

the people's active participation in social activities, which helped in poverty alleviation in coastal villages.

Lessons from the community-based resource management system in Cu Lao Cham archipelago could be adapted for establishing new or managing other existing MPAs in Vietnam. Recommendations for the establishment of MPAs, based on the study, include the following:

- The establishment of MPA should strongly emphasize in reducing the vulnerability of poor families living in small fishing communities.
- Communities are encouraged to take full and active involvement in the management of the MPA through community-based organizations, integrated management and feedback mechanisms.
- MPAs should be focused on increasing awareness and understanding of marine resource protection and the role of the MPAs in enhancing sustainable livelihoods.

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Reducing the Impacts of Fishing Activities

on Coastal and Marine Environments in the Southeast Asian Waters: A Regional Synthesis

Worawit Wanchana, Bundit Chokesanguan and Virgilia Sulit

Many traditional fishing activities have been found to induce negative impacts on the coastal and marine environments as well as on the resources. In an effort to assess the extent of such impacts, SEAFDEC convened in January 2009 a workshop to address the concerns on the need to improve the designs and use of fishing gear in order to address the impacts of using such gear on the coastal and marine environments as well as mitigate sea turtle by-catch in fisheries. This article includes the initiatives of the Southeast Asian countries in reducing the impacts of fishing practices on the marine environments and resources.

Concerns regarding the effects of fishing on the marine and coastal environments have been seriously discussed worldwide. Guided by the policy framework on sustainable fisheries for food security, the Southeast Asian Fisheries Development Center (SEAFDEC) in collaboration with the SEAFDEC Member Countries and other relevant organizations had been “working towards the conservation and rehabilitation of aquatic habitats essential to enhancing fisheries resources” (Para 9: Resolution on Sustainable Fisheries for Food Security for the ASEAN Region 2001). In this regard, SEAFDEC has been promoting the development and adoption of responsible fishing gear and practices in the Southeast Asian waters that aim to minimize the impact of fishing to the coastal and marine environments (SEAFDEC, 2000 and SEAFDEC, 2003). Such initiatives by SEAFDEC have been demonstrated through the implementation of various activities that include a number of R&D activities on turtle excluder devices (TEDs), Juvenile and Trash Excluder Devices (JTEDs) as well as human capacity building on topics related to the use of selective fishing gear and devices and promotion of the concept on fisheries refugia (SEAFDEC, 2006).

Moreover, minimizing the incidental catch of threatened marine species such as sea turtles, dolphins and other species which could be included in CITES Appendix 1 and 2 is

also being promoted by SEAFDEC. In the Southeast Asian region, it is a fact that there is a dearth of information on the current status of sea turtles and the factors that led to their high mortalities, even considering that activities related to the collection of information of sea turtles mortality has been initiated and conducted through various initiatives. Considering such realities, SEAFDEC has also embarked on activities that assess the impacts of fishing on the sea turtle resource.

Reducing the Impacts of Fishing Activities in Southeast Asian Waters

Within SEAFDEC, reducing the impact of fishing to the environment and resources has been one of the major key issues in its activities that aim to boost sustainable fisheries development in Southeast Asia. In order to provide a forum for experts from Southeast Asia and Japan to exchange information and discuss activities related to the reducing the impact of fishing, SEAFDEC conducted the Regional Workshop on the Reduction of the Impact of Fishing in Coastal and Marine Environments in the Southeast Asian Waters in January 2009. In addition, discussion on the need to improve the various designs and uses of the fishing gear was also conducted while initiatives and efforts made by the countries in the region to mitigate the impacts of fishing on the coastal and marine environments were collated and summarized.

Brunei Darussalam

The country has been exerting efforts to reduce the impact of fishing in coastal and marine environments and address the concern on the over-exploitation of the country's marine resources especially the capture fishery resources that have started to show symptoms of fatigue from fishing. The country's activities include the adoption of JTEDs and mesh size regulation (51 mm² mesh at cod-end), and imposing a moratorium on the issuance of new licenses for demersal trawlers starting in 2000 as well as for small-scale capture fishing operations in Zone 1 (0-3 nautical miles). Through its Department of Fisheries (DOF), Brunei Darussalam continues to pursue its campaign in regulating capture fisheries in various possible ways one of which is the use of excluder devices not only for trawlers but also for other types of fishing gear to minimize the continuous capture of by-catch that includes the juveniles of commercially important fishes. Specifically, the "Moratorium" on fishing operations in Zone 1 area is aimed at giving opportunities for local fishermen dependent on the resources in Zone 1 to improve their livelihood, giving chance for the fishery resources to recover and be sustainable for a long period of time, reducing the pressure on the fish breeding and spawning areas that include the Brunei Bay (Teluk Brunei),

and ensuring that the exploitation of the fishery resources remains at sustainable level. The "Moratorium" involves transferring the operations of fishing companies with foreign fishers from Zone 1 to Zone 2 (3-20 nautical miles), suspension of licenses for new fishing gears that exceeds the allowable limit, and placing the new part-time fishermen and applicants in companies to Zone 2. In order to sustain such regulations, the DOF of Brunei Darussalam adopts strategies that include the gradual phasing out of trawl, mesh regulation by gear types, continuous monitoring of CPUE and fish production, and coastal area management. Moreover, the DOF stand on strict enforcement is being demonstrated through more vigilant actions of the appropriate authorities.

Cambodia

Reducing the impact of fishing on the coastal and marine environments in Cambodia covers a much wider scope of activities, such as: registration system for all kinds of fishing boats/gears, licensing system (for boats and fishing gears), elimination of trawling boats in coastal areas (area < 20 m-depth), establishment of a clear definition of "landing sites", and improving control and monitoring systems. In addition, a number of initiatives have been promoted that include: establishment of Community Fisheries (CF) in coastal areas, protection of the resources by defining the type of fishing gears and controlling the use of destructive fishing gears, rehabilitation of the degraded coastal resources and the ecosystems through a Management Strategy Plan which includes co-management of the fishery resources and fisheries conservation strategies such as the installation of artificial reefs, establishment of seasonal protected refugia. Furthermore, the Alternative Livelihood Program for Fishers has been promoted covering small-scale coastal aquaculture development, enhancement of post-harvest skills, integrated fisheries-livestock-raising and other employment skills. Moreover, the Development of the Coastal Area has also been promoted to advance not only industrial investments in the coastal areas but also recreational activities (resort and hotel industry) and ecotourism. In this connection, the Fisheries Administration of Cambodia has started to build the capacity of institutions and human resources of which the specific activities include information collection, management and analysis of fishery resources as well as further strengthening of its capacity in research, fisheries management, conservation and law enforcement.

Indonesia

Since the tidal traps are widely used in Indonesia, the possible replacement of the Tidal Traps with the Set Net has been considered since tidal traps also catch the juveniles of economically important fishes in addition to unwanted



Photo: Zarochman, 2009)

catch. This is part of the country's efforts in undertaking activities that are aimed at maintaining the fisheries habitat by minimizing habitual unsustainable fishing activities such as the use of tidal traps. There are two types of tidal traps (stationary fishing gear) commonly used in the country, namely: with leader net for catching various species of fish and without leader net used mainly to catch shrimps. Tidal traps with leader net or stake set-nets are operated at limited shallow waters close to the coastline during the tides while tidal traps without leader net are operated mainly during periods of rising tide and target mainly shrimps and fishes of various species and sizes. Tidal traps without leader net and without wings are operated in narrow straits or around estuaries. Being stationary, the stake set-nets operated in critical water areas also catch the small sizes of various fish species and thus, are considered menace to the fishery resources. Considering that the operation of tidal traps and tidal nets in critical water areas that serve as spawning, growing and nursery grounds of various marine species is unsustainable, measures are being undertaken to manage the resources with emphasis on the management of water resources and regulating the use the tidal traps or similar gears. An option being considered in the country is the promotion of the Japanese type of set-net to substitute the stick set net (tidal traps with leader net).

Malaysia

Malaysia had enforced regulations on the use of destructive fishing gear and practices, fisheries zoning, reduction of fishing capacity of trawlers in coastal waters, protection and conservation of critical areas, and protection and rehabilitation of destroyed habitats. Among the activities undertaken by the Department of Fisheries Malaysia include experiments on JTEDs, selection device for the Acetes Trawl (known as the Malaysian Acetes Efficiency Device or MAED), and assessment on the impact of "pukat buaya" (trawl net with large mesh size of wing). The MAED is designed to retain almost all of the Acetes in the cod-end which could pass through the slanting filter while most of the by-catch such as fish and jelly fish that could not pass through the filter are guided and released through a special opening. The filter is collapsible so it could be hauled in the net drum. The protection of the critical habitats is a major concern in Malaysia to ensure the conservation of the environment, including aquatic flora and fauna and their habitats, and natural breeding grounds like mangrove areas. This effort is being promoted through the Establishment of Marine Parks and Prohibited Fishing Areas. At present there are 40 marine parks in Malaysia, where habitat rehabilitation includes the installation of artificial reefs using used tires, junked vessels, and designed concrete structures which also serve as protection for habitats and breeding grounds for fish.

Myanmar

Myanmar focuses its efforts in the assessment of the impact of the trawl fishery production system on the environment and resources specifically on the hilsa and pomfret fishery resources. The country's efforts include the conduct of studies on the economic value of by-catch and discards as well as on the development of by-catch reduction technologies in collaboration with SEAFDEC, introduction of alternative fishing methods following the responsible fishing technologies and practices, promotion of the successfully developed by-catch reduction devices (BRDs) through training and extension services, and development of the necessary legal and management framework. In addition to the campaign on the use of TEDs and JTEDs in collaboration with SEAFDEC, management measures are also being advanced that include imposing closed season, restriction on mesh size, and banning of illegal fishing methods. However, the country still needs to strengthen its management measures to control fishing efforts and enhance its rehabilitation and conservation activities while regulations related to the reduction of impact of fishing activities and conservation in fisheries resources need to be strengthened.

Philippines

In the Philippines, Republic Act No. 8550 also known as the Philippine Fisheries Code of 1998 covers policies related to the utilization, management, development, conservation and allocation system of fisheries and aquatic resources as well as establishment of Municipal and Commercial Fisheries. Specifically, the policies also provide that municipalities and city governments have jurisdiction over municipal waters (0-15 km), define the role of the FARMCs (Fisheries and Agriculture Resources Management Centers) in the enactment of ordinances, and authorize the local government units (LGUs) to enforce fishery laws and regulations. Moreover, the policies also specify the provisions on vessel licensing and registration, registration and licensing of fishing gears, incentives for fishing further into the EEZ and also the implementation of the Philippine Management Plans such as the Tuna Management Plan that regulates the tuna purse seine mesh size, limits the number of fish aggregating devices (FADs) and monitors fishing vessels; the Sardine Management Plan that includes control of fishing capacity, effort, season, areas, and catch of immature fish; and the Comprehensive National Fisheries Industry Development Plan.

Thailand

Focus has been made in Thailand to regulate the use of light fishing and collapsible crab traps (**Box 1**) as these practices are known to have impacts to the environment and marine waters as well as also regulating the use of clam dredging gear. Furthermore, Thailand collaborated with SEAFDEC/TD to explore various alternative energies for fisheries that include the use of sail for fishing boats and natural gas in order to reduce the impact boat engines and fuel to the environmental as well as the effect of increasing cost of fuel on the fishers. This is also considering the fact that the use

of wind energy for fishing boat could replace the energy requirement for engine boats while natural gas could also be used for fishing vessels. Moreover, Thailand also promoted the use of the Set-Net fishing technology for sustainable coastal fisheries management which was started in Rayong Province. The technology was transferred later to Chonburi Province (Thailand) and Bone in Indonesia, and perhaps later to other Southeast Asian countries.

Vietnam

The fishing vessels in Vietnam are small and operate in inshore areas, and most fishing fleets are traditional and lack of modern fishing equipments. In the midst of such constraints, Vietnam is exerting efforts to reduce the impacts of fishing on the coastal/marine habitats as reflected in Decision 10/2006/QĐ-TTg dated 11 January 2006 of the Prime Minister specifically the approval of the comprehensive master plan of fisheries sector by 2010 and orientation by 2020. Moreover, Government decree no. 123/2006/NĐ-CP dated 27 October 2006 provides the management of fishing activities of organizations and individuals in Vietnam's seawater areas. Moreover, Vietnam is monitoring the use of deep gill net that catches the Manta Ray (CITES species) and is enhancing its efforts in reducing the impact of fishing activities especially in the marine protected areas through the development and adoption of JTEDs, among others.

Reducing the Impacts of Fishing Practices: The Case of Japan

In Japan, various types of light fishing are practiced specifically for angling gear (*e.g.*, squid jigging, pole and line, hook and line) and net gear (*e.g.*, scoop net, stick-held lift net, purse seine). Different light intensities are used in different fishing grounds targeting a number of marine

Box 1. Light fishing and use of collapsible crab traps in Thailand

Light Fishing. In the upper Gulf of Thailand, light fishing is one of the most common operations adopted by the fishers believing that increasing the light sources could aggregate more fishes. The fishers are not aware that increasing the light source could lead to increased investment costs especially with the current increase in fuel prices. Fishing lamps such as incandescent lamps, metal halide lamps or fluorescent lamps are commonly used with fishing gears, *e.g.* surrounding net, lift net and falling net. However, the total radiant energy from the light source loses half of its value in the half meter depth of seawater, owing chiefly to the strong absorption in the infrared and of the suspended particles. Specifically in the upper Gulf of Thailand, the level of suspended particles is reported to be dense near the river mouth and coastal areas but decreasing in the offshore areas. Moreover, results of the study which considered the impacts of anchovy and squid light fishing on the coastal and marine environments including the color and intensity of the light, especially on the biodiversity (by-catch), indicated a form of light shock reaction behavior in anchovy and light detection by squid. The results therefore suggested that anchovy and squid light fishing which use white color of light could impact the coastal and marine environment in terms of by-catch. Therefore there is a need to develop regulations for light intensity and color for anchovy and squid light fishing that are being operated nearshore.

Collapsible crab traps. Results of the survey conducted by DOF Thailand and SEAFDEC/TD in the eastern part of Thailand (Rayong, Chantaburi and Trad Provinces) indicated that collapsible crab trap operations had little or no direct impact to the fisheries resources. However, in order to mitigate the impact of such fishing activity, SEAFDEC/TD suggested that the cover mesh size of the traps operating near the shoreline should be enlarged. In addition, zoning to limit the operation of the collapsible crab traps used by commercial boats should be initiated and regulations on large mesh size traps for inshore operations should also be imposed. On the other hand, considering that abandoned crab pots and traps could induce ghost fishing, efforts should be made to collect all crab traps that have been used in previous fishing operations.

species. Research studies on catch comparison among the different light outputs have been conducted including the analysis of fishing efforts and catch, underwater light intensity, and monitoring the capture processes. The impact from light fishing could include lighting power competition (effect to other boats in a congested fishing ground and to small-scale fisheries in the coastal areas), cost impact due to high fuel consumption, environmental impact due to CO₂ emission, and biodiversity impact (non species/size selective as in the case of purse seine).

Research studies have also been conducted to evaluate the impact of light fishing which includes monitoring of underwater light intensity, understanding fish responses to light, and comparative experiments with different lighting outputs. In addition, reducing the light output has also been explored using LED (light emitting diode) for squid jigging boat and for the underwater lamp of purse seine. Thus, the technology of light fishing that should be disseminated to the other countries could include: (1) optimum lighting technology; (2) reasonable cost for initial investment and fuel consumption; (3) clever light fitting for fishing boats and gear; (4) clever light fitting for target species and size; and (5) promotion of user-friendly technologies.

Regional Network for the Reduction of the Impact of Fishing in Coastal and Marine Environments in Southeast Asian Waters (IFCOME Network)

In line with the efforts of the ASEAN Countries to reduce the impact of fishing practices to the coastal and marine environments, the establishment of the IFCOME Network has been proposed to facilitate the sharing and dissemination of information on programs and initiatives related to the reduction of the impact of fishing, and monitor the developments to be used as basis in improving the design of fishing gears and promotion of responsible fishing practices. The main role of the IFCOME Network is to provide information and recommendations that could contribute to: (1) improving the current fishing gear technology and its actual practices to reduce the impacts from fishing activities; (2) enhancing inter-agency and inter-sectoral coordination at the national, regional and international levels for achieving sustainable fisheries management and development in the Southeast Asian region through proper development of fishing gear technologies and practices; (3) strengthening regional cooperation on R&D, technology transfer, and resources capacity building on the issues related to reduction of impact of fishing practices; and (4) widening the network of people, government, organizations for reducing the impact of fishing practices to the coastal and marine environments.

Status and Trends of Sea Turtle Interactions: Degree of Risks each Fishery Poses to Sea Turtles

SEAFDEC has been conducting studies aimed at mitigating the interaction and reducing the mortality of sea turtles due to fishing, which include the development and application of the turtle excluder devices (TEDs) and assessment of the efficiency of the Circle Hook compared with the J-hook in long-line fishing. Technical consultations on the progress of the initiatives in reducing sea turtle mortalities from fishing have also been conducted while production of information packages and conduct of awareness building campaigns on the conservation and management of sea turtles has been enhanced. The impact of trawling on sea turtles has also been monitored to establish the necessary management measures for the conservation of the sea turtles. SEAFDEC also implements activities related to the inter-nesting habitat of sea turtles in Southeast Asia focusing on satellite telemetry study and tagging of sea turtles with the main objective of gathering information on the migration pattern of sea turtles in the region. Results have shown the inter-nesting habitat, *i.e.* the area and period where the occurrence of sea turtles, are very closed to shore and that small scale/traditional fishing gears could cause high potential mortalities on turtles. Moreover, the use of traditional gears such gill and drift nets are among the major fishing activities in the inter-nesting habitat in the region while mini trawls have also been reported to be possible threats to the sea turtles in the inter-nesting habitat. Furthermore, the use of stow-net which is a popular fishing operation in the inter-nesting habitat of sea turtles (particularly in Myanmar) could also cause mortalities on sea turtles. In this connection, SEAFDEC suggests that innovations in the gear technology should be enhanced in order to minimize sea turtle mortalities in the region's sea waters.

In a related activity, in Indonesia an onboard observation program on shrimp trawlers and bottom long-line demersal fishing boats is being carried out to observe the impact of fishing operations on sea turtles as well as on the promotion and implementation of circle hook for long-line fishing. On the other hand, the results of the Rapid Assessment of By-catch in Sabah (Malaysia) indicated that by-catch from fishing operations includes the sea turtles, dugong and assorted cetaceans. In Thailand, an Act has been legislated concerning sea turtles conservation.

Furthermore, SEAFDEC is also conducting a study to investigate the impact of fish aggregating devices (FADs) on sea turtle mortality in the Eastern Indian Ocean. FADs are usually installed to lure tuna and other fishes but sometimes the FADs endanger the marine species such as sea turtles that could be entangled especially in the drifting

FADs (DFADs). In view of such developments, SEAFDEC raised some considerations on the use of FADs that include: abandonment of FADs in the oceans should be prohibited, the net materials used to construct the DFADs should be modified, and that the use of small mesh size nets and large twines for the FADs should be promoted. Moreover, the use of coconut leaves for the FADs could also be considered.

Considering that the following fishing practices could bring about negative impacts on the coastal and marine environments especially in the Southeast Asian waters, namely: (1) light fishing; (2) use of stationary gears (*e.g.*, tidal traps, stow-net, fyke net, Japanese set net, muro-ami, choko-ami, etc.); (3) use of active gears (*e.g.*, trawls, dredge, push net, etc.); (4) use of semi-passive gear and small-scale fishing gear (*e.g.*, pot, gill net, etc.); (5) long-line fisheries; and (6) purse seine operations associated with FADs, actions have been proposed to mitigate such impacts (**Box 2**) at the regional and national levels. Moreover, the action plan for

Summary Recommendations and Follow-up Actions

Box 2. Regional Action Plan for the Reduction of the Impacts of Fishing on the Coastal and Marine Waters in Southeast Asia

Gear Type	2009 Action Plan	Three-Year Action Plan	Final Goal
Light Fishing	<ul style="list-style-type: none"> Survey of present status of light fishing in Southeast Asia for each target/gear/area (already initiated in Thailand, to be conducted in Indonesia and Malaysia under JTF) Literature review on status of light fishing in Southeast Asian countries Regional expert meeting for setting the research project framework (Oct or Dec @ KU) Technical meeting on light fishing technology 	<ul style="list-style-type: none"> Collaborative research programs on fishing technology, such as: <ul style="list-style-type: none"> Visual Physiology Optical Oceanography Monitoring of fish response Socio-economics Optimum lighting in fishing Saving energy of light Develop best practices Draft appropriate policy Transfer technology 	<ul style="list-style-type: none"> Optimization of lighting output for specific target/gear Preparation of technical/management manual Development of appropriate policy for Southeast Asia Reduction of social and resource use conflicts, and promotion of zoning
Stationary Gear, such as : Tidal Trap Stow/Fyke net Japanese type Set-net Otooshi-ami Choko-ami	<ul style="list-style-type: none"> Develop technical/management manual on Japanese Set-net Establish regional expert network on set-net in order to promote further extension of set net technology in the region according to national request Implement pilot project on set net in Southeast Asia (Indonesia and Malaysia) Assess the impact of tidal gears (traps/stow nets, tidal nets) in Southeast Asia Regional expert meeting to report progress on set-net in Thailand and Indonesia (Oct or Dec @ KU) 	<ul style="list-style-type: none"> Disseminate and promote the manual (model net plan) in some Southeast Asian countries Capacity building of set net experts Develop best practices for stationary gears Implement Extension Phase through a SEAFDEC Regional Training Course for trainers Facilitate the conduct of National Training Course for fishers 	<ul style="list-style-type: none"> Adoption of stationary gears based on best practices Publication of manual on best practices for stationary gears Transfer and adoption of the Japanese Set net as alternative gear in selected coastal areas in the region
Active Gear, such as: Shrimp/Fish Trawl Dredge Push net	<ul style="list-style-type: none"> Develop strategy on implementation of the use of JTEDs in Southeast Asia Evaluate and assess the adoption of JTEDs in the Southeast Asian region (Philippines and Indonesia) Develop observer program for active gears Further study on the impacts of dredge, push net, etc. operated in coastal areas 	<ul style="list-style-type: none"> Develop best practices for JTEDs, etc. Develop Policy Recommendation on the use of dredge and push net in coastal areas 	<ul style="list-style-type: none"> Adoption of JTEDs based on best practices Adoption of Policy Recommendation on the use of dredge and push net
Small-scale Gear such as: Gill net Pot/Trap	<ul style="list-style-type: none"> Assess the impact of small-scale gears (<i>e.g.</i> gill net, pot, trap) to marine bio-resources and marine mammal by-catch Conduct R&D on mitigation measures for ghost fishing and non-selective gears (<i>e.g.</i> gillnet) 	<ul style="list-style-type: none"> Promote and implement solution (management) models for small-scale gears Develop strategy on mitigating impacts of gillnet fishing of marine mammal by-catch Awareness building on use of non-selective gears in critical habitats 	<ul style="list-style-type: none"> Strategy on mitigation of marine mammal by-catch in small-scale gears (non selective gears)
Longline	<ul style="list-style-type: none"> Develop strategy on the adoption of Circle Hook in longline fishery Promote best practices for longline fisheries Develop strategy for market incentives 	<ul style="list-style-type: none"> Secure reliable supply of appropriate hooks Implement onboard observer programs in relevant Southeast Asian countries 	<ul style="list-style-type: none"> Adoption of Circle Hook in longline fishery Improved information base on longline fisheries Increased demand for sustainably caught tuna
Purse seine operation associated with FADs	<ul style="list-style-type: none"> Conduct inventory survey on FADs (DFADs or Fixed FADs) deployed in Southeast Asian waters Assess the impact of Fixed FADs to tuna stocks Improve DFADs to reduce marine mammal by-catch 	<ul style="list-style-type: none"> Conduct awareness building on the loss of D-FADs and on the use of Fixed FADs in purse seine fisheries Develop recommendations and best practices for D-FADs and Fixed FADs 	<ul style="list-style-type: none"> Recommendations and best practices for D-FADs and fixed FADs

Box 3. Alleviating fisheries and sea turtles interactions

2009 Action Plan	Three-Year Action Plan	Final Goal
<ul style="list-style-type: none"> • Conduct awareness/educational programs targeting the fishers and students on the conservation of sea turtles and other endangered species • Regional Technical meeting on sea turtle enhancement and fishery-sea turtle interaction including poaching of sea turtles by MFRDMD • Assess the risk areas in sea turtle-fisheries interaction and identify gear risk to sea turtle mortality 	<ul style="list-style-type: none"> • Conduct experiment on the improvement of fishing gears and methods (such as gill net, set-net) to reduce sea turtle by-catch • Implement regional program on research and management of foraging habitats of sea turtles in the Southeast Asia • Develop recommendations on the management measures to reduce the sea turtle by-catch in the Southeast Asian region 	<ul style="list-style-type: none"> • Adoption of fishing gears and methods (such as gill net, set-net) to reduce sea turtle by-catch • Implementation of regional program on research and management of foraging habitats of sea turtles • Recommendation on the management measures to reduce the sea turtle by-catch in Southeast Asia

Box 4. Proposed operationalization of the IFCOME Network

2009 Action Plan	Three-Year Action Plan	Final Goal
<ul style="list-style-type: none"> • Conduct impact/risk assessment for awareness building in critical habitats (SEAFDEC) • Develop best practices to mitigate the impact of fishing gears • Establish the IFCOME Network • Source funds at regional/ national levels • Conduct Nature-Harmonized Gear Competition for enhancing the R&D for impact reduction 	<ul style="list-style-type: none"> • Enhance awareness through training programs on impact of fishing activities to critical habitats • Implement/communicate through the IFCOME Network 	<ul style="list-style-type: none"> • Awareness building on impact of fishing activities to critical habitats (SEAFDEC) • Adoption of the best practices to mitigate the impact of fishing gears • Regional Network IFCOME established

alleviating the interaction of fisheries with sea turtles has also been developed for consideration by the countries in the Southeast Asian region (**Box 3**). At the regional level, the establishment of IFCOME Network could provide the necessary link for the exchange of information by the countries in Southeast Asia (**Box 4**).

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