

# Driving the sustainability of small-scale fisheries and aquaculture in Southeast Asia

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Small-scale fishing is predominated in Southeast Asian fisheries, whether they are in coastal or inland waters. Small-scale fisheries and aquaculture have the potential to significantly contribute to poverty reduction and food security in Southeast Asia. However, they face habitat degradation and resource depletion, poverty, and restricted access to market and financial products and services, as well as public infrastructures such as health care, education, and communication. To address such concerns, several approaches have been initiated.

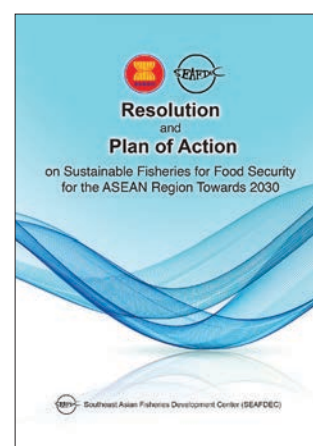
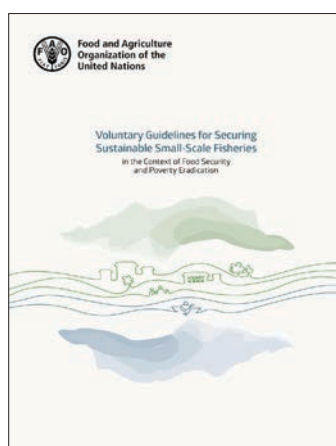
This article, therefore, covers the gradual development of regional and national programs and policies focusing on small-scale fisheries and aquaculture in the region to address the persistent social, economic, and ecological issues such as the developing of international and regional guidelines, enabling policies that can operationalize and safeguard community fishing rights and gender inclusion, integrating aquaculture into rural development, restoring fishery resources and habitats, promoting safety at sea for small-scale fishing vessels, developing technologies to reduce post-harvest losses in small-scale and traditional fish and fishery products, and facilitating access to markets of small-scale fisheries and aquaculture. The key achievements and activities of SEAFDEC, Member Countries, and relevant institutions toward the sustainable development of small-scale fisheries and aquaculture in the region are highlighted in this article to commemorate the International Year of Artisanal Fisheries and Aquaculture 2022 (IYAFA 2022).

Fisheries in the Southeast Asian region are characterized by small-scale or artisanal fisheries as most of the fishers are engaged in small-scale fishing operations in the pre-harvest, harvest, or post-harvest activities. The Guidelines for Responsible Fisheries in Southeast Asia: Responsible Fishing Operations define small-scale fisheries in the Southeast Asian region as fishing units that use small-scale boats, fishing gear, and equipment (SEAFDEC, 2000). Small-scale fisheries are a dynamic and evolving sector, employing labor-intensive harvesting, processing, and distribution technologies to exploit marine and inland water fishery resources. Small-scale fisheries directly contribute to food security by increasing the supply of fish while it may, however, indirectly support food security by generating revenues from production and related processing and marketing operations. Small-scale fisheries also contribute significantly to the local economy through income and employment. In the region, the estimated catch from small-scale fisheries is about 8 million tonnes (average

amount per year in 2013–2017), and engage about 5 million fishers in 2016 (FAO *et al.*, 2022).

However, small-scale fishing operations in “multiuse, multiuser” coastal and inland resources compete with other sectors leading to environmental and socio-economic issues. Small-scale fishers and aquaculture confront habitat degradation and resource depletion, poverty, and limited access to market and financial products and services as well as public infrastructure, *e.g.* health care, education, and communication (FAO, 2019). Small-scale fisheries are overlooked in the decision-making process as the limited catch information of this subsector has not been easily quantified (Teh and Pauly, 2018).

The FAO Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) were developed to raise the profile of and support small-scale fisheries (FAO, 2015a). SEAFDEC also underscored the importance of small-scale fisheries under the framework of the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2030 (RES&POA-20203). Resolution No. 1 stresses “*necessary national fisheries policies, legal and institutional frameworks that encourage and support responsible fisheries and aquaculture operations, including small-scale operations as well as providing supplementary livelihood options*” (SEAFDEC, 2020a).



The FAO Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (*left*) and the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2030 (RES&POA-20203) (*right*)

## Small-scale fisheries management

### Coastal fisheries

The coastal small-scale fisheries are important because they feed millions of people, support a growing population, and preserve the cultural and social integrity of communities that rely on fishing. Along the Southeast Asian coastlines, small-scale fisheries remain one of the most significant livelihood activities and also provide fishers with direct employment (Pomeroy, 2012). While coastal areas provide vast opportunities to support small-scale fishery communities, these shared resources are in the midst of a devastating environmental collapse and human-induced hazards (Almutairi *et al.*, 2020). Although livelihoods and the marine region in Southeast Asia are always changing, there are increasingly large areas of change and transitions. Diverse forms of maritime zone development such as tourism, land reclamation, infrastructure, and industrial developments further transform the economic and physical landscape of coasts. The governance of resource access, usage, and control is therefore important to be examined critically in light of how rights, claims, and counterclaims. As diversification can increase a household safety net, but in other cases, small-scale fisheries' livelihoods may experience vulnerability (Fabinyi *et al.*, 2022; Kongkeaw *et al.*, 2019; Teh and Pauly, 2018).

Since 1999, SEAFDEC has continued the promotion of several concepts and management tools for small-scale fisheries such as rights-based management and co-management; integrated coastal resources management; locally-based coastal resource management; coastal fisheries management; and ecosystem approach to fisheries management (EAFM). In 2006, the Guidelines on “Co-management Using Group User Rights for Small-scale Fisheries” were created as part of the Special 5-year Program on Sustainable Fisheries for Food Security in ASEAN Region: Towards Decentralized Management of Sustainable Fisheries (SEAFDEC, 2006). Through a series of consultations with SEAFDEC Member Countries, it is built on concepts and techniques, rights-based fisheries, and co-management. The Guidelines provide in-depth information on the delegation of coastal fisheries management authorities



The Supplementary Guidelines that comprise section on Co-management Using Group User Rights for Small-scale Fisheries





to local fisheries organizations, which may allow small-scale fishers to participate in management activities. Furthermore, SEAFDEC trained more than 500 fisheries officers from Southeast Asian countries from 2014 to 2021. SEAFDEC also promoted the EAFM concept in learning sites in Myanmar, Cambodia, Lao PDR, and Thailand (SEAFDEC, 2022).

As EAFM devotes a broader scope to fisheries management, this approach is a significant tool to address common transboundary policy and regulatory concerns including illegal cross-border fishing by small-scale fishers, commercial-scale fishing operations, and transshipment (Pomeroy *et al.*, 2019). In the Sulu-Sulawesi Seas sub-region, the EAFM plan links with international agreements while also linking to local fisheries management units (Pomeroy *et al.*, 2019). Several countries in Southeast Asia had adopted this approach in their policy framework. The Philippines has integrated EAFM into the country's 12 fisheries management areas (FMAs) in accordance with the Fisheries Administrative Order 263 (SEAFDEC, 2022). The case study in the Visayan Sea, Philippines described a long process of consensus-building to prepare and adopt an EAFM plan for a large area managed by multiple agencies and political units. Decision-makers were informed about the status of the resources (overfished) and the effects of suggested actions through the participatory planning process, which incorporated science. The scientific data served as the starting point for discussions between stakeholders to create policies and regulations that protected fisheries resources while reducing the negative effects of harvest control rules. Based on this case, there is a need for new strategies to promote the livelihoods of impoverished fishers without adding to fishing pressure and also a need for capacity-building for key implementers, *i.e.* fisheries officers and local governments (SEAFDEC, 2019a).



In Indonesia, though there is no regulation that is specific to an EAFM, several current laws and policies have addressed an EAFM principle, *e.g.* MMAF Regulation No. 21 of 2015 Concerning Partnership on Management of Marine Protected Areas (Muawanah *et al.*, 2018). This law sets up an institutional framework between the provincial administration and the local community in managing area-based aquatic

conservation (Muawanah *et al.*, 2018). Indonesia as on the countries in the Coral Triangle region established Sulu-Sulawesi Seascape as the Fisheries Management Unit. Several fisheries and coastal resources were included in the EAFM plan such as small pelagic species, live reef food fish, and tunas (Coral Triangle Initiative, 2015). These resources are important for livelihoods in small-scale fisheries livelihoods (Buchary *et al.*, 2006).

In Thailand, the Marine Fisheries Management Plan of Thailand applied EAFM which aims to achieve sustainable development by balancing both ecological (fisheries resources and environment) and human (social and economic benefits) well-being (Department of Fisheries, Thailand, 2015). This demonstrates that EAFM can balance local, national, and regional fisheries management priorities and merge multilevel action plans into conceivable practices. In the promotion of EAFM in Nainang Village, Muang Krabi, Thailand, regular conversations resulted in an agreement to follow the fisheries law in order to stop illegal fishing, and eventually, the illegal bamboo stake traps were taken down. Additionally, the environmental conservation area for aquatic species, such as blood cockles, was designated using a precautionary approach. Additionally, the regular meetings and public discussions, as well as capacity building improved awareness and comprehension of the relevant laws and community rules, as well as the relationships between the various groups of people in the Village. In sum, the aquatic animal resources in this area expanded in quantity and variety, increasing fishers' revenue (Weerawat and Worranut, 2019).

### Inland fisheries

Inland fisheries contribute an important protein source embedding food security into the livelihoods of millions of people in the rural areas of the Southeast Asian region. Inland fisheries cover both freshwater and brackishwater in some countries, *i.e.* Indonesia, Myanmar, and the Philippines while some countries mainly refer to freshwater, *i.e.* Lao PDR, Malaysia, Singapore, and Thailand (SEAFDEC, 2003a). Concerning inland water bodies in Southeast Asia, Indonesia has the largest floodplains around 33 million ha, followed by



Thailand (13 million ha), Myanmar (6 million ha), Malaysia (3 million ha), Cambodia (0.7 million ha), and Lao PDR (0.6 million ha) (Muthmainnah *et al.*, 2019). Inland fisheries of the region begin in the rainy season when fish migrates from major rivers to other water bodies for feeding or reproduction, and end when fish returns to major rivers in the middle of the dry season (Muthmainnah *et al.*, 2019). Large quantities of fish are gathered in the floodplain areas generating productive fishing grounds. In 2013–2017, the annual catch and number of people employed in inland small-scale fisheries had an average of about 2.5 million t and 1 million persons, respectively (FAO *et al.*, 2022). Meanwhile, there were over 4.75 million people engaged in inland small-scale fishing primarily for their personal subsistence in 2016 (FAO *et al.*, 2022).

However, inland fisheries in the region encounter a number of potential threats such as dam development for hydropower and irrigation, overexploitation, pollution, land use change, introduction of invasive species, diversion of water for agriculture, and others (Welcomme *et al.*, 2016). In order to effectively manage inland fisheries from the rising demand for multiple usages of inland water resources, co-management

and collaboration at local, national, regional, and international levels urgently has to be reformed (Welcomme *et al.*, 2016).

In order to safeguard the sustainability of inland fisheries in the region, several aspects should be considered, *e.g.* improving data collection, analysis, and dissemination, enhancing inland aquatic organisms and habitats, applying EAFM in inland fisheries management, applying fish passage to mitigate the impacts of cross-river obstacles (Baumgartner *et al.*, 2021; Muthmainnah *et al.*, 2019; Weerawat *et al.*, 2022). There were extensive researches and programs on inland fisheries in the Southeast Asian region, *e.g.* fish species composition in inland waters (Coates, 2002; Isa and Ibrahim, 2004; Muthmainnah and Rais, 2020; Sarnita, 1983; Sarnita, 1987; Talawat, 2004); application of geographical information system and mobile technology for inland capture fisheries (Muthmainnah *et al.*, 2020; Siriraksophon *et al.*, 2004); negative effects of building water barriers on inland fisheries (Le *et al.*, 2007); restocking and stock enhancement (Htun, 2014; Ingthamjitr and Sricharoendham, 2015; Kartamihardja, 2015); fish abundance and diversity monitoring (Ngor *et al.*, 2014); co-management and community-based management (Phounsavath, 2015; Try and Sitha, 2011). These research results could serve as a reference for tackling issues with inland fisheries growth and management, particularly through the formulation of policies, capacity building, networking, and technology verification and dissemination.

### Community rural aquaculture

Aquaculture contributes to the region's economic growth while also meeting the needs of its population, particularly those living in rural areas for adequate protein (Salayo *et al.*, 2012). Taking into consideration the issues and constraints faced by the aquaculture industry, especially on the need to enhance the role of aquaculture in securing food and income which is critical in rural development in the region, the





RES&POA-2030 highlighted the significance of small-scale aquaculture operations as it provides supplementary livelihood options as well as the contribution of integrated aquaculture to rural development activities concerning multiple-use of land and water resources through interagency coordination (SEAFDEC, 2020a). Such provisions, therefore, encourage national programs and policies on aquaculture in the region to address the persistent social, economic, and ecological aspects of sustainable aquaculture that directly impact rural development.

Integrating aquaculture into rural development requires government engagement and support for regional initiatives to assess the role of aquaculture in poverty alleviation for better policymaking. In order to integrate aquaculture activities into community development plans realistically, such plans will require adherence to national employment practices, promotion of financial incentives and credit systems, aid and other support structures to motivate aquaculture entrepreneurs (SEAFDEC, 2020a).

Several aquaculture techniques have been developed to suit small-scale aquaculture development in rural areas (Baticados, 2015; SEAFDEC/AQD, 2009). The farm-system shifts from agricultural crops to shrimp farming or producing other high-value aquatic species were observed in several areas in the region (Fabinyi *et al.*, 2022; Pham *et al.*, 2021). Though technological advances have been introduced, the adoption of appropriate technologies is slow among rural aquaculture farmers (Baticados, 2015; Salayo and Agbayani, 2012). One such slow adoption would be the financial inaccessibility of these farmers (Salayo and Agbayani, 2012). Several programs, therefore, have been developed to increase the technology adoption both by government and non-government agencies. For example, Yusoff (2015) reported that the Malaysian government has started a program to provide areas for the culture of a number of highly valuable aquatic species. The initiative is designed to plan the Malaysian government's objectives for greater income, job opportunities, and food security (Yusoff, 2015). The Vietnam Bank for Agriculture and Rural Development and the Vietnam Bank for Social Policies, in collaboration with the Women's Unions of Vietnam, implemented an investment program for developing small-scale aquaculture communities with the overall goal of reducing poverty and improving local food security among underprivileged ethnic fishing communities (World Bank, 2019). Concerning limited infrastructure assets in the rural areas, public-private partnership and/or inter-agency coordination to secure sustainable small-scale rural aquaculture should be guided by the abovementioned provision.

## Gender inclusion

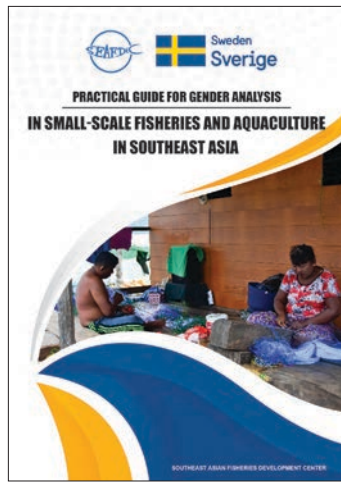
It is important that gender issues should be identified in small-scale fisheries, especially marginalized and vulnerable people that require special attention. In order to ensure that both men's and women's perspectives are heard, decision-makers should make sure that such identification and application are driven by meaningful and substantial participative, consultative, multilevel, and objective-oriented processes. As necessary and pertinent, all stakeholders should support and take part in such processes (FAO, 2015a). As official statistics frequently neglect or underrepresent women's work in the fisheries industry including small-scale fisheries. This creates a recurring cycle in which a lack of sex-disaggregated data results in gender-blind policy-making, which then results in insufficient financing for the economic sectors where women are well-represented (FAO, 2015a).

As people of different genders, ages, and social and economic statuses have different needs, priorities as well as unequal access to opportunities, gender inclusion in the fisheries sector, therefore, require interagency collaboration to promote gender inclusion and fisheries management. The RES&POA-2030 thereby encouraged the ASEAN Member States (AMSs) to promote capacity building of relevant organizations and stakeholders to support fisheries-related organizations to implement necessary actions towards increased resilience, improved livelihoods, and poverty alleviation, in support of achieving sustainable development with gender integration in the process. SEAFDEC stepped into this path and developed the SEAFDEC Gender Strategy in 2019. It intends to support the integration of gender perspectives in fisheries and aquaculture of the SEAFDEC Member Countries. Its five main strategies are: 1) Mainstreaming Gender at all levels of the organization, 2) Integrating gender in SEAFDEC programs and projects, 3) Incorporating gender perspectives in all events organized by SEAFDEC, 4) Boosting the visibility of SEAFDEC as a gender-responsive and gender-sensitive organization, and 5) Strengthening further the cooperation and collaboration with Member Countries and other organizations on gender aspects (SEAFDEC, 2019b).

Moreover, the SSF Guidelines also provide the guiding principles for gender equity and equality, especially for small-scale fisheries. The SSF Guidelines demand that men and women participate equally in fishing organizations and decision-making processes. Equal rights must be supported by laws and policies, and both men and women must have access to the right tools and resources to do their jobs.

With the abovementioned strategies and principles, gender inclusion has received strong institutional support within SEAFDEC and related program executions. SEAFDEC continues its support to SEAFDEC Member Countries in the integration of gender into fisheries management.

With the adoption of the SEAFDEC Gender Strategy (SEAFDEC, 2019b), SEAFDEC mainstreams gender issues at all levels of the organization and integrates gender in its programs, projects, and activities. In practice, there are many instruments that could be used such as gender in coastal and fisheries resource management including Practical Guide for Gender Analysis in Small-scale Fisheries and Aquaculture in Southeast Asia (SEAFDEC, 2020b). This guide was developed by SEAFDEC in 2020 to support mainstreaming and integrating gender perspectives into SEAFDEC programs and projects concerning small-scale fisheries and aquaculture in Southeast Asia. This guide could be used by countries without any framework in place to support the development and implementation of gender inclusion programs.



Gender inclusion related programs have been implemented and supported by several SEAFDEC programs. SEAFDEC-Sweden Project during 2013–2019 had successfully formed SEAFDEC Gender Team and designated SEAFDEC Gender Focal Persons for the SEAFDEC Secretariat, and its four sister Departments; conducted in-house capacity building on gender aspects for staff of SEAFDEC Secretariat and Training Department; developed “Gender Synthesis Review” and “Gender Analysis Toolkit” to improve gender integration and mainstreaming in coastal resource management programs in South and Southeast Asia in collaboration with IUCN/SEI; field level work and local capacity building on gender-based activities and reporting by the sub-contracted partners; disseminated and promoted the “Policy Brief: Applying Human Rights-based and Gender Equality Approaches to Small-scale Fisheries in Southeast Asia”; developed the Practical Guide for Gender Analysis in Small-Scale Fisheries and Aquaculture in Southeast Asia (SEAFDEC, 2019c).

Some activities of the project supported by the Japanese Trust Fund “Small-scale Fisheries Management for Better Livelihood and Fisheries Resources” during 2020–2024 has conducted a study on the status of fisheries socio-economic assistance, and gender assessment in the SEAFDEC Member

Countries as well as capacity development on gender integration in small-scale fisheries. The project on “Gender Dimension in the Value Chain of Small-scale Fisheries and Aquaculture in Southeast Asia” supported by FAO in 2021–2022 has collected and analyzed data on gender dimension in the value chain of small-scale fisheries and aquaculture (Sornkliang and Chumchuen, 2022).

In addition, another SEAFDEC-Japanese Trust Fund project on “Assistance for Capacity Development in the Region to Address International Fisheries-related Issues” conducted the Regional Capacity Building Network activity emphasizing the transfer of technical knowledge and building up network among the AMSs on a particular subject. In 2022, to commemorate the International Year of Artisanal Fisheries and Aquaculture (IYAFA) 2022 the theme is small-scale fisheries and aquaculture. In this connection the “Regional Training Course on Gender Mainstreaming in Small-scale Fisheries and Aquaculture for Sustainable Development in Southeast Asia” was conducted in September 2022 in Thailand. A total of 19 participants from the AMSs attended the training. They gained knowledge of gender concepts, roles, mainstreaming tools, and analysis framework. Data collection for gender analysis was conducted in Rayong Province. Moreover, the trainees learned to identify actions to integrate gender into small-scale fisheries and aquaculture development projects and developed the action plans to be implemented in their works with the engagement of their top management and colleagues towards gender mainstreaming in their respective countries (Kaewnuratchadasorn, 2022).

## Fishery resource enhancement

The rich biodiversity and productivity of fishery resources in the region made populations heavily dependent on marine and inland fisheries (Lebata-Ramos and Doyola-Solis, 2005). However, the depletion of fish stocks and habitat degradation have been observed due to many factors for instance overfishing, illegal fishing, use of destructive fishing practices, environmental degradation, and aquaculture intensification in mangrove areas (Theparoonrat *et al.*, 2016). Ecologically sound measures such as the installation of artificial reefs, mangrove reforestation, coral plantation, fish passage construction, good aquaculture practices, and others have been undertaken in Southeast Asian countries to restore aquatic resources for small-scale coastal and inland fisheries (Ali and Arnupapboon, 2022; Hai, *et al.*, 2020; Kongkeaw, *et al.*, 2019; Kusmana, 2017). To improve fish stocks in critical habitats and fishing grounds, several efforts on restoration and rehabilitation of fishery resources and habitats have been initiated (Ahmad *et al.*, 2004; Theparoonrat *et al.*, 2016). SEAFDEC/Training Department has grouped several resource enhancement projects into five protocols that could be applied in the Southeast Asian region (**Box**) (SEAFDEC/TD, 2021);



### Box. Resource enhancement protocols applied in the Southeast Asian region

**Catch Management Area** is a marine area where particular management measures are used to increase habitat productivity and support resource recruitment. It normally has to do with fishing prohibition policies, e.g. marine protected areas (fishing gear are permanently prohibited), closed season areas (some fishing gear, mostly commercial scale, are prohibited during a specific time), fisheries refugia (catching target species at their critical stages of life cycles is prohibited). For example, the project “Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand” has established community-based refugia management plans in six participating countries. The plans contain specific regulations, including those on how to operate types of fishing vessels or fishing gear inside of refugia, how to change management measures over time, and how to enforce them. This benefits small-scale fisheries as they operate in the coastal habitats where the adoption of sustainable fishing practices is needed (UNEP, 2015)

**Habitat Rehabilitation** is the effort to rehabilitate the degraded coastal ecosystem such as coral reefs, seagrass beds, and mangrove areas in order to protect spawning and nursery grounds of fishery resources. A study on the relationship between habitat improvement initiatives and fish abundance found that restoration of mangrove areas in Indonesia initially resulted in increased catch production of small-scale fisheries (Debrot *et al.*, 2022)

**Artificial Reef Employment** is manmade underwater structures that are employed to serve as shelter and habitat, source of food, breeding area, and shoreline protection. For instance, the management of artificial reefs in Sabah, Malaysia was established by the local fishers community to safeguard the installed artificial reef sites as local fishers would be advantageous from the construction plans, especially the economic returns (Theparoonrat *et al.*, 2016)

**Restocking or stock enhancement** usually refers to the release of cultured stock usually in an early life stage into depleted wild populations. For example, SEAFDEC/AOD restocked donkey's ear abalone as this mollusk is one of the most traded species by small-scale fishers in Molocaboc Island, Philippines during 2007-2014. They found that stock enhancement needs significant financial investments and massive transaction expenses over a long period of time, which are typically out of the price range of local governments in Southeast Asia. As a result, community-based collaborations could support restocking and enhancing goals (Salayo *et al.*, 2016)

**New Policies for Fisheries**, this has been employed to mitigate the effects of high fishing pressure. Despite the fact that it is tough to make new measures since they affect a wide variety of communities. These are for example EAFM concepts and principles for participatory community engagement, implementation of a vessel monitoring system, control of catch size of mackerel fish by Malaysian purse seiner, and fishing quota by limiting the number of fishing days in Thailand. These measures are to ensure the abundance of fishery resources and reduce conflict between stakeholders and improve the relationship between government agencies and fishing communities (SEAFDEC, 2019a)

## Safety at sea and adaptation to climate change

The majority of fishery vessels in Southeast Asia are small-scale. The respective countries have their own legislations pertaining to the safety requirements for fishery vessels. The RES&POA- 2030 thereby encouraged the AMSs to strengthen measures for the safety of fishery vessels. SEAFDEC conducted a series of workshops in 2003, 2010, and 2011 to review the measures for the safety at sea of small-scale fishery vessels in the region. The recommendations include registration of small-scale fishery vessels, interagency coordination on monitoring and control of small-scale fishing vessels' safety, identification of basic requirements for safety at sea, development of appropriate communication systems on weather forecast information, development of a mechanism to record the accidents of fishing boats at sea (SEAFDEC, 2003a; SEAFDEC, 2010). SEAFDEC has developed and publicized the translated versions of the Safety Recommendations for Decked Fishing Vessels of Less Than 12 Meters in Length and Undecked Fishing Vessels FAO/ILO/IMO in Vietnamese (2013), Burmese (2013), Bahasa-Indonesia (2014), Filipino (2014), Thai (2014), Khmer (2015), and Bahasa-Malaysia (2017).

Moreover, the FAO Safety at Sea for Small-scale Fishers was developed in 2019 in support of the implementation of the SSF Guidelines. The manual is intended for small-scale fishers who use vessels of less than 12 meters in length and provides guidance on safety matters related to the work on a small-scale fishing vessel (e.g. fire safety, deck safety, lifesaving equipment, lighting, and ventilation), personal safety, and navigation safety. The manual also includes examples of accidents that may occur onboard fishery vessels and useful instructions to prevent such accidents. In addition, the manual provides the checklist and procedures that small-scale fishers should follow prior to a fishing trip to increase the likelihood to survive accidents at sea. Other information on safety for small-scale fishing vessels includes Safety Recommendations for Decked Fishing Vessels of Less than 12 meters in Length and Undecked Fishing Vessels (FAO/ILO/IMO, 2012), Best Practices to Improve Safety at Sea in the Fisheries Sector





(FAO, 2015b), and Safety Guide for Small Fishing Boats (Gulbrandsen, 2009).

Besides following those guidelines, risks associated with small-scale fishing operations at sea should be insured through several insurance schemes. To mediate economic risks resulting from adverse impacts of climate change, insurance complement such impacts and help reduce various risks. It was estimated that 4 million fishers in Asia in 2020 were covered by specific insurance programs (Van Anrooy *et al.*, 2022). Accident, life, and health insurance services for small-scale fishers that meet their specific needs and conditions should be promoted to increase the resilience of small-scale fishing operations in the Southeast Asian region.

## Post-harvest

Small-scale fishers and fish workers in Southeast Asia use traditional methods of fish processing (such as fermenting, smoking, sun-drying, salt-drying, among others) to preserve large catches during peak season or increase the shelf life of fish and fishery products. The RES&POA-2030 suggested the development and application of technologies and best practices that optimize the utilization of catches/farmed products, reduce post-harvest losses and wastes, add value to byproducts, and valorize fish waste/trimmings in small-scale fisheries (SEAFDEC, 2020a). To ensure that processing could be readily managed under local conditions with little input, SEAFDEC has improved such traditional processes in terms of safety and quality as well as in the technical elements despite inadequate resources and infrastructure by improving the ability of countries to comply with quality assurance systems, including HACCP and GMP, among others, in processing establishments as necessary; making accredited laboratories available to detect contaminants in food products, such as chemicals, antibiotics, and biotoxins that are subject to trade regulations; and by implementing cold chain management throughout the fishery supply chain from catching/harvesting until reaching consumers (SEAFDEC, 2022). SEAFDEC/MFRD assisted the Department of Fisheries of Myanmar to create HACCP plans for some traditional fermented fish



products such as fish sauce, whole fish, and fish paste. Product descriptions, manufacturing flow diagrams, hazard analyses, and HACCP plans were created for these products (Eong and Chung, 2011).

By combining conventional, cutting-edge, and cost-effective techniques with proper technologies, sustainable practices can help reduce losses and wastes and enhance inclusive value chains for small-scale fisheries and aquaculture. The effect of food loss and waste, as well as the management techniques used to minimize these losses and wastes, differ among AMSs. In Indonesia, less-skilled workers may waste more fish parts when separating the flesh from the bones and skin of fish. Similarly, during distribution, an excess supply of fish and a lack of customers resulted in the waste of unsold products while delays in distribution/transportation also resulted in food loss and waste. Currently, several initiatives have been implemented, *e.g.* utilization of shrimp shell waste into chitin/chitosan, byproduct utilization training, post-harvest facilities assistance, development of cold storage and integrated cold storage, regulation on increasing value added of fishery products (Eu and Siok, 2022). The Malaysian Standard of Hygiene on Board (MSHOB) enhanced the willingness of local fishers in practicing proper fish handling procedures and reducing food loss onboard fishery vessels. In the Philippines, the Community Fish Landing Centers (CFLCs) located in strategic coastal communities provided postharvest facilities



and give more fishers access to ice-making facilities to reduce food loss due to inappropriate storage temperatures (Eu and Siok, 2022).

## Fish Trade

The production from small-scale fisheries in Southeast Asia is mostly intended for household consumption and local markets. The RES&POA-2030 encouraged the AMSs to assist small-scale producers from both capture fisheries and aquaculture in securing and maintaining access to markets at the national, regional, and international levels, and in the process, develop marketing systems that are not capital intensive but are accessible for local producers. The countries are also encouraged to develop and implement institutional and policy frameworks that support fair, stable, and transparent prices to ensure adequate compensation for small-scale artisanal fisheries and aquaculture work and investments through the gradual application and use of pertinent international instruments and guidelines (FAO, 2022).

SEAFDEC/TD organized the training course “Market Access for Small-scale Fisheries Product in the Next Normal” in December 2021 at the pilot site in Nam Oon Dam, Sakon Nakhon Province, Thailand. The aim was to help the group build its marketing plan. The analytical findings from research on the production, distribution, and market situation of fish



processing goods as well as the profitability of fishery products were presented to the participants.

In Malaysia, although there are no specific national guidelines or procedures for trading of fish and fishery products from small-scale fisheries, in the National Agrofood Policy (NAP 2.0), small-scale industries including fish and fishery products were given priority on market access facilitation along the fish value chain. In Thailand, the Office of Agricultural Economics regularly produces and disseminates data on market prices of agricultural crops including fisheries products. In addition, the Department of Fisheries, Thailand, farmers, and processors of white leg shrimp have collaborated in a program on purchasing of marine shrimp at prices that do not lower than the production cost and farm-gate prices across Thailand (personal communication).

## Way Forward

At the national level, many countries in the region have decentralized its fisheries administration, however, small-scale fisheries have not been properly managed. Therefore it is necessary to investigate new data collection techniques and analysis methods suitable for small-scale and multispecies characteristics of both coastal and inland capture fisheries, choose appropriate reference points for a range of fishing gears and multispecies catch, implement appropriate catch documentation and traceability systems of fish and fishery products from small-scale fisheries, and increase the involvement of local institutions and communities in the decision-making process.

Since aquaculture would continue to grow, engaging small-scale fish farmers with the access to good quality seed would enhance food security and alleviate poverty in the rural areas. The implementation of good aquaculture practice should also be continued especially with small-scale farmers as disease prevention is a key for sustainability. Cooperation among the AMSs and relevant research institutes in the areas of fish nutrition and feed development should be promoted. Initiatives should be developed to teach small-scale fish farmers on how to properly handle alternative feed ingredients to increase their usage in aquaculture feed formulations. Market-based governance through third-party certification programs may assist small-scale fishers and farmers to access markets. An inclusive and certification scheme that adapt to local context should be promoted while group certification among small-scale producers could be an option.

At the regional level, relevant upcoming SEAFDEC projects in relation to small-scale fisheries and aquaculture include “Promoting the Blue Economy and Strengthening Fisheries Governance of the Gulf of Thailand through the Ecosystem Approach to Fisheries” to be implemented in 2023–2027 will promote the implementation of the SSF Guidelines in particular the knowledge of transboundary sustainable fisheries practices and aquatic ecological corridors. In addition, the “Blue Horizon: Ocean Relief through Seaweed Aquaculture Project” to be implemented in 2023–2026 consider that seaweed could strengthen the economic resilience of coastal communities as it can be integrated in multitrophic system as well as stabilize the health of surrounding ecology. Moreover, the USAID/SEAFDEC/Sustainable Fish Asia-SEA Project in 2023–2027 will implement activities to sustain inland fisheries production through small-scale fisheries livelihood improvement including inland fisheries data collection system establishment. Furthermore, SEAFDEC/AQD continues promoting alternative feeds for sustainable production of freshwater aquaculture species focusing on small-scale fish farmers.

At the global level, in continuing the celebration of the International Year of Artisanal Fisheries and Aquaculture 2022, the 35<sup>th</sup> Session of the Committee on Fisheries emphasized the significance of sustainable small-scale fisheries and aquaculture in attaining sustainable and resilient food systems and future food demands, and welcomed global initiatives to enhance collaborations and promote food from inland and marine waters. The importance of small-scale and artisanal fishers, fish farmers, and fish workers was further emphasized in this respect, as well as the necessity of addressing gender equity and inequities in the fisheries and aquaculture industry.

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