

# Showcasing the Application of Ecosystem Approach to Fisheries Management: a case study in Nainang Village, Muang Krabi, Thailand

Panitnard Weerawat and Parnpan Worranut

The FAO Code of Conduct for Responsible Fisheries (CCRF) sets the principles and international standards of behavior and practices to ensure effective conservation, management, and development of living aquatic resources, with due respect for the ecosystem and biodiversity (FAO, 1995). As stated in the CCRF, “the purpose of the ecosystem approach to fisheries is to plan, develop, and manage fisheries in a manner that addresses the multiple needs and desires of societies without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems.” While specifically focusing on fisheries, the ecosystem approach to fisheries (EAFM) is concerned with the relationship between fishing activities and the ecosystem as a whole, including the social and economic implications, as well as management requirements. Moreover, it also considers non-target species, endangered species, minimizing waste and pollution, biodiversity, and welfare of coastal communities, small-scale fisheries and subsistence fishers. Overall, EAFM “strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within meaningful boundaries” (FAO, 2003).

An EAFM is a practical, participatory way to manage fisheries by continually striving to achieve a balance between ecological well-being and human well-being through good governance. FAO defines an Ecosystem Approach to Fisheries (EAF) as “an approach to fisheries management and development that strives to balance diverse societal objectives, by taking into

## Box 1. Key principles of an Ecosystem Approach to Fisheries Management

- Principle 1: Good governance
- Principle 2: Appropriate scales (across ecological, socio-economic, temporal, and legal/jurisdictional levels)
- Principle 3: Participation with stakeholder involvement throughout the planning and management processes
- Principle 4: Multiple objectives of different stakeholder groups
- Principle 5: Cooperation and coordination across sectors/groups/institutions and management levels (e.g. regional, national, provincial, municipal, and village)
- Principle 6: Adaptive management
- Principle 7: Precautionary approaches to ensure that management is able to address threats under conditions of uncertainty over time

account the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to management of fisheries within ecologically meaningful boundaries” (FAO 2003). It endeavors to plan, develop, and manage fisheries in a manner that addresses the multiple needs and desires of diverse stakeholders and the broader societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems (Garcia *et al.*, 2003; FAO 2003, 2012; Heenan *et al.*, 2015). EAFM includes seven key principles that are in line with the CCRF (**Box 1**).

## The Southeast Asian Fisheries Scenario

Most of the fisheries in the Southeast Asia region have declined, especially over the past 30 years. Conventional approaches to manage the target fish stocks and species in isolation from their supporting ecosystem have largely been ineffective and inequitable, and unable to address the challenges of complex multi-species and multi-gear fisheries as well as counter the impacts of illegal, unreported and unregulated (IUU) fishing. In addition, the reality that fisheries are dependent on ecosystems affected by both natural and anthropogenic factors is oftentimes ignored, considering the wide range of societal objectives for fishery resources and marine ecosystems among diverse stakeholder groups. Therefore, the need for more effective and equitable management that balances ecological well-being and societal benefits has become very evident in order to ensure the long-term sustainable uses of the fishery resources. Such management measures need to take into account good governance and ecosystem dynamics of which people are involved with very important roles in the management.

Since the ASEAN Member States (AMSs) are signatory to the 1995 FAO Code of Conduct for Responsible Fisheries which calls for the promotion of an Ecosystem Approach to Fisheries Management (EAFM), the AMSs also considered it important to promote the EAFM concept in the region, as demonstrated by their adoption of the ASEAN-SEAFDEC Resolution and Plan of Action on Sustainable Fisheries for Food Security Towards 2020 “Fish for the People 2020” (SEAFDEC, 2011). Specifically, Resolution (RES No. 6) encourages SEAFDEC and the AMSs to “*Implement effective management of fisheries through an ecosystem approach to fisheries that integrates habitat and fishery resource management aimed at increasing the social and economic benefits to all stakeholders, especially*

through delegating selected management functions to the local level and promoting co-management as a partnership between government and relevant stakeholders,” while Plan of Action (POA No. 8) directs SEAFDEC and the AMSs to “Accelerate the development of fisheries management plans based on an ecosystem approach, as a basis for fisheries conservation and management,” and (POA No. 10) to “Establish and implement comprehensive policies for an ecosystem approach to fisheries management through effective systems (i) to provide licenses to fish (boats, gear and people); (ii) for community fishing rights/rights-based fisheries; (iii) that provide for the development of supporting legal and institutional frameworks; (iv) encourage and institutional cooperation; and (v) that aid in streamlining co-management.” In this regard, SEAFDEC in collaboration with other regional and international organizations has promoted the EAFM concept in various ways to enable the AMSs to practice sustainable and responsible fisheries in their respective countries and across the Southeast Asian region.

## Piloting the EAFM Concept in Selected AMSs

With support from the Japanese Trust Fund (JTF), the SEAFDEC Training Department (SEAFDEC/TD) implemented the project “Human Resource Development for Sustainable Fisheries” in 2013-2019, to address the priority actions stipulated in the ASEAN-SEAFDEC Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020. Through this Project, the concept of an EAFM has been promoted in pilot sites in the AMSs, *i.e.* in Cambodia, Lao PDR, Myanmar, and Thailand. At the end of the Project implementation, key successes were achieved that include: 1) establishment of EAFM core team in the concerned countries; 2) integration of EAFM in fishery management plans at community level; 3) enhanced ability of EAFM core team to organize EAFM training courses in their respective countries; 4) strengthened capacity of fishery officers in conservation of the ecosystem; and 5) broader coverage of fisheries management in respective countries, *i.e.* the environment, stakeholders, alternative livelihoods, and governance. The lessons learned from the pilot sites are summarized below, with the impacts of the adoption of the EAFM concept in the pilot site in Thailand provided with more details.

### Cambodia

The implementation of EAFM in Cambodia started in 2017 with the training course on EAFM for officers of the Fisheries Administration (FiA) organized by SEAFDEC/TD. The pilot site was between Trapeang Ropov in Kampot Province and Prey Nup 2 in Sihanoukville Province (**Figure 1**), and co-managed by the two provinces. The fishery resources in the pilot site include fish, blue swimming crab, sea grass, blood cockle, and mangroves, and the major fishing gears operated by fishers are crab trap, mullet gill net, gill net, and push



Figure 1. EAFM pilot site in Cambodia (between Prey Nup 2 in Sihanoukville Province and Trapeang Ropov in Kampot Province)

Source: Google maps

net. The area also serves as habitat for endangered species such as dugong, sea turtles, and sea horses. Prior to the promotion of the EAFM concept, the pilot site in Cambodia was confronted with ecological issues and concerns, *i.e.* destruction of mangrove areas due to the operation of trawls in shallow waters and sea grass beds, coastal development, and aquatic pollution; as well as declining fishery resources because of the increasing number of fishers and rampant use of destructive fishing gears.

In human dimension, the fishers in the pilot site had been earning low income considering that the prices of fish are often dictated by middlemen, while fishers do not have alternative livelihoods to fishing, and their skills are inadequate to perform other jobs aside from fishing. In addition, fish processing and market facilities had also been inadequate. In terms of governance, law enforcement had been ineffective to reduce IUU fishing mainly due to insufficient budget to address the issues concerning IUU fishing, cooperation among stakeholders had been weak, and knowledge of fishers about the fisheries laws and regulations had been very limited. As a result, participation and capability of fishers in fishery resource management was very inadequate.

### Lao PDR

From 2015 to 2017, several training sessions on EAFM concept were conducted by SEAFDEC/TD for the fisheries officers in Lao PDR. The pilot site was in Aung Nam Kadun Reservoir established in 2001 in Paksan District, Bolikhamxay Province (**Figure 2**) with an area of 53 km<sup>2</sup>. The Reservoir is surrounded by seven villages, namely: Nasavanh, Pakadun, Phongnam, Thana, Nahouaphou, Phonesavang, and Hatxaykhoun. The total population of the seven villages was 4,139 involving 817 households and 232 fishers.





Figure 2. EAFM pilot site in Lao PDR (Ang Nam Kadun Reservoir, Paksan District, Bolikhamxay Province)  
Source: Google maps

Before the promotion of the concept of EAFM, the pilot site was confronted with several ecological problems that include declining fishery resources because of rampant destructive fishing practices (*e.g.* use of dynamite and poison (cyanide), electric fishing), frequent occurrence of flooding, and increasing number of fishers. In human aspects, fishers in the pilot site were faced with issues and concerns that include low income because of low fish catch and inefficient marketing system. In governance, the pilot site experienced insufficient human resources, ineffective fisheries regulations and management measures, and low awareness of communities on fisheries and management measures.

In an effort to address the said concerns, consultation meetings with local authorities and key stakeholders were convened by SEAFDEC/TD with the cooperation of the Department of Fisheries and Local Government of Lao PDR, resulting in the establishment of the Fisheries Management Committee (FMC). Meanwhile, the fisheries conservation zone (FCZ) in the Reservoir was also defined. The FMC mapped its plans that include installation of fish shelters in the FCZ using locally-available materials, promotion of fish stock enhancement in the Reservoir, as well as creation of alternative livelihood programs, *e.g.* fish culture and fish processing as alternative livelihoods. Nonetheless, the FMC would seek funding sources to be able to implement its plans.

### Myanmar

The implementation of EAFM started with the training course on EAFM organized by SEAFDEC/TD in 2015 in the pilot

site in Thahton Township, Mon State (**Figure 3**). This led to the establishment of the EAFM core team to facilitate the development of the Fisheries Management Plan.



Figure 3. EAFM pilot site in Myanmar (Thahton Township, Mon State)  
Source: Google maps

The pilot site was chosen considering the several issues and concerns that confronted the area. In the ecological aspect, the area had declining fishery resources due to overfishing; and in human well-being, the fishers had low income due to decreasing fish catch and low market price, while the fishers had limited technical knowhow in adding value to fish and fisheries products. Moreover, there had been ineffective enforcement of fisheries regulations while the fishers' awareness of fisheries regulations was very limited.

When the EAFM concept was promoted in the pilot site, establishment of the mangrove plantation farm was initiated by the fishers, the women's groups were established as means of promoting alternative livelihoods and one of their projects was the installation of fish drying racks. Meanwhile, the EAFM Handbook was translated into the Myanmar language and disseminated to all stakeholders for increased understanding of the EAFM concept.

As a result, the fishery resources of the pilot site had improved, as well as the socio-economic condition of the communities. The awareness of local people on the fisheries regulations had been raised. After the project implementation in the pilot site,

SEAFDEC was requested to conduct more EAFM trainings throughout the country.

## Promotion of EAFM in Nainang Village, Muang Krabi, Thailand

The pilot site was located in Nainang Village in Muang Krabi District, Krabi Province (**Figure 4**) where people's lives depend on the ecosystem. Located beside the sea, Nainang Village is host to people practicing eco-friendly careers, such as fishers, rubber plantation caretakers, and palm gardeners. The Village also has an environmental conservation tourist program which is managed and serviced by the local people. However, in this Village, there existed a conflict between groups of people, such as the bamboo stake traps operators and the mackerel gillnet fishers, over the concerned issues on the proposed dismantling of the bamboo stake traps, prohibition of illegal fishing gear, and the overlapping fishing areas that resulted in decreasing aquatic animal resources and small-scale fishers' income. When the EAFM concept was introduced to the pilot site, the existing fisheries management plan of the Village was redesigned according to the EAFM principles to encourage the stakeholders to participate in fishery resources management. As a result, the conflicting atmosphere had cleared out and the people understood the adverse impacts of illegal fishing gear on the fishery resources. The concerned stakeholders have also recognized the importance of the

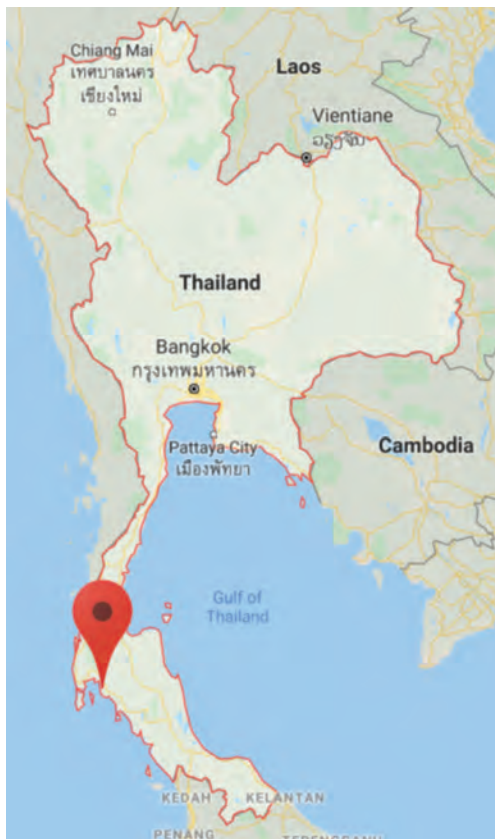


Figure 4. EAFM pilot site in Thailand (Nainang Village, Krabi Province)

Source: Google maps

Village's participatory fisheries management plan and are willing to take part in the implementation of the plan.

Furthermore, some programs that had been partly implemented by various groups were revised following the EAFM principles. These include programs spearheaded by the Ban Nainang Product Processing Group, Bee Farmers Group, Local Thai Dessert Group, Integrated Farming Group, Thai Souvenir Group, Garbage Ban and Tree Bank, and Environmental Conservation Tourist Group.

### Issues and Concerns

Enforcing a fisheries law (*e.g.* top-down management) to combat IUU fishing could not be an effective means of addressing the problems in the pilot site, especially that the use of illegal fishing gears had been rampant, the conflict between fishers using bamboo stake traps (**Figure 5**) and mackerel gillnets over the boundary of fishing grounds had escalated, and the operation of fishing gears had been overlapping beyond their designated areas of operation. It was in 1993 that the fishers came to recognize the fishery resource disaster that was happening in Ban Nainang community, *i.e.* the amount of resources had radically decreased that adversely affected the local artisanal fishers.



Figure 5. Bamboo stake traps considered as one of the illegal fishing gears in Nainang Village

Although the government sector attempted to address the problems, yet illegal fishing operations were still observed. After the core team of experts from the Department of Fisheries (DOF) of Thailand and SEAFDEC/TD promoted the EAFM principles in the Village, (*e.g.* increase participation, coordination, and precautionary approach), the issues and concerns have been dealt with successfully resulting in increased aquatic animal resources and clear atmosphere between the conflicting groups. More particularly, the issues and concerns grouped into ecological, human well-being, and governance (**Box 2**) had been addressed.



**Box 2. Issues and concerns that were encountered by the fisheries stakeholders in Nainang Village**

Ecological	Human well-being	Governance
Bamboo stake traps, which have high potential to trap every size of aquatic animals, were set along the coastal area that led to the decreasing number of aquatic animals	Fishers continue to get low income	Ineffective enforcement of the law, as the boundary of fishing area was not clear, while the fishing ground for the fishers operating the bamboo stake traps and the mackerel gillnet, was overlapping that led to conflict between bamboo stake traps and mackerel gillnet fishers

**Promotion of the EAFM Concept**

The EAFM concept was introduced in the Village to address the issues and concerns that confront the fishers. This involved capacity building to increase people’s participation, engagement, and coordination with key stakeholders, in decision-making process and setting up of a resource management plan. Through regular consultations, an agreement to comply with the fisheries law to combat IUU fishing was reached, and finally dismantling of the illegal bamboo stake traps was carried out. In addition, precautionary approach was adopted by designating the environmental conservation area for aquatic species, *e.g.* for blood cockles. Moreover, the regular organization of meetings and public consultations (**Figure 6**), and capacity building (**Figure 7**) led



Figure 6. Public hearing of stakeholders on dismantling of the bamboo stake traps along the coastal areas of Nainang Village



Figure 7. Engagement of stakeholders in developing the fisheries management plan based on the EAFM process

to enhanced knowledge and increased understanding of the related laws and community’s regulations, and strengthened the relationship between the groups of people in the Village. The overall result was increased amount and diversity of aquatic animal resources in the pilot site that led to increased income of fishers. The local fishing community set up a community project plan (**Box 3**) that was supported by funds from the Government.

**Box 3. Community project plan developed by the fishing community of Nainang Village**

- Area of conservation and rehabilitation for blood cockles: 10 rai
- Area of conservation and rehabilitation for wing shell: 50 rai
- Area of conservation and rehabilitation for mud crab and periwinkle: 500 rai
- Blue swimming crab bank: 2 branches
- Fish bank: 7 branches
- Fish stock enhancement program



**Conclusion and Recommendations**

Based on the experience in the promotion of EAFM concept in Nainang Village, strict law enforcement could not be immediately applied in any situation. The people should be allowed to adjust their mindset and attitude first before introducing any laws or regulations. Before interventions are introduced, it is necessary to know the whereabouts of particular communities, especially the community leaders, who would be tasked to acknowledge the problems that had been identified and who would serve as conduit to encourage the stakeholders to participate in the process of finding solutions to the problems. The success of EAFM promotion in Nainang Village could also be due to the long history of fisheries management implementation in Krabi Province that had already lasted for a decade. In the near future, the Provincial Government and DOF Thailand would extend and apply the EAFM concept to the whole Krabi Province.

Participatory stakeholders' engagement in co-management programs plays an important role in the promotion of the EAFM concept in Nainang Village, serving as basis of the adoption of the EAFM principles. This has made the application of EAFM in Nainang Village easy because the community plan developers just revised their fisheries management plans that have been implemented before. Changes were then made while other aspects were added following the EAFM framework.

## References

- FAO. (1995). Code of Conduct for Responsible Fisheries. Rome, FAO; 41 p
- FAO. (2003). Fisheries management – 2: The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries No.4, Suppl.2. Rome, Italy. <http://www.fao.org/DOCREP/005/Y4470E/y4470e00.htm> .
- FAO. (2012). EAF Toolbox: The ecosystem approach to fisheries. Rome. FAO; 172 p
- Garcia S., Zerbi A, Aliaume C, Do Chi T, Lasserre G. 2003. The ecosystem approach to fisheries: Issues, terminology, principles, institutional foundations, implementation and outlook. Rome, Italy

- Heenan A., Pomeroy R., Bell J., Munday P., Cheung W., Logan C., Brainard R., Amri A., Alino P., Armada N., David L., Rivera-Guieb R., Green S., Jompa J., Leonardo T., Mamaug S., Parker B., Shackeroff J., Yasin Z. (2015). A climate-informed ecosystem approach to fisheries management. Marine Policy Vol. 57, pp182-192
- SEAFDEC, 2011. Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020. Southeast Asian Fisheries Development Center, Bangkok, Thailand; 23 p

## About the Author

**Ms. Panitnard Weerawat** is the Senior Instructor/ Researcher of Training and Research Supporting Division and Special Department Coordinator of SEAFDEC/ Training Department in Samut Prakan, Thailand. Email: [panitnard@seafdec.org](mailto:panitnard@seafdec.org)

**Mr. Parnpan Worranut** is Fishery Biologist (Practitioner Level) under the Division of Fisheries Foreign Affairs, Department of Fisheries of Thailand. He was also appointed as EAFM national focal person for Thailand. E-mail: [parnpan.ffad@gmail.com](mailto:parnpan.ffad@gmail.com)