western corner of the Coral Triangle biodiversity hotspot, off the coast of Bali, Indonesia, lie the islands of Nusa Penida, Nusa Lembongan and Nusa Ceningan. The islanders and coastal fishers from Bali derive their livelihoods from the rich surrounding seas through fisheries, seaweed farming and marine tourism. Nusa Penida’s waters support a rich marine life, such as the peculiar Ocean Sunfish (*Mola mola*) and Manta Ray (*Manta birostris*).

The Coral Triangle Center (CTC) has been closely involved in the establishment and management of a locally-managed marine protected area (MPA) in Nusa Penida. Acknowledging the site’s collaborative governance model, which aligns benefits for all stakeholders with marine biodiversity conservation and is therefore an example for the whole region and beyond, CTC has developed Nusa Penida into a learning site. The establishment and collaborative governance of Nusa Penida MPA has shown immediate positive effects on the recovery of fish stocks and reef health while ensuring high acceptance of the site by the community. Illegal fishing practices, such as cyanide and blast-fishing, have been virtually eliminated.

Coral Triangle Center (CTC) executive director Rili Djohani:

»Nusa Penida has become a jewel in Indonesia’s marine protected area system, as one of the most thoroughly planned and zoned MPAs in the Coral Triangle through bottom-up collaborative management that contributed to people’s livelihoods and economies while protecting the world’s biological wealth for future generations.«

Visitors are informed about Nusa Penida’s biodiversity

Baseline data collection

Scientific data with input from relevant stakeholders is collected and documented through a series of surveys, interviews and discussions. This helps to determine criteria for establishment of protection zones and acts as input for discussions with local stakeholders.

Zoning and management plan

Formalise and enhance local customs and institutions legally. Conduct a series of consultations with all stakeholders, including local government, fishermen, tribal council, seaweed farmers and dive operators. Identify core zones of high resilience, thus high conservation value, as well as clear direction for long-term management of MPA.

Collaborative management body scheme

Establish a management body including all stakeholders reflecting the collaboration between local governments ensuring transparency and accountability. Set up joint patrol, biophysical and resource monitoring teams with members of all stakeholder groups.

Ecological restoration

Rehabilitation of mangroves enhances climate change resilience by protecting the island from rising sea level and heavy storm impacts and increases sequestration of carbon.

Sharing experiences

Provide a platform for training and field visits. Train staff and key stakeholder representatives. Conduct review sessions for customisation and quality control.

Sustainable financing mechanism

Develop a formalised entrance fee system for marine tourism. Apply concept of ‘sharing program, sharing costs’ to individual stakeholders for joint activities. Develop tourist attractions such as mangrove tours and ‘adopt the coral’ program which are managed by and financially benefit the community. Ensure active support of dive tour operators to avoid adverse impacts of visitors.

This solution is being implemented by the Coral Triangle Center (CTC) in cooperation with the International Union for Conservation of Nature (IUCN).



PALAU’S PROTECTED AREAS NETWORK ACT

Palau features the most biologically diverse coral reefs, lagoons, mangroves and seagrass beds in Micronesia. Over the past decades, considerable changes in coral cover on Palau’s coral reefs have been observed, including widespread coral bleaching and coral mortality.



Snorkeling at Palau’s coral reefs

The Palau Protected Areas Network (PAN) Act provides the legal basis to establish a network of protected areas. It empowers communities to designate and manage marine and terrestrial protected areas in cooperation with governments, NGOs and other partners. The act outlines standards, criteria, application processes, technical and sustainable financial assistance for management and monitoring of sites. The Protected Area Network Fund is sourced from visitor fees and directly supports participating local communities. The PAN Act has been recognized as an exemplary policy through the Future Policy Award by the World Future Council.

The communities of Ngarchelong and Kayangel started cooperating in the early 1990s on conservation and resource management. In 2012, they joined the Palau Protected Areas Network (PAN) to improve management and enforcement of their protected areas.

Chief Uorchetei Victor Joseph of Ngarchelong

»Our land areas are small, so our livelihoods must extend to the sea and we need to ensure resources continue to be abundant. Stewardship begins with us, and PAN is our major enabler.«

Chief Rdechbor of Kayangel:

»Traditionally we used to cooperate. With this renewed cooperation, made possible by PAN, we have the opportunity to solve many issues facing us, especially, in dealing with climate change, sea level rise and coral threats and fish declines that undermines our livelihoods.«

Protected Area Network (PAN)

The designation of protected areas to become part of a nationwide network follows clear criteria, categories and application procedures.

Adaptive and participatory locally based management

Communities develop management plans and monitoring protocols, based on scientific baseline and monitoring data. Enforcement mechanisms for protected areas are established.

Capacity building for protected area management

State governments and local communities are trained in scientific surveying, site preservation plans, sustainable use practices, educating the public about preservation and protected areas.

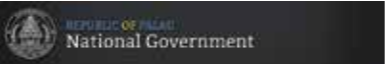
Green Fees

The Protected Area Network Fund (PANF) was created to support management and monitoring of the network’s protected areas. The “resource-user pays” principle was applied to establish a “Green Fee” for tourists. Complementary funds from other donors are acquired.



Seascape of Palau

This solution is being implemented by the Ministry of Natural Resources, Environment and Tourism of Palau in cooperation with the Palau International Coral Reef Center (PICRC) and other NGOs. It has been awarded the Future Policy Award by the World Future Council.



CONNECTIVITY OF MARINE PROTECTED AREAS

28 SOLUTION

Networks of marine protected areas (MPAs) are considered a key tool for fisheries management, biodiversity conservation and strengthening of coral reef resilience. The effectiveness of MPA networks significantly increases if MPAs are ecologically connected, for example by situating the protected areas to facilitate the linking of marine populations through dispersal of fish and coral larvae. Although the understanding of ecological connectivity is crucial for the establishment of MPA networks, little is known about connectivity patterns.



A local fisher deploys barrier net



The parrotfish *Scarus niger*, focal species for the study on larger-scale connectivity

This solution provides for the first time scientific data to better understand ecologically relevant larval dispersal of reef fishes in the Philippines. Genetic data analysis revealed that locally-managed MPAs situated along a 90 km coastal stretch in the province of Negros Oriental can supply reef fish larvae to fellow MPAs and to areas open to fishing. The derived knowledge on larval dispersal patterns helps stakeholders to improve existing MPA networks or to efficiently plan new networks that may even cross political (municipal) boundaries.

Dr Rene A. Abesamis was the main investigator of the larval connectivity study that was carried out at the Silliman University, Angelo King Center for Research and Environmental Management. He and his colleagues worked with local stakeholders in eight municipalities in Negros Oriental during the scientific study. They shared their findings with local government officials, government agencies and representatives from people’s organisations, the education sector and other stakeholder groups. In workshops with stakeholders before and after the study they explained the concept of larval connectivity and why knowledge of larval dispersal patterns is crucial for determining the size, spacing and location of individual MPAs within a network. In 2013, Dr Abesamis was awarded as an outstanding young scientist by the National Academy of Science and Technology for both his research and his endeavors to share his findings and transfer knowledge.

BUILDING BLOCKS Solution components for replication

29

**Scientific investigation on larval dispersal**  
Parentage analysis using microsatellite DNA markers is used to expose links between reef fish populations via larval dispersal and the extent of ecological connectivity between different MPAs.

**Communication of scientific results**  
Findings on larval connectivity are communicated to local stakeholders, decision-makers and the scientific community to improve the efficiency of existing and future MPA networks and its governance.



Samples of reef fish are processed by marine biologists while local fishers and community leaders at Apo Island observe



Mr Manric Barillo introduces the study during a meeting held with members of Barangay Siit in Siaton

This solution is being implemented by the Silliman University, Angelo King Centre for Research and Environmental Management (SUAKCREM) in cooperation with GIZ’s project Adaptation to Climate Change in Coastal Areas (ACCCoast) on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).



FISHERIES CO-MANAGEMENT THROUGH FARMCS

In the Philippines, like in many other places, fish stocks are decreasing as a result of marine and freshwater habitat destruction. This solution addresses insufficient and ineffective fisheries management to improve income and livelihood for small-scale fishers – by setting up Fisheries and Aquatic Resource Management Councils (FARMCs).



Looc FARMC: fish catch data collection

These FARMCs are composed of representatives from local fishermen, government, academia, civil society and private sectors and serve as a legal forum to jointly discuss and decide solutions for the sustainable use of municipal marine and other aquatic resources. They give resource users a legal status and actively involve them in all management and decision making processes.

**Arturo Maristela, former mayor of Aroroy, a municipality in the province of Masbate:**

*»Because of the creation of the FARMC, the fisherfolk’s perspective towards their resources was challenged, provoking a changing of mind-set that gives more respect towards their resources, and establishing a sense of ownership and responsibility.«*



Aroroy FARMC representative

When a fisherman in the Philippines claims, *»Our government cannot manage our coastal resources on its own, it needs us fisherfolk. We are part of the solution,«* he will most likely be a member of a FARMC. These local councils have fisher folk who had felt helpless and abandoned by their government but are now empowered and recognized for their significant contributions in coastal and fisheries resources management.

**National FARMC Programme Management Centre**

The Bureau of Fisheries and Aquatic Resources established this national centre that implements and coordinates the national FARMC programme of the Philippine government.

**Capacity building for FARMC members**

Continuous training equips stakeholders with the necessary know-how and skills to set up and run a FARMC. It includes assistance on habitat assessment and monitoring, the establishment and management of marine protected areas, mangrove rehabilitation, fisheries law enforcement, integrated coastal zone management and climate change.

**Inclusion of fisherfolk leaders**

Regular participation and consultation of fisherfolk leaders is sought from the beginning. These leaders are appropriate advocates for responsive and effective co-management planning and implementation since they are directly affected and speak the language of coastal dwellers.

**Regional FARMC Programme Management Centres**

Regional centres established in every region of the Philippines facilitate all fisheries co-management activities on site.

**Rewards and incentives**

A national incentive system that includes cash prizes, trophies and appreciation by the President of the Philippines recognises outstanding FARMCs and FARMC coordinators as role models.

**Partnerships and networks**

Partnerships with research, government and civil society institutions help FARMCs in the planning and implementation of their activities.

This solution was implemented through FARMC Project Philippines funded by the Lighthouse Foundation in selected pilot sites in support to the national programme for FARMCs of the Department of Agriculture-Bureau of Fisheries and Aquatic Resources.

MANGROVE CONSERVATION AND REHABILITATION

Mangroves and beach forests provide coastal greenbelts that act as a protective buffer against sea level rise and storms. Moreover, they are particularly effective in mitigating global warming and rising carbon dioxide levels by capturing and storing carbon in both above- and below-ground biomass.



Centuries-old mangrove

This solution empowers people on Panay Island in the Philippines to protect remaining mangrove forests and rehabilitate lost forest sites with suitable mangrove species. Abandoned fish ponds, in particular – many of which used to be mangrove sites – are turned back into healthy mangrove forests. The sound scientific base for rehabilitation and pond reversion ensures their success.

Dr Jurgenne Primavera, leading scientist in mangrove conservation:



Dr Primavera teaching about mangroves

» The inland mangroves of Bugtongbato-Naisud in Ibayay, Aklan Province of Panay Island, boast of 27 true mangrove species. The jewel in its crown is a magnificent stand of centuries-old *Avicennia rumphiana*, the biggest of which is a 20-meter tall tree with a girth of nine meters. The forest is full of birds, fiddler crabs, mud skippers and mud lobsters, called the engineers of the mangroves because of their mound-building activities.

The discovery of this patch of mangrove in 1996 was followed by intensive research over the next ten years, which was documented in various scientific publications. The construction of a 1,000-meter foot walk started in 2008 with funds from my Pew Fellowship in Marine Conservation. The next year, it was completed by the local government in collaboration with the Zoological Society of London. The 44-hectare huge Kantunggan It Ibayay Eco-Park was inaugurated in 2010. Since then, thousands of national and international tourists, students, researchers and others have visited the park. My fondest hope is that all Filipinos will have the opportunity to visit and appreciate this marvellous, magical forest and its wildlife.«

**Seafront mangrove planting**  
Trained local communities rehabilitate lost forest sites, in particular vulnerable seafronts, using science-based methods.

**Reversion of abandoned ponds to mangroves**  
An inventory of all fishponds is generated and fed into a central database to determine tenurial status. Planting trials identify the most effective methods for pond-mangrove reversion.

**Mangrove eco-park**  
The eco-park is a means of protecting remaining mangrove forests and also helps to raise awareness of the importance of mangroves, while providing valuable additional income for the local communities who manage the park.



Schoolchildren visiting KII Eco-Park

This solution is being implemented by the Zoological Society London (ZSL) in cooperation with GIZ's project Adaptation to Climate Change in Coastal Areas (ACCCoast) on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).

MANGROVE REHABILITATION AND INCOME DIVERSIFICATION



Planting mangrove seedlings at Silonay

Mangrove ecosystems provide livelihoods and coastal protection. They also have a high carbon sequestration and storage potential and thus contribute to climate change mitigation. And yet, mangroves are being cleared at an alarming rate. In the Philippines over 50 per cent of mangroves have already been lost.

Community-based mangrove rehabilitation addresses the degradation of coastal greenbelts by enabling and empowering people to protect remaining mangroves and reforest degraded areas. In order to make protection, rehabilitation and management measures sustainable, this solution also stimulates income diversification and offers capacity building for communities.

The island-village of Silonay is exposed to frequent storm surges. During the past decades, the village has become even more vulnerable because residents have cut huge parts of the island's mangrove trees. With support of Conservation International (CI) the local community organisation Sama-Samang Nagkakaisang Pamayanan ng Silonay (SNPS) is turning the situation around – by implementing the Silonay Mangrove Conservation and Ecotourism Project for the rehabilitation and conservation of a 42-hectare mangrove area.



Bamboo boardwalk in Silonay Mangrove Conservation and Eco-tourism Park

SNPS is working to diversify income from mangrove conservation and planting to micro-enterprise projects ranging from ecotourism to the sale of souvenirs. CI and the provincial government of Oriental Mindoro funded the construction of a 400-meter mangrove boardwalk, where visitors can experience the vast expanse of the mangrove forest. A look at Facebook shows that the eco-tourism concept and the crash course in nature conservation for tourists work well. Students and teachers, government officials and foreign journalists, and even beauty queens have posted their encounters with the “paradise island of mangroves” on the project’s Facebook account.

Vulnerability assessment

Suitable sites are identified and prioritised based on the potential of successful mangrove rehabilitation to reduce vulnerability in the face of climate change.

Capacity building

Trainings and mentoring activities strengthen the capacities of communities in mangrove rehabilitation and management as well as in developing alternative livelihood options.

Income diversification

Communities identify prospective livelihood options that are sustainable and correspond to the communities’ capacities. Training, resources and continuous mentoring help to realise chosen alternative livelihood options.

Conservation framework

Communities and local governments receive support to draw up a conservation framework that prepares the ground for mangrove rehabilitation. This framework takes into account important aspects like climate change adaptation and disaster risk reduction and integrates them into local plans, budgets and policies.

Conservation agreement

Networking and linking with other organisations has proven to be effective in ensuring sustainability and continuous support. All partners involved in conservation and rehabilitation activities jointly develop a conservation agreement that lays out the cooperation details.

This solution is being implemented by Conservation International (CI) in collaboration with the provincial government of Oriental Mindoro and city government of Calapan.



SOCIAL MARKETING LITE

36 SOLUTION

Social Marketing Lite is a solution that uses private sector marketing tactics to inspire people to change their behavior. In the coastal areas of the Philippines this solution is applied to support people protecting their environment.



Developing campaign messages and materials

A main focus of Social Marketing Lite is to build social marketing capacities among local government units and to improve their governance of marine protected areas through community participation.

This solution can be applied within one year and needs as little as 5,000 US dollars of financial input. Social Marketing Lite therefore can be seen as a cost-efficient model for increasing community engagement in the governance of marine protected areas and for fostering climate change resilience of coastal ecosystems.

On Suyac Island one can see the difference that Social Marketing Lite makes. The 1.8 hectare island with a population of 751 people is inhabited mainly by fisherfolk. Although the island has pristine mangrove resources, until lately the people of Suyac were not aware of their rich environment and its importance to people’s livelihood. They were



unaware that some of their practices were environmentally destructive. They used to uproot mangroves or practiced dynamite fishing or fish poisoning. Along with the decision to establish eco-tourism on the island, Social Marketing Lite was introduced to trigger behavioral change. A people’s organisation composed of island residents was established to manage the emerging eco-park. Another activity that proved highly efficient on Suyac Island was the training of young children in mangrove protection, waste segregation, public speaking, and tour-guiding. Today, these young “eco-patrollers” act as advocates for coastal resource conservation on their home island.

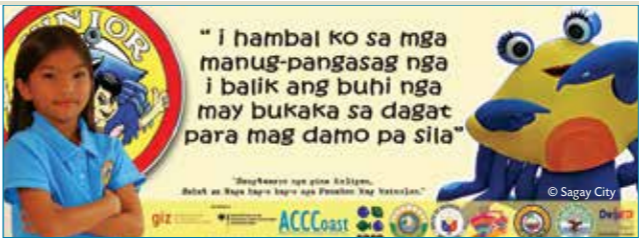
BUILDING BLOCKS Solution components for replication

37

**Social Marketing training**  
A series of workshops trains participants in social marketing concepts and techniques. This enables them to develop and implement their own campaigns in their communities. The exchange of experiences through cross-visits supports the learning process.

**Community mobilisation**  
Activities and events raise awareness and gain support from the larger community for environmental protection.

**Small grants**  
Funding to produce materials and conduct community mobilisation events is provided through small grants.



Children and mascots are effective promoters of behaviour change

This solution is being jointly implemented by the non-governmental organisation Rare and GIZ’s project Adaptation to Climate Change in Coastal Areas (ACCCoast) on behalf on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).



A map of the Philippines archipelago. The islands are colored in shades of orange and yellow, set against a blue background representing the surrounding seas. Labels on the map include 'South China Sea' to the west, 'Philippine Sea' to the northeast, and 'Sulu Sea' to the south. The main island groups are labeled: 'LUZON' in the north, 'VISAYAS' in the center, and 'MINDANAO' in the south. Within Mindanao, 'NORTHERN MINDANAO' and 'MISAMIS OCCIDENTAL' are specifically marked with red lines and text. The word 'MALAYSIA' is visible at the bottom left corner of the map.



and capacity development of beneficiaries in participatory research and collaborative implementation of EAF strategies and produces practical guidelines for EAF action programs and policy recommendations for long-term planning.

The formation of IBAMO is based on previous programmes in the field of coastal resource management in the province of Misamis Occidental. Thus, building partnerships and consensus with “outside” institutions (including NGOs and civil society groups) and catalyzing the improvement of fisheries governance at target sites was achieved within two years. In 2012, all eight LGUs entered and signed a new Memorandum of Agreement (MOA) to constitute IBAMO, along with the provincial government and regional offices of several government agencies of Northern Mindanao.

Since its establishment, IBAMO increases the commitment to implement EAF in small-scale fisheries management through better understanding of its potential for poverty reduction and environmental sustainability, integrates EAF in existing Coastal Resources Management plans and enhances the understanding of the roles of marine protected areas. The alliance fosters active participation

### BUILDING BLOCKS

The RAFMS approach considers the broader context of socio-economic, biophysical, and institutional dimensions of fisheries management systems. Results indicate five crucial issues to be addressed by IBAMO: depleted fishery resources and low fish catch; degraded fishery habitats; lack of alternative livelihood; limited institutional capabilities including lack of effective fisheries monitoring program; and lack of harmonization of fisheries laws and ordinances.

IBAMO builds partnerships and consensus with NGOs and civil society groups and catalyses the improvement of fisheries governance at the target sites. To constitute IBAMO, eight municipalities of Misamis Occidental signed a Memorandum of Agreement with the provincial government and regional offices of several government agencies.

Five major committees facilitate sustainable implementation of the IBAMO: (1) Information, Education and Communication Committee; (2) Law Enforcement Committee; (3) Habitat Enhancement Committee; (4) Institutional/Capacity Building Committee; (5) Monitoring and Evaluation Committee. Capacity building focuses on the institutional strengthening of IBAMO members and includes topics such as Coastal Resources Management and Fisheries Data Collection.

This solution is being implemented by the Iligan Bay Alliance of Misamis Occidental (IBAMO) in collaboration with World Fish with the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), funded by the European Commission.



TUBBATAHA REEFS NATURAL PARK ACT



The creation of protected areas, especially protected areas with restrictive no-take policies prohibiting extractive activities, often fuels fears in local communities that are confronted with new rules and restrictions. They are afraid to lose access to resources and thus to income. The Tubbataha Reefs Natural Park Act showcases that, if carefully planned and sensitively managed, assumed losses in protected areas can be turned into benefits.

The formulation of the Act and its policies involved multiple consultations with a cross section of society – from the village to the national level. This participatory process ensured that the affected communities and stakeholders were able to shape the contours of the new rules and regulations that would later affect them. Locally-based management involving a range of stakeholders, partnerships between the public and private sector, good communication and financial compensation have led to effective and voluntary compliance with the specifications of the Act and improved protection of this UNESCO World Heritage Site.

The Tubbataha Reefs Natural Park is composed of over 10,000 hectares of coral reef and more than 87,000 hectares of surrounding waters. A main source of income for the Tubbataha Reefs Natural Park is dive tourism.

USS Guardian aground at Tubbataha Reef

In 2013, a US Navy warship ran aground at Tubbataha Reef. It damaged an area of 2,345.67 square metres. The vessel had to be removed from the reef in segments. The Tubbataha Protected Area Management Board issued a notice of violation to the US government and communicated the total cost of damage and penalties for violations, based on fines stipulated in the Republic Act No. 10067, the Tubbataha Reefs Natural Park Act of 2009. The violations include unauthorised entry, damage to the reef, destruction of resources, non-payment of conservation fees for entering the park area, and obstruction of law enforcement officers. Thus, the US Navy is facing a fine of 58 million Philippine Pesos, or US\$ 1.4 million. Reckoning the cost of damage was straightforward because it is based on clearly articulated provisions embodied in the Act.



© US Navy  
USS Guardian aground at Tubbataha Reef

Participatory development of the Act

A series of multi-stakeholder consultations and workshops for drafting and reviewing the Act ensures full stakeholder participation as well as broad acceptance and compliance with rules and regulations.

Information campaigns

To promote awareness and a general understanding of the global significance of this biodiversity hotspot, the developed Act and policies are communicated to the public through various outreach activities, e.g. through radio plugs and local newspapers.

Financing park management

The Tubbataha Reefs Natural Park is run with financial assistance from a range of sources. Conservation fees paid by visitors are the main source of funding. Grants from NGOs and the private sector make up 32% of the budget.

Locally-based park management and law enforcement

Local institutions and communities, municipal and national government representatives, NGOs, academia, and the private sector are all represented in a locally-based park management and law enforcement body. Law enforcement is ensured through partnerships with the Philippine Navy and Coast Guard and locally recruited park rangers who receive in-depth training and appropriate surveillance equipment. The environmental situation in the park is monitored regularly, while the effectiveness of governance is measured annually using participatory mechanisms.

Economic incentives for communities

Local communities are compensated for economic losses caused by no-take policies. A share of the conservation fee is channelled into a livelihood fund that provides loans for development.

This solution is being implemented by the Tubbataha Management Office (TMO).



LAURU RIDGES TO REEFS PROTECTED AREA NETWORK

About 26,000 people live in Choiseul Province, or Lauru by its local name, in the Solomon Islands. Due to its remoteness, people in Lauru depend heavily on natural resources for food and income. The area boasts the largest remaining stands



Rich in natural resources: Lauru in the Solomon Islands

Jimmy Kereseka, member of the Lauru Land Conference of Tribal Community (LLCTC):

»LLCTC is the representative organisation of the collective chiefs of all communities in Lauru. It was established in 1981 and has given the people of Lauru a strong voice. A couple of years ago we decided to join forces in order to make



Developing the conservation plan with the help of 3D modelling

more wise and informed choices about our future – which is especially urgent given the pressures from logging, rising water levels, decreasing natural resources and increasing exploration by mining companies. Therefore, in 2008 LLCTC together with the provincial government requested support from The Nature Conservancy in order to better protect the land and seas of Lauru. The result was a provincial master conservation plan. This plan has been the foundation for the development of the 18 marine and terrestrial protected areas that have been established in Lauru so far.«

of lowland rainforest and more plant and animal species than any other island in the Solomon archipelago. Its unique marine biodiversity calls for preservation – a task that the Lauru Ridges to Reefs Protected Area Network takes care of.

The Lauru Ridges to Reefs Protected Area Network is the first locally managed marine area network in Melanesia. The network helps to strengthen the ownership and responsibility of local communities. It provides them with a systematic approach and useful tools to develop their own conservation plans, so that they can create protected areas and achieve legal security over access rights.

Conservation plan built on local and scientific knowledge

Through a participatory process, all relevant stakeholders map key features, cultural heritage and ecosystem services. MPA planning software identifies options for cost-effective protected area networks. 3D modelling is used to link local knowledge and scientific findings.

Integration of protected area sites into network

Once the conservation plan, the sites’ conservation value and the community’s commitment are approved by LLCTC, a new site is added to the Lauru network. A management committee formed by the community oversees and manages the new protected area.

Continued collaboration between all stakeholders

Monthly visits between LLCTC, the contact point in the community and the community committee allow for cross-learning and ensure true collaboration and partnership as well as long-term sustainability and commitment.

Monitoring of protected areas

The community’s management committee ensures continuous monitoring of protected areas. Interested community members are trained in monitoring using standardised techniques.

Overseeing implementation of the network

An overall committee made up of representatives of all stakeholders meets twice a year to review the implementation and progress at different sites in accordance with the conservation master plan.

Alternative livelihoods

Where feasible, LLCTC explores options of developing alternative incomes in order to counteract possible negative impacts of resource use limitations. Eco-tourism or eco-timber (including honey bee projects) are such alternatives.

This solution is being implemented by Lauru Land Conference of Tribal Community (LLCTC), the Government of Choiseul province and The Nature Conservancy (TNC)



GREEN FINS: RESPONSIBLE DIVING

44 SOLUTION

Tourism accounts for a third of the economic value of coral reefs. Tourism is also of increasing importance for developing countries but constitutes a significant pressure on coral reefs. The diving and snorkelling industry is one of the fastest growing tourism industries. What is good for business often creates threats for nature – in this case for marine ecosystems and in particular for coral reefs in tourism hotspots worldwide. This solution targets these threats. The Green Fins approach provides guidance to environmental standards for dive operators thus creating more responsible and sustainable behaviour within the industry. It offers simple and economic recommendations to prevent hazards like anchor damage or littering. In order to sustainably conserve and protect coral reefs, private and public sector stakeholders are brought together and collaborations are encouraged to create a network for awareness.



Green Fins members on the island of Pulau Tioman, Malaysia

This is how dive centres get involved: dive centres agree to become members. This is voluntary and free of charge. A trained Green Fins assessor then carries out an assessment and the dive centre agrees on three realistic actions it can commit to that will limit its environmental impact and improve environmental awareness and eco-friendly dive operations. Depending on the success of these actions, dive centres have the possibility to become one of the 10 top members. If, after two yearly assessments, no improvement is recorded, free membership can be suspended or withdrawn from the member. This is a valuable quality control tool because members and above all the most eco-friendly operators get free publicity – on the Green Fins website, on social media, or at international dive shows.



Filippino Green Fins members recover rubbish from the sea

BUILDING BLOCKS Solution components for replication

45

**Multi-stakeholder partnerships for eco-friendly diving**  
Public and private sector partnerships are initiated to build management capacities and shape regulatory frameworks for a more sustainable diving industry.

**Code of conduct**  
This code outlines 15 actions that target environmental threats caused by the dive industry both on land and under water. The guidelines help dive centres and individual divers to reduce their impact on reefs by providing clear industry standards for environmentally responsible practices and promoting marine environmental awareness.

**Environmental assessment of dive centres**  
Dive centres that are willing to implement environmental standards can be certified based on the Green Environmental Assessment Rating System (GEARS) used to evaluate the day-to-day practices of dive and snorkel centres against set criteria. Certification and free publicity are efficient incentives for eco-friendly dive tourism.



Lost and found during the underwater cleanup on Koh Phi Phi, Thailand

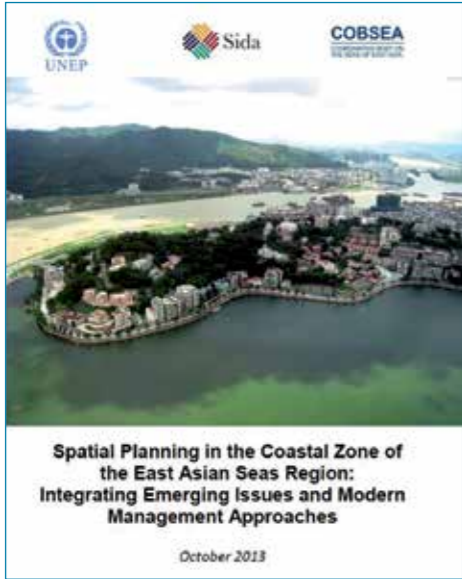
This solution is being implemented by Green Fins – a joint initiative of the Reef-World Foundation and United Nations Environmental programme (UNEP).



STRENGTHENING CAPACITIES IN COASTAL SPATIAL PLANNING

46 SOLUTION

Coastal areas are extremely vulnerable to the impacts of climate change, and it is necessary to respond to these threats and attempt to minimize the vulnerability of coastal ecosystems and communities. Spatial planning is a tool to integrate measures to incorporate climate change into planning processes. It is not a new concept in the East Asian Seas Region. In fact, spatial planning has been employed for decades in member countries of the East Asian Seas Region. However, existing planning systems often do not include climate change and sea level rise scenarios or modern management approaches.



Regional resource document on coastal spatial planning

Based on the regional and national resource documents and trainings, a six-month demonstration activity was conducted with the aim of enhancing the knowledge and capacity of Cambodian local authorities on coastal spatial planning. This was done through hands on demonstration and development of coastal planning scenarios considering ecosystem-based adaptation (EBA) and disaster risk reduction (DRR). During the trial two things were developed with participation of local authorities and communities: a spatial planning strategy for EBA and DRR; and an outreach document in non-technical language with illustrative graphics of EBA and DRR scenarios including the role of mangrove and coastal ecosystems for climate change mitigation and adaptation. The spatial planning strategy and the outreach document are now used by Cambodia in their planning activities.

This solution is an initiative in the East Asian Seas Region that provides capacity building for national and local authorities responsible for coastal development and management and in particular for coastal spatial planning. It integrates emerging issues and new management approaches into existing planning concepts. The solution also provides national adaptation activities tailored to the needs and priorities of each country as well as best practices for capacity building and field applications.

Strengthening capacities in Cambodia

Based on the regional and national resource documents and trainings, a six-month demonstration activity was conducted with the aim of enhancing the knowledge and capacity of Cambodian local authorities on coastal spatial planning. This was done through hands on demonstration and development of coastal planning scenarios considering ecosystem-based adaptation (EBA) and disaster risk reduction (DRR). During the trial two things were developed with participation of local authorities and communities: a spatial planning strategy for EBA and DRR; and an outreach document in non-technical language with illustrative graphics of EBA and DRR scenarios including the role of mangrove and coastal ecosystems for climate change mitigation and adaptation. The spatial planning strategy and the outreach document are now used by Cambodia in their planning activities.

BUILDING BLOCKS Solution components for replication

47

**Regional resource document**  
This document describes management approaches in existing spatial planning systems, and outlines applications of the general spatial planning process at different scales, administrative levels and degrees of complexity.

**National resource document**  
This document provides information, case studies and examples of all aspects of coastal spatial planning to inform local or national planning processes. It provides orientation to local planners, researchers, students, and national authorities.

**Capacity building**  
Regional and national trainings that are tailored to the needs and priorities of the participating countries and compliant to the respective regional and national resource documents build capacities of national and local authorities. These trainings prepare authorities to integrate spatial management approaches into their national planning processes.



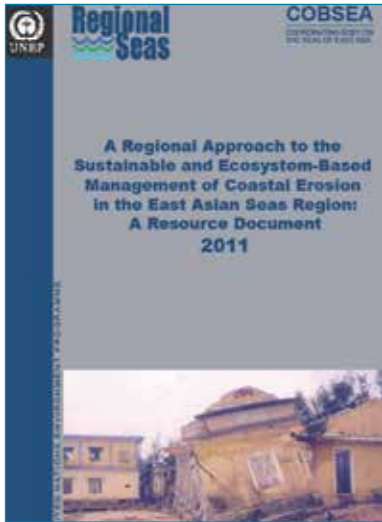
Regional training course on coastal spatial planning, Thailand

This solution is a joint initiative of the the Coordinating Body on the Seas of East Asia (COBSEA) of the United Nations Environment Programme (UNEP) and the Swedish International Development Cooperation Agency (SIDA).

REGIONAL STRATEGY ON COASTAL EROSION MANAGEMENT

48 SOLUTION

In the countries of the East Asian Seas Region the speed of coastal erosion, exacerbated by climate change, increases year by year, threatening coastal ecosystems, communities and economies. In most countries comprehensive strategies to cope with coastal erosion are missing so far.



The “COBSEA Regional Programme for the Sustainable and Ecosystem-Based Management of Coastal Erosion in the East Asian Seas Region” responds to policy and operational gaps in order to address coastal erosion in six countries in the East Asian Seas Region: Cambodia, Indonesia, Malaysia, Philippines, Thailand and Vietnam. National authorities assess gaps and needs in their respective countries and identify priority actions for addressing coastal erosion. Results and recommendations are presented in national reports, that are discussed and agreed upon through a national consultation process with all stakeholders.

*Ms Morin, Under Secretary of State of the Ministry of Environment of Cambodia, during her opening remarks at the national consultation meeting in Cambodia :*



Coastal erosion in Vietnam

*»The National Coastal Erosion Assessment is the first ever report on coastal erosion in Cambodia. This document will be widely used. It is fundamental for the preparation of National Coastal Erosion Strategy and for mobilizing support from the development partners.«*

BUILDING BLOCKS Solution components for replication

49

**National assessment of coastal vulnerability**  
Participating countries analyse coastal vulnerability in a standardised format. Gaps, needs, interventions and prioritised actions at national and subnational levels are defined.

**Regional assessment report**  
Across the whole region a summary of national assessments is published as a resource book for an ecosystem-based and sustainable integrated coastal zone management framework.

**National consultation meeting**  
National authorities and stakeholders discuss and approve findings, recommendations and pilot interventions during national consultation meetings. Here, they exchange information, enhance awareness and foster dialogue and cooperation.



National consultation meeting in Malaysia

This solution is a joint initiative of the Coordinating Body on the Seas of East Asia (COBSEA) of the United Nations Environment Programme (UNEP) and the Government of the Republic of Korea through the Korea Maritime Institute (KMI), the Ministry of Land Transport and Maritime Affairs (MLTM) and the Korea International Cooperation Agency (KOICA).



COMMUNITY-BASED ECOLOGICAL MANGROVE RESTORATION FOR  
NATURAL MANGROVE RECRUITMENT

There are an estimated 400,000 hectares of abandoned shrimp ponds in former mangrove areas worldwide. These areas represent both environmental degradation and lost economic opportunities. There are many efforts to regenerate hydrologically disturbed or degraded mangrove forests. The success rate, however, is rather low due to a number of reasons, including failing to observe nature and planting the wrong species in the wrong place at the wrong time.



Preparing an abandoned shrimp pond for mangrove regeneration in Thailand



Measuring physical features for pond reversion in Burma

This solution, applied in the coastal Trang Province in Thailand, has shown that Community-based Ecological Mangrove Restoration can make a difference. It restores degraded and unproductive areas back to healthy and diverse mangroves at low cost and with community stewardship. The overall aims are to sustain livelihoods of fishers and resource users, to protect communities from disasters and last but not least to benefit the environment. This solution highlights the need to observe nature thoroughly first while allowing nature to do the seeding and rehabilitation by itself.

The activities in Thailand are part of the Mangrove Action Project (MAP) involving four countries in Asia and five non-governmental organisations. All project activities follow MAP’s five-pronged approach to mangrove conservation that involves education, advocacy, collaboration, conservation and restoration, and sustainable community-based development.

**Collection of historical and ecological background information**  
In order to identify suitable sites for mangrove restoration, research is undertaken and information collected, including information on land tenure, historical changes and local utilisation as well as mangrove distribution and tidal requirements.

**Community awareness, participation and stewardship**  
Local communities discuss restoration objectives, protection plans and co-management principles and are trained in community-based ecological mangrove restoration. Project managers connect communities and government agencies to support the restoration process.

**Site suitability assessment**  
Knowledge of the local mangrove ecology, on modifications of the mangrove environment that may prevent natural regeneration and on the hydrology that controls the distribution and growth of targeted mangrove species is the basis for successful restoration.

**Mangrove restoration – Implementation**  
A restoration program is designed for appropriate sites using assisted natural plant recruitment. The regeneration process is closely monitored. Planting of seedlings only takes place if natural regeneration is not successful.

**Long-term monitoring**  
Regular and long-term monitoring for at least 3-5 years allows tracking changes over time, making early modifications to address problems and controlling whether defined objectives are being achieved.

This solution is being implemented by the Mangrove Action Project (MAP)



BEST MANAGEMENT PRACTICES FOR SILVO-AQUACULTURE

52 SOLUTION

Aquaculture in Vietnam is dominated by brackish-water and freshwater production systems. The Mekong River Delta accounts for about 80 per cent of the country’s total shrimp production. Silvo-aquaculture is an extensive farming method that incorporates mangrove forest in aquaculture ponds. However, poor culturing techniques, a lack of capital and mono-cultures make aquaculture farms prone to calamities that may lead to periodical loss of profit. To supplement their income, farmers therefore often collect natural resources from adjacent mangroves, causing their degradation. By promoting Best Management Practices for silvo-aquaculture as well as supporting Farmer Interest Groups along the Mekong Delta coast, the solution aims at both awareness creation for mangrove ecosystem conservation and diversification of farmers’ incomes. It promotes ecological farming techniques and the integration of mangroves in shrimp ponds.



Silvo-aquaculture farmer in Bac Lieu province

Through the application of Best Management Practices, the risks of crop failure and diseases are successfully reduced. Farmers’ incomes increase due to optimal species composition and non-aquaculture product diversification, juvenile selection, separated breeding and water control. The farmers are aware of the benefits of silvo-aquaculture, continuously improve these Best Management Practices and share them with others in neighbourly cooperation and farmer networks.

BUILDING BLOCKS Solution components for replication

53

**Ecological farming techniques**  
Integrated silvo-aquaculture that incorporates mangrove forest in mixed-species aquaculture ponds is optimized in model trials to identify Best Management Practices (BPM) regarding species composition and stock density, water management, nursing and mangrove conservation.

**Farmer interest groups (FIG)**  
Neighbouring farmers meet regularly and work together to share information and best practices on diversified aquaculture production, to buy seedlings economically in group orders, and to grant annual farmer loans financed by a FIG membership fee.

**Promotion of Best Management Practices (BMP)**  
BMPs are promoted via theoretical and practical on site trainings. Farmers use model trials to show case BMP and to exchange experiences.



Crab from species-mix aquaculture

This solution is being implemented by the Department of Agriculture and Rural Development (DARD) and the Bac Lieu Experimental Station for Aquaculture (BLESA) in cooperation with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB).



CO-MANAGEMENT OF MANGROVE FORESTS

54 SOLUTION

In large parts of Vietnam’s Mekong Delta the rapid expansion of shrimp farming and the cutting of mangroves for income generation have boosted local economies and reduced poverty in the last decades. But unsustainable use of natural resources and the loss of mangrove forests have started to show negative impacts: incomes are decreasing, poverty is increasing again, and vulnerability to climate change has risen.

This solution can lead the way out of this vicious circle by aligning environmental and economic interests. It uses a more sustainable management approach called co-management that is based on shared governance, responsibility and accountability among all stakeholders involved.

*Mr Huỳnh Lâm Biên, member of a co-management group in the Mekong Delta:*

Co-management has changed people’s attitudes towards both the environment and the authorities. *»Before co-management was applied, we were afraid of the forest rangers, now we work together with them to protect our forest and resources.«* The simple logic of this change: people who have the rights to use certain natural resources have a natural interest in protecting them. However, it’s not only the communities who benefit from this new approach, but also the authorities. They now need less manpower and financial resources to protect the environment.



Collection of resources in Au Tho B village

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55

Participatory consultation process

The basis for successful co-management is a participatory consultation process with all stakeholders – from government authorities to local resource users. Resource users are recognized as exclusive right-holders.

Pluralistic co-management board

Key stakeholders take all decisions jointly. The board is responsible for the overall steering and monitoring, for conflict resolution and, if necessary, for a revision and adaptation of the co-management agreement.

Co-management agreement

This formal agreement provides the legal framework for the protection and the sustainable use of mangroves. It defines who can do what, where, when, how and to which extent, including a zonation scheme.



Agreement of local people to join the co-management group of Vo Than Van village

This solution is being implemented by the Department of Agriculture and Rural Development of Soc Trang Province in co-operation with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).



COMMUNITY-INITIATED TRAO REEF LOCALLY MANAGED MARINE AREA

56 SOLUTION

Trao Reef in Vietnam’s Khanh Hoa province faces destruction as already observed at neighbouring reefs due to unsustainable fishing, pollution through lobster and black tiger shrimp aquaculture, and climate change induced effects. The open access system and lack of a national legal framework and coordination renders responsibility and accountability of stakeholders ineffective. Thus, livelihoods of most households are at stake.



MPA watch station at Trao Reef

**Dao Van Luong, Head of the Agriculture and Rural Development Office in Van Ninh District:**

» The recognition of the Trao Reef as a marine protected area is not only a great sense of accomplishment and encouragement for community members who have contributed to the area’s protection, but is also an example of effective



Raising awareness in Van Hung

The bottom-up participative and adaptive locally managed marine area (LMMA) of Trao Reef addresses environmental degradation, resource depletion, weakened management of coral reefs, and climate change adaptation for local fisherfolk. Based on the 2001 community request, the project, supported by the Provincial People’s Committee and the Center for Marinelife Conservation and Community Development, improved local ownership and management capacities as well as fish stocks.

co-operation among three sectors – the local community, state management offices at all levels, and civil society – towards the common goal of protecting the environment and marine resources for future generations.«

BUILDING BLOCKS Solution components for replication

57

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| <p><b>Requirement assessment</b></p> <p>Community and other stakeholders participate in all aspects of the management process. Enable community to conduct stakeholder consultation on LMMA zoning and management operations, using a 3D model of the site for visualisation.</p>               | <p><b>Establishing participative management</b></p> <p>Adopt co-management structure, including enforcement of regulations by joint patrols. Transfer ownership of LMMA to local governance. Ensure legal status and governmental funding.</p>   |
| <p><b>Ecological restoration and site implementation</b></p> <p>Establish no-take reef zone to prevent further loss of ecological values. Advance enforcement of LMMA regulations. Provide training for coral transplantation. Conduct regular under-water monitoring of resource recovery.</p> | <p><b>Fine-tuning site management</b></p> <p>Legalise LMMA at district and provincial levels. Implement a two-year management plan with regular revision, monitoring and reporting of all stakeholders. Include adaptive management of livelihoods and needs. Mobilise additional funding.</p> |

This solution is being implemented by Van Ninh district’s People’s Committee in Khanh Hoa province and the Centre for Marinelife Conservation and Community Development (MCD).



ECOSYSTEM-BASED COASTAL PROTECTION THROUGH FLOODPLAIN RESTORATION

58 SOLUTION

Along the mangrove-mud coasts of the Mekong Delta, erosion causes loss of land up to 30–90 m per year and affects the life of many thousands, often poor farmers and fisherfolk. The traditional response of building concrete dykes and seawalls does not work on the soft soils since the structures simply sink into the mud or collapse. In such situations, a coastal area protection strategy which combines floodplains (foreshore), mangrove forests and, where necessary, an earth dyke is the most effective solution. However, at sites where the foreshore and mangrove forest have been destroyed by erosion, such a strategy can only be implemented after restoration of the eroded floodplains. This will re-create the site conditions suitable for mangrove forest growth.



T-shaped fences in the provinces of Bac Lieu and Soc Trang

This solution restores floodplains and mangrove forests as elements of an ecosystem-based approach to coastal protection at relatively low cost. Developed for the Lower Mekong Delta’s muddy coast in Vietnam, it provides security for people living directly behind dykes and supports their livelihood through income from small-scale fishery and aquaculture in mangrove and floodplain ecosystems.

Mrs Sà Vọng from the coast of Soc Trang Province, Vietnam:

In the past, Mrs Sà Vọng and her family had a good life with catching fish, collecting clams and cockles in the mangrove forest and on mudflats in addition to income from her small fish pond. Then, the mangroves were destroyed due to many people having uncontrolled access to the fishing grounds. Her livelihood, like that of many others’, was



regularly threatened by floods inundating her gardens and house. The construction of T-fences and restoration of mangroves started in May 2012. »I am very happy as waves no longer reach the dyke, and my house is not destroyed by floods or strong wind.«

Boys fishing in front of the dyke in Nopol

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59

Numeric modeling of hydro- and sediment-dynamics

Understand and project natural forces which are shaping the shoreline in order to plan the optimal placement and design of breakwaters: (1) Use available field data to calibrate and validate numeric models. (2) Use projected hydro- and sediment dynamic conditions to determine feasibility and inform best design of breakwaters through boundary conditions derived from numeric modeling and placement of breakwaters.

Planning and construction of breakwaters

Field testing of the design verifies the strength of the natural material of choice – bamboo. Local people are informed of and engaged in the planned activity. With technical support, local people construct the breakwaters, in this case T-shaped fences. The long-shore parts break the waves and the cross-shore elements catch suspended sediments in long-shore currents.

Monitoring

Sediment accretion, natural regeneration of mangroves, and the state of T-shaped fences are monitored regularly. The natural recruitment of mangroves is documented by recording species, size and density.

Mangrove regeneration

Mangrove regeneration is supported by planting species which are suitable for the specific site conditions.

This solution is being implemented by GIZ’s programme Climate Change and Coastal Ecosystems Program in the Mekong provinces for the Adaptation to Climate Change (ICMP/CCCEP) on behalf of German Federal Ministries.

SUPPORTING THE DEVELOPMENT OF THE RESILIENT ECO-CITY HOI AN:  
THE CHAM ISLANDS MARINE PROTECTED AREA



Aerial of Cham Islands and Hoi An

The coastal city of Hoi An is flooded every year, incapacitating all economic and social life in the city. Typhoons destroy crops, buildings, homes, schools, and infrastructure – endangering people’s lives. Saline intrusion as well as coastal and riverbank erosion are serious challenges.

Hoi An officially aims to become a resilient eco-city by 2030. As part of the eco-city strategy, Hoi An established the Cham Islands Marine Protected Area (MPA). The MPA allows the city to regulate fishing activities and control pollution to protect species and marine resources. It furthermore helps to reduce coastal erosion through ecosystem restoration and supports the development of eco-tourism models to diversify local income sources, proving that environmental protection can also be compatible with economic growth.



Marking of a land crab

For the establishment of Cham Islands Marine Protected Area, an integrated and adaptive ecosystem management approach was applied by local people. Since 2006, the entire MPA is managed by a community organization. A community-based ecotourism home-stay program was developed, which provides job opportunities and improves local people’s standard of living. The recently established community-based land crab management programme was particularly innovative because residents agreed upon a protocol for sustainable management of the endangered land crabs. This programme has been enormously successful and has demonstrated the power of thoughtful and sustained community participation in environmental decision-making.

**Conducting formal risk assessment**  
The risk assessment and the creation of Biosphere Reserve criteria lead to the delineation of the MPA in accordance to ecosystem and community needs.

**Establishing local management infrastructure**  
A coordinating centre sets up the Cham Islands MPA zoning plan and regulation roadmap. It supervises monitoring, conducts research, public awareness raising and education, and coordinates development of management regulation and alternative livelihoods.

**Designing and zoning an MPA for climate adaptation**  
The MPA design followed an ecological systems approach to prioritize strictly protected areas, ecological restoration, tourism development, reasonable exploitation and development areas. Zone management allows for specific adaptive measures.

**Developing alternative livelihoods**  
The community-based eco-tourism homestay programme promotes socio-economic development and local income opportunities. The community-based land crab management programme promotes the sustainable exploitation of land crabs.

**Facilitating a co-management dialogue**  
The MPA management plan was developed using the co-management model including workshops and stakeholder meetings. Shared responsibilities and interests of the state, community, and stakeholders have been jointly identified.

**Enabling stakeholder-driven patrolling and enforcement**  
MPA patrolling teams coordinate between different stakeholders, border guards, local police, fishery inspectors and communities to manage the marine resources in accordance with provisions for fishing on coral reefs and seagrass beds.

This solution is being implemented by Cham Islands Marine Protected Area Authority.



WATER AND FIRE MANAGEMENT OF A PEAT SWAMP FOREST

62 SOLUTION

The conservation of *Melaleuca* trees has national priority in Vietnam because they buffer the effects of river floods, recharge aquifers and provide a unique environment for many wetland species of which a great number are endangered. The largest remaining stands of *Melaleuca* forest occur on peat soils – like in Vietnam’s U Minh Thuong National Park which is one of the country’s only two remaining peat swamp forests. However, from 2004 – 2009 the park’s *Melaleuca* trees and other species came under acute threat – mainly due to inappropriate artificial flooding to avoid fires.



Rich in biodiversity: U Minh Thuong National Park

**Mr Luong Thanh Hai, Director of the Kien Giang Department of Science and Technology:**

»Our new water management system that restores the wetlands to their natural condition through a system of gates, pump stations and canals and the new fire prevention system has helped us to bring the on going habitat and biodiversity loss in U Minh Thuong National Park to a halt. Plant species, including *Melaleuca* trees, are flourishing once again. Bird populations have increased by 33 per cent and nine new bird species have been recorded. Since we introduced our new management regime no major fires have been recorded which means we could also reduce the costs of firefighting extremely. There are also a number of positive social and economic impacts. To name but two: the park now provides a clean water source and supply of fish fingerlings into the waterways for about 10,000 people who live in the buffer zone.«

This solution introduces appropriate water and fire management in the park with the aim to recover its natural conditions. Today, 3,900 hectares of the park’s unique peat swamp forests are protected and biodiversity is on the rise again. There is even more good news: the park’s peat preserves 2.7 million tons of carbon and the introduction of co-management leads to less incidents of looting, poaching and infringements.

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63

**Multi-stakeholder workshop**  
Stakeholders from many different backgrounds discuss issues regarding biodiversity, water and fire management, and co-management for natural resources. The workshop group then decides on actions to be taken in the park and agrees on a reasonable timetable.

**Water management**  
Efficient water management schemes for an appropriate flooding of different soils in peat swamp forests are developed and implemented. This includes infrastructure and capacity training of park staff.

**Fire management**  
The newly introduced fire management includes the preparation of an investment plan, provision of adequate equipment and infrastructure for fire prevention as well as capacity training of park staff.



Park ranger helping a bird trapped in poacher’s trap

This solution is being implemented by the Kien Giang Department of Science and Technology in cooperation with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Australian Department of Foreign Affairs and Trade (DFAT).

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