

**Box 15. Ways and means of reducing the use of fossil fuel in fisheries (Cont'd)**

**Modification of fishing gear and methods**

The amount of fuel used to catch and land a metric ton of fish varies greatly with the type of fishing gear and methods as well as the fish resource including the distance to fishing grounds. The strength of the fish source (good fishing grounds) is of major importance in terms of fuel use. A poor resource or poor fishing ground means more fuel used per metric ton of fish landed.

**Alternative fuel use**

Alternative fuels to petro-diesel include bio-diesel, LPG, LNG, CNG, ethanol, and hydrogen. A right choice of fuel may reduce fuel costs and improve business liability, as well as reduce greenhouse gas emission. This issue could have a bearing on the net cost of converting an alternative fuel (Sterling and Goldsworthy, 2006).

**Alternative energy use**

Utilization of alternative energy relates to moving away from the use of chemical energy in the form of fuel and the conversion of the heat of combustion into mechanical work using a heat engine. Among the alternatives that have practical possibilities are wind, solar, and wave energies. However, there are two issues related to harnessing such energy, namely: collection and conversion of the energy to more usable form and storing the energy until it is required in fishing operations. For all these forms of energy, it seems unlikely that either or all of them combined would be able to satisfy the total energy demand of a typical fishery operation at least in the foreseeable future. Nonetheless, utilization of both wind and solar energy in fishing could be easily conceptualized based on the already proven and well-known technologies, although the practicalities and performance of such systems on fishing boats would depend on the exact application of the correct or emerging technologies used. Nevertheless, the utilization of wave energy could not yet be easily conceptualized as of the moment.

*Source: Chokesanguan, 2011*

It is therefore necessary for the fishery sector to explore and adopt energy saving technologies and practices that reduce reliance on fossil fuel and eventually achieve improved national financial economy. Toward this end, fuel and energy source alternatives should be identified while R&D on environment-friendly and efficient capture technologies should be pursued. Projects have already been initiated in the Southeast Asian region concerning measures to reduce fossil energy dependence in capture fisheries. There are many ways of reducing the use of fossil fuel in fisheries and fishing operations as shown in **Box 15**.

Involvement of and awareness-raising in addressing issues on energy use in fisheries, especially on the part of the private sector, should continue to be enhanced with the objective of reducing the use of fossil fuels in fishing operations. Meanwhile, relevant programs should be promoted in collaboration with concerned institutions including the academe, NGOs, research institutions, especially in developing advocacies relative to minimizing the contribution of fisheries to climate change.

#### **5.4 Community-based Fisheries Management Approach**

The coastal and inland areas of Southeast Asia provide the means of livelihood to coastal and inland dwellers, where hundreds of thousands of coastal and inland families are directly engaged in fishing activities and aquaculture including related activities such as fish processing, marketing, boat building, and net making, among others. The fishers' overdependence on the coastal fishery resources without appropriate resource management, however, leads to overexploitation and degradation of the resources. Conflict on the multiple-use of the resources also threatens the livelihoods of dwellers in coastal

fishing communities. In addition, communities have to pay more for fuel, food, and services, while the income generated from their production activities remains low. Unsustainable utilization of the fishery resources by coastal dwellers is one of the reasons that drive fishers in coastal communities to continuously intensify their fishing efforts to sustain their livelihoods.

Confronted with degrading fishery resources and without having any knowledge of appropriate resource management, coastal dwellers have to cope with low living standard and poverty. Considering that many fishing communities are outside of any social safety net systems that may exist in other areas of a country, it has become urgent to strengthen community fisheries organizations and build capacity for better development and management of the coastal and inland fishery resources and sustain the livelihoods in coastal communities. It is indeed important that appropriate coastal resource management and stable alternative livelihoods should be put in place.

Appropriate resource management is an indispensable activity that keeps fishery resource utilization sustainable. Autonomous resource management by community fishers' groups is the most effective and efficient way rather than the top-down management of coastal and inland fisheries by the government. However, community fishers alone can hardly establish and implement community-based resource management (CBRM) without governments' support and initiative.

In 2014, the ASEAN Regional Workshop for Facilitating Community-based Resource Management in Coastal and Inland Fisheries was organized in Phnom Penh, Cambodia to review the national activities on fishery resource management in coastal and inland fisheries, and share the

results of case studies that could be used in identifying the key factors for improvement of national resource management plans and their successful implementation. Results of the Workshop indicated the need to ensure that legal and policy frameworks should clearly indicate the roles, responsibilities, and fishing rights of resource users, government, and concerned stakeholders. Moreover, the fishery resource boundaries should be clearly defined, and that the communities should have their respective active and responsible leaders. Furthermore, the Governments should provide access to legal and policy frameworks in support of the establishment of CBRM and rights-based fisheries as well as technical and financial support to enhance the adoption of CBRM by resource users and fisheries officers. The fishery resource boundaries should be clearly defined to ensure effective management of fisheries by the fishing communities. Community members, resource users, and stakeholders should be encouraged to actively participate in the implementation of CBRM and that their knowledge should be enhanced to make them fully aware of their rights.

#### **5.4.1 Co-management/ Community-based Fisheries Management**

Since its establishment in 1967, SEAFDEC has been extending technical support to the AMSs to enable the countries to attain sustainability in fisheries and contribute in enhancing the contribution of fisheries to food security in the Southeast Asian region. However, everything did not seem to come along fine since regional concerns over the unsustainable fisheries practices had impacted the fish supply for food security of the people in the region. For this reason, the ASEAN and SEAFDEC organized the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security in the New Millennium “Fish for the People” in November 2001 where the ASEAN-SEAFDEC Ministers adopted the 2001 Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region. In a span of ten years, the AMSs have made significant strides in the implementation of the 2001 Resolution and Plan of Action, but efforts of the countries had been hampered by a number of emerging issues brought about by the changing environment not only because of climate change but also changes in the requirements for trade of fish and fishery products. Such changing scenario therefore called for the conduct of a sequel Conference, the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 “Fish for the People 2020: Adaptation to a Changing Environment”.

Important fisheries-related issues and concerns were discussed during the sequel Conference, one of which focused on Enhancing Governance in Fishery Management which included Co-management as a sub-theme. Results

from the discussions led to the establishment of the Resolution and Plan of Action for this particular sub-theme, to wit: 1) *Adopt co-management at all levels and with all relevant stakeholders in the process of planning and policy formulation for management, conservation and rehabilitation of habitats and protective geographical features, as well as policy formulation on the use and management of natural and human resources to ensure that climate change responses are integrated into fisheries policy frameworks;* 2) *Strengthen the capacity of fisheries communities and the capability of fisheries related organizations, NGOs and the private sector to better implement necessary actions towards enabling the communities and local organizations to increase resilience, improve livelihoods, alleviate poverty, adopt alternative livelihoods, adapt to climate change in support of achieving sustainable development, and encourage the participation of women and youth groups in the process;* 3) *Enhance and promote the participation of local communities, fisheries associations and other stakeholders in fisheries management and co-management. In addition, communities should take part in fisheries and stock assessments by providing data, local ecological knowledge, and status of the stocks; and 4) Raise awareness of the need to develop financial incentives, especially for small-scale stakeholders and cooperatives, e.g. micro-credit, with national and regional institutional assistance for the responsible development of fisheries enterprises and developmental activities that will optimize socio-economic returns and food security.*

With financial and technical support from donors and collaborating agencies, SEAFDEC has been supporting the AMSs in their efforts to review the problems and constraints in fisheries data collection in coastal small-scale and inland fisheries at national level, and identify the key issues in fisheries data collection that should be addressed by the countries. In 2013-2017, the Japanese Trust Fund for SEAFDEC supported the organization of on-site training on “Facilitating Fisheries Information Gathering through Introduction of Co-management/Community-based Fisheries Management (Co-management/CBFM).” The training was aimed at building the capacity of provincial officers of the AMSs in planning and implementation of Co-management/CBFM. Results of monitoring the current situation in the AMSs were used to facilitate the planning and implementation of Co-management/CBFM in the AMSs.

In the Southeast Asian region, fishing areas are still considered as “open-access” for everyone to exploit, therefore most fishers tend to catch as much fish as possible without limit, leading to overexploitation of the resources. In such a situation, co-management and community-based management models could be adopted to address such concern as the models would help resolve the

conflicts among fishers on the use of the resources while encouraging the fishers to protect the resources. Although most AMSs do not have legal frameworks on fisheries co-management, efforts have been made by SEAFDEC to promote co-management in their respective national jurisdictions through the establishment of pilot sites.

Viet Nam started promoting the concept of Co-management/CBFM in 2003, and has developed national guidelines on small-scale fisheries co-management for approval by the Government. A provision which states that “co-management is a management approach, in which the State shares its authority, responsibility, and management functions with the resource users,” was included in the guidelines.

Thailand started implementing Co-management/CBFM models in 1997 through some activities that aimed to enhance the well-being of fishers’ groups around the coast of Gulf of Thailand and Andaman Sea. These included providing improved infrastructures in local fishing piers and fish processing plants, enhancing extension works on coastal aquaculture, and promoting fish releasing activities and installation of Artificial Reefs (ARs). The latter activity was however faced with the difficulties in finding appropriate locations for installing ARs as the ARs were large and seemed to sink in the bottom of the sea, and there was no space to serve as a public place for fishers to use during the installation. In addition, monitoring of the ARs was not carried out after the termination of the project. Under the new Fisheries Law which was adopted in 2015 (some parts of which deal with the fishing communities), promotion of the co-management concept could be intensified as the Law stipulated the need to “promote the participation and support local fishing communities in the management, maintenance, conservation, restoration, and sustainable use of aquatic resources within the fishery in coastal fisheries or inland fisheries.”

In the State of Sabah in Malaysia, Co-management/CBRM of the river fish population locally called “Tagal System” was initiated in 2000. A smart-partnership approach between the local communities and the State Government, the System aims to protect and restore the fishery resources in the river for sustainable benefit of the local communities. In 2004, the Department of Fisheries of Sabah zoned the Tagal sites to make the Tagal System more successful and sustainable. Since then, the CBRM/Tagal System was also applied to other areas such as rice-field water canals, brackishwater rivers, and coastal waters. Local business development like eco/agro-tourism was also promoted in some successful Tagal sites to generate additional incomes for the local communities which include sports fishing, fish feeding, fish body massage, and swimming with the fish. The CBRM/Tagal System then expand to the marine

waters through the launching of Artificial Reefs in 2009 as well as CBRM/Tagal for sea cucumber in 2011 that aimed to protect and restore the population of sea cucumber in Sabah since sea cucumber is considered a potential agro-tourism product of the State of Sabah. The success of Tagal System could be seen in all rivers with Tagal sites that are clean with plenty of fish, and in the enhanced awareness, harmony, and cooperation that has been created among local communities and other stakeholders on fishery resources conservation. The successful results also created an opportunity for the adoption of the CBRM/Tagal System in other States of Malaysia for sustainable fisheries development of the country. CBRM is considered a mechanism for sustainable utilization of fishery resources in coastal and inland areas through appropriate resource management. Therefore, promotion of this mechanism in the AMSs should be intensified.

## 5.5 Ecosystem Approach to Fisheries Management

Fisheries has been playing an essential role in the development of national and local economies of developing countries. However, compared with the other sectors of the national food economy, development of the fisheries sector is not only poorly planned and regulated but is also inadequately funded and often neglected by all levels of the government. The little attention given to the fisheries sector caused considerable impacts on productivity, livelihood sustainability and vulnerability of the fishing communities, and the resilience of the overall fisheries systems.

Building on the FAO initiatives, the Ecosystem Approach to Fisheries Management (EAFM) was advocated in the Southeast Asian region to strike a balance among the diverse societal objectives by taking into account the knowledge and uncertainties of biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries (FAO, 2003). EAFM is essentially an integrated management strategy within ecologically defined boundaries, and the integrated systems approach promoted through the EAFM tie together integrated coastal management and ecosystem-level perspectives. The principles that underlie the EAFM (FAO, 2005) emphasize on the importance of collaborative and adaptive approaches, in simple terms, EAFM is an attempt to do fisheries management in an ecosystem context (Link, 2010).

EAFM is an adaptive management process in which stakeholders’ participation and co-management approach play a central role. The process begins with a scoping phase, during which concerns over both fishing and non-