Cooperative Set-net Fishing Technology
for Sustainable Coastal Fisheries Management in Southeast Asia

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The current state of declining coastal fishery resources in the Southeast Asian region would require urgent mitigation measures aiming towards better management policies and technical solutions. Majority of the fishers in Southeast Asia are engaged in small-scale fisheries and operate in congested and limited fishing grounds racing after the limited resources, leading to the degradation of the resources and decreasing fish catch. Oftentimes, small-scale fisheries also come in conflict with commercial-scale fisheries especially those that operate the trawls and purse seines. Development of alternative approaches that could address the existing conflicts in the fisheries sector is therefore necessary in order to solve the real critical problems in fisheries. One technical approach promoted by the Southeast Asian Fisheries Development Center (SEAFDEC) is the transfer of the community-based Set-Net fishing technology.

In 2003, the SEAFDEC Training Department (SEAFDEC/TD) initiated the pilot project introducing the Japanese-type Set-Net as an environment-friendly and energy-saving fishing gear in Rayong Province, Thailand (SEAFDEC/TD, 2005). Funded by the Trust Fund Program of the Government of Japan, the Project facilitated the organization of the local small-scale fishers of Rayong Province to undertake the group operation with the collaboration of the Rayong-based Eastern Marine Fisheries Development Center (EMDEC) of the Department of Fisheries (DOF) of Thailand. In addition, the Project also availed of the technical support from Himi City of Japan under the Japan International Cooperation Agency (JICA) grass-root partnership program and TUMSAT under the Core University Program of the Japan Society for the Promotion of Science (JSPS) and the National Research Council of Thailand (NRCT). The activity envisaged that the lessons learned from the implementation of the pilot project can be applied to other coastal areas in Thailand as well as to other countries in Southeast Asia. Thus, through the adaption of the Set-Net fishing technology, sustainable fisheries management and resource conservation could be intensively promoted in the region.

Set-Net Fishing Technology

Developed in Japan (**Fig. 1**), the Set-Net is a passive type of stationary fishing gear which was first introduced in Thailand in 1953 (DOF Thailand, 1969), in Indonesia in 1956 (Zarochman, 2007; Arimoto *et al*., 2008), and in the Philippines where the successful transfer of the technology was reported in 1957 (Aguilar, 1989). Since then, several attempts have been made to transfer the Set-Net fishing technology in Thailand and Indonesia. However, technical and management difficulties as well as the reluctance of most fishers to take part in the Set-Net operations could have contributed to the repeated un-successful results of such efforts. This time, many fishers have started to recognize the importance of the technology not only for resource conservation but also as means of increasing their catch in terms of quantity and quality.

The re-introduction of the Set-Net fishing technology in Thailand in 2003 was aimed at promoting Set-Net fisheries as means of reducing pressure on the coastal fishery resources, alleviating competition among the fishing gear types, developing common policy concept on responsible coastal fisheries management, and raising the awareness of the community on the need to conserve the coastal fishery resources and fishing grounds. Moreover, the technology was also specifically considered as an immediate solution for the declining fish catch in the Gulf of Thailand and the Andaman Sea. The 30 x 150 x 250 meter Otoshi-ami type

Fig. 1. Set-Net fishing operation in Japan
(Source: Arimoto et al., 2008)

Fig. 2. Set-Net fishing operation in Rayong Province, Thailand (Source: Munprasit *et al.*, 2005)

(Inoue *et al.*, 2002) of Set-Net with non-return slope net and trapping chamber was installed in the 13-meter deep coastal waters off the Mae Rumpheung Beach in Rayong Province, Thailand. After which, the Set-Net fishing has been operated by a group of small-scale fishers who were organized in the project area to attain the objective of the project (**Fig. 2**).

While Otoshi-ami is recommended for open coastal fishing grounds, the Choko-ami type with a slope funnel entrance can be applied in shallower and calmer fishing grounds. In both Set-Net types, modifications of the gear design would be necessary to make the gear more appropriate for the target species in certain fishing ground conditions. The Set-Net can be installed in coastal fishing grounds giving due consideration to the environment, especially the biodiversity of the coastal areas (**Fig. 3**).

Impacts of Set-Net Fishing Technology

The most important impact of the Set-Net technology was demonstrated in the enhanced cooperation of the local small-scale fishers, especially that during the net-hauling operation which is mostly conducted at day time every two days, 9-15 fishers would be needed using 3-4 small-scale fishing boats (6 m long). From their involvement in the project, the members of the fishers group were able to enhance their knowledge on the basic concept of cooperativism by working together as a group, and at the same time also learned the concepts of sustainable fisheries and community-based management.

Sustainable Coastal Fisheries Management

The successful results of the pilot Set-Net project in Rayong had proved that the Set-Net fishing gear is environment-friendly. Specifically, the main catch consisting of trevally, sardines, mackerel, pomfret, and cuttlefish, did not include any trash fish and discards (Munprasit *et al.*, 2005). Moreover, since the Set-Net can be used as barrier for any active fishing gear in the coastal fishing grounds, it can specifically protect the bio-diversity of the coastal areas and promote the conservation of fishery resources (Ekmaharaj, 2007). Commercial fishing boats such as trawlers, purse

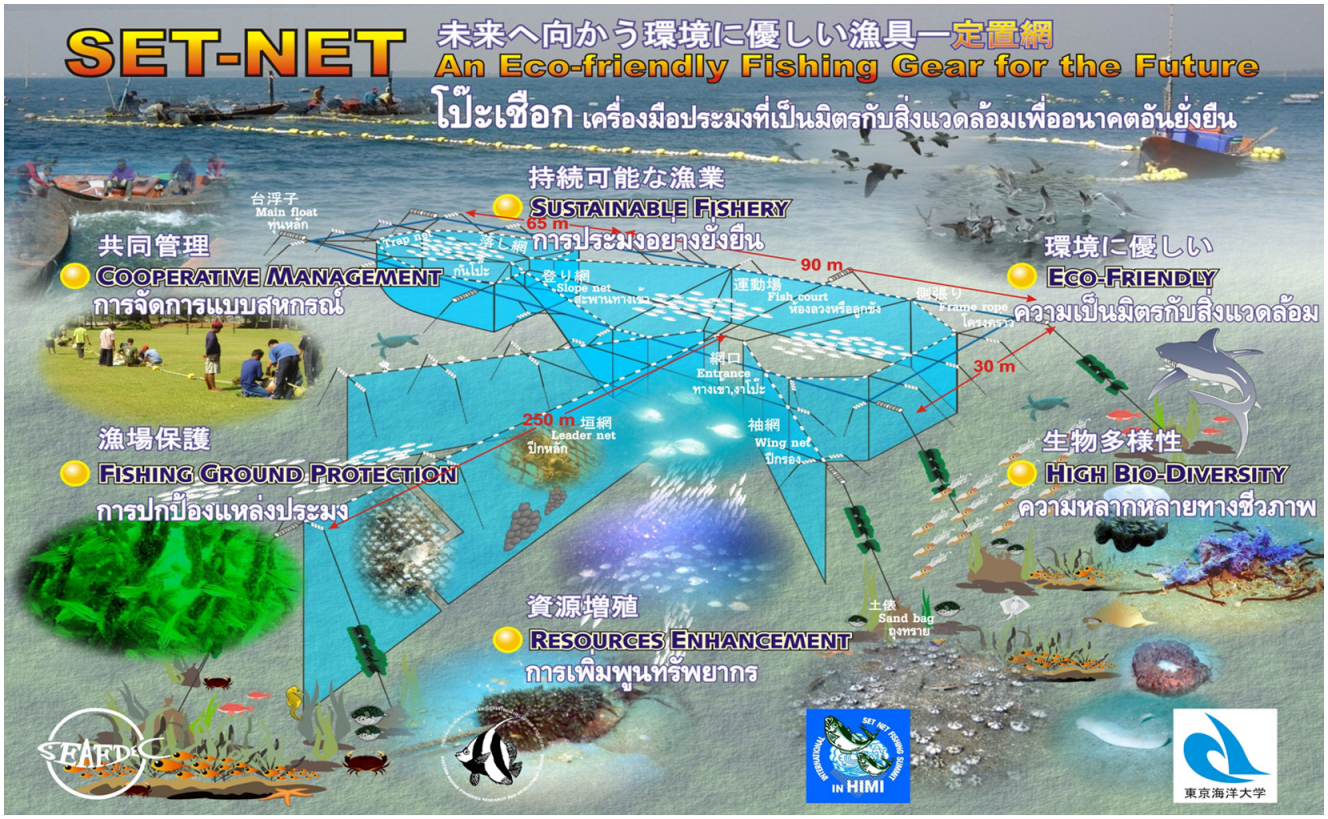

Fig. 3. The Set-Net fishing technology promoted by SEAFDEC/TD

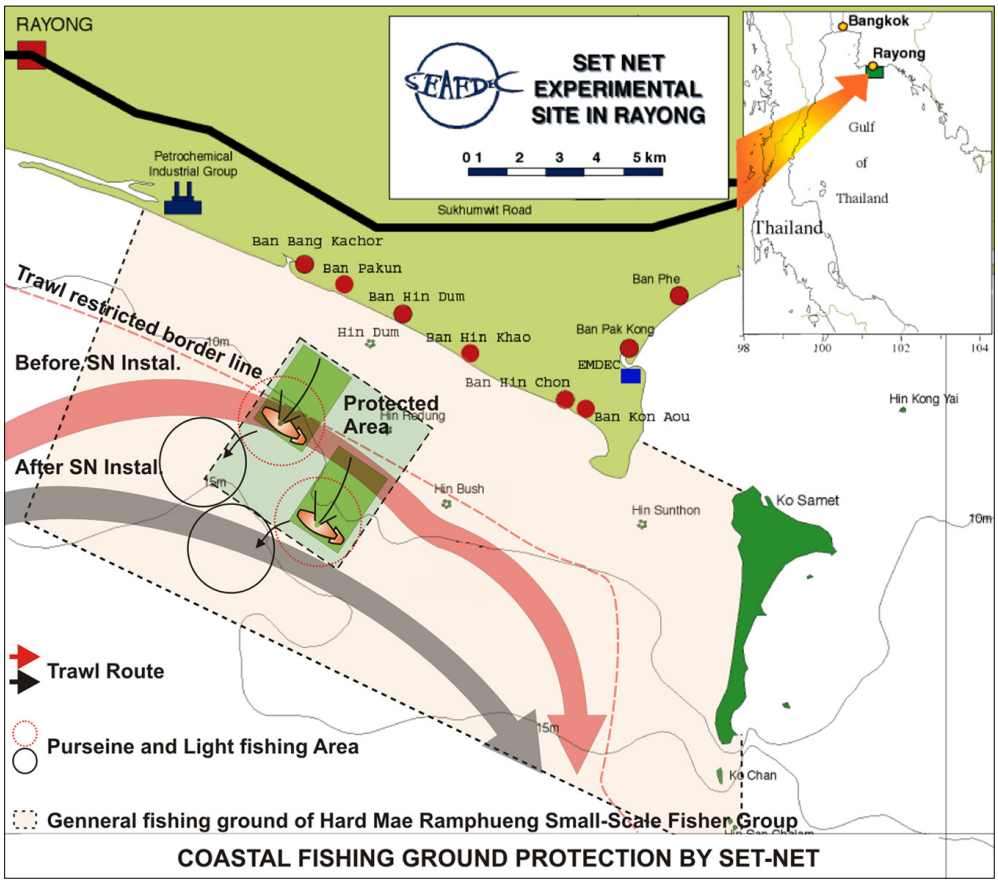

Fig. 4. Coastal fishing grounds could be protected by the Set-Net as confirmed in the project site

seiners, and light fishing gears could be kept at bay and away from the Set-Net area (**Fig. 4**). It can also pursue a stock enhancement function by creating certain zones not only for resources rehabilitation but also as spawning and nursery grounds of important aquatic species.

Group Participation and Capacity Building

The launching ceremony of the "Set-Net Experimental Project" in Rayong Province in July 2003 was attended by about 85 small-scale fishers and their family members from seven communities, where the concept of coastal resource management using the Set-Net was also presented and explained. As a result, the Administrative and Management Committee of the fishers group was organized to manage the Set-Net operation. During the implementation of the pilot project, cooperative management system was introduced gradually year by year, through the concept of group cooperation management of the fishery resources in coastal waters (**Fig. 5**). The daily operation of the Set-Net also served as capacity building especially in enhancing the fishers' awareness on the concepts of environmental and resource conservation, and in better understanding of the status of the fishery resources through the adoption of responsible fishing practices.

Economic Growth through Increased Income

As observed during the project implementation, the Set-Net fishing operation has contributed significantly to the economic growth of the beneficiary fishers group in Mae Rumpheung, Rayong Province. Firstly, the energy-saving aspect of the Set-Net fishing technology contributed to the reduction of fishing operation costs, especially in the current high-price oil crisis. The routine hauling operation is easy

Fig. 5. Cooperation and camaraderie had been demonstrated among the small-scale fishers in the Set-Net project site in Rayong Province

to undertake in shorter period of working hours at sea (2-3 hours/day). Since the Set-Net fishing operation is done in fishing grounds near the shore, there is no need to spend more time, effort and money for finding the schools of fish. Secondly, the additional income derived from the Set-Net fishing operation had been reserved as savings fund of the fishers group for future use.

As shown in their outputs between 2004 and 2009 (Fig. 6), the average catch per day-trip increased from 255 kg to 352 kg, and correspondingly the income per day-trip increased from Baht 5,000 to Baht 10,141 (SEAFDEC/TD, 2008; EMDEC/DOF, 2009). The good quality of the catch resulted in better unit-prices, while the efforts of the fishers group in improving fish handling techniques by using ice to keep the freshness of the fish and in advancing their marketing strategies that include managing their own market for specific customers at the beach side, resulted in the sustainability of the Set-Net technology.

Further Promotion of the Set-Net Fishing Technology

After the successful transfer of the Set-Net fishing technology in Rayong Province, Thailand, TUMSAT started a new project in Indonesia in 2007 under the JICA grass-root partnership program. The small-scale fishers in Pallette, Bone, South Sulawesi were organized to operate the Set-Net fishing with the cooperation of Himi City, Japan; and the Hasanudin University and Bone National Fisheries High School. The Otoshi-type of Set-Net was 20 x 110 x 200 meters and installed at the 13 m deep coastal waters in March 2008 after a gear modification especially its both-side chamber trap system. This model could be promoted further in Indonesia through extension services on community-based Set-Net and empowerment of the coastal fishing communities (Arimoto *et al*., 2008). While the project in Indonesia is in progress and would be continued until 2010, another project was also started in September 2008 by SEAFDEC/TD with the cooperation of Kasetsart University of Thailand in Sriracha in Chon Buri Province where the Choko-ami type gear was introduced. There is a great potential that the Set-Net fishing technology would be adopted in other countries in the region for sustainable coastal fisheries management.

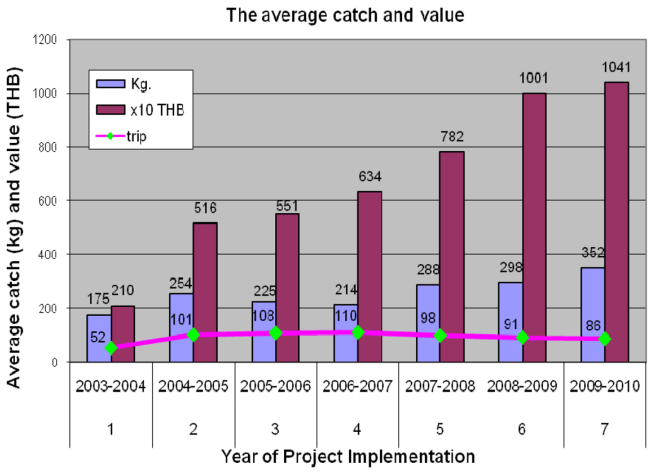

Fig. 6. Catch and income statistics of the Rayong Set-Net project

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