

## PART III

# Outlook of Fisheries and Aquaculture for the Southeast Asian Region

The launching of an ambitious task to build the ASEAN Community by 2015 had been supported jointly by the Southeast Asian countries. Being aware of the consequences and advantages that could emanate from the integration of the fisheries sector into the three pillars of the ASEAN Community, the ASEAN countries should have to ensure that socio-economic considerations are being dealt with accordingly within the fisheries sector. Moreover, policy mechanisms for national institution building should also be put in place considering that by 2015 the ASEAN would be transformed into a region with free movement of goods, services, investments, and skilled labor as well as free flow of capital. In so-doing, the countries should be able to address the prevailing issues which could include social, economic, environmental, and political considerations through the implementation of programs and activities guided by the Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020.

### 1. Rising to the Challenges and Opportunities from the Establishment of the ASEAN Community: Fisheries and the People Involved

Management of the natural resources including aquatic resources, fisheries management and the importance of properly managing important coastal and inland environments/habitats as well as maintaining protective geographical features remain key important concerns that should be addressed now and in the foreseeable future, especially in the Southeast Asia region and among the ASEAN countries. These concerns should be considered from the perspective of poverty reduction and the need to maintain a socially sound, economically balanced and sustainable development, based on a healthy and productive environment in the ASEAN region while living up to the expectations of an ASEAN Community by 2015. This would mean reversing the present trend of environmental degradation and depletion of aquatic resources, and enhancing the social well-being and working conditions of people involved in fisheries and related activities, where specific attention should be given to management of fishing capacity (large- and small-scale operations) including labor and safety aspects as well as the status of migratory fishworkers comprising both men and women.

Equally, this also implies the need to maintain a resources-based equilibrium between the growing demand for fisheries and aquatic products with the available supply, in other words, to balance conservation needs with sustainable exploitation levels of the fishery resources. It is very important consider the contribution of fisheries to economic growth and to food security and livelihood of the people. Attaining food security is tantamount to ensuring sustainability in fisheries, which requires that countries in the region should put together their efforts in improving fisheries governance and sustained endeavors in conservation and rehabilitation of the natural resources, where people will not go hungry if they know how to fish responsibly.

Looking towards the establishment of the ASEAN Community by 2015, the ASEAN countries should strengthen national institutional and policy mechanisms to be able to incorporate the requirements of the three “pillars” as indicated in the three “Blueprints” developed by Member States which are meant to facilitate the efforts needed to establish the ASEAN Community by 2015. These three pillars are the ASEAN Political-Security Community, ASEAN Economic Community, and the ASEAN Socio-Cultural Community. The requirements for Member States, and information to the “global community”, are further defined in three “Blueprints”, namely ASEAN Political-Security Community Blueprint, the ASEAN Economic Community Blueprint, and the ASEAN Socio-Cultural Community Blueprint.

As anticipated, by 2015 the ASEAN region would be characterized by having a single market and production base with free flow of goods, services, capital investment, and skilled labor; being a highly competitive economic region with equitable economic development; and being fully integrated into the global economy. This is therefore an opportune time for the countries of the region to boost the performance of their respective fishery sector by enhancing connectivity in terms of physical infrastructures such as land and marine transportation systems in order to facilitate the flow of goods like fishery products within and outside the region, and promote cross border trade thereby improving their respective economies. However, some of the adverse impacts of the integration of fisheries into the ASEAN Community should be taken into account, which could

include increased competition of fishery products, trans-boundary transfer of aquatic resources, and increased pressure to the fishery resources. The countries should therefore take a closer look at these issues in order to mitigate the possible impacts that could take place in the fisheries sector in the coming decades.

## 2. Growing Demands of Fisheries that Challenge Food Security

In June 2011, the ASEAN and SEAFDEC organized the ASEAN-SEAFDEC Conference on Sustainable Fisheries for Food Security Towards 2020 “Fish for the People 2020: Adaptation to a Changing Environment” with the main objective of paving the way for the sustainable development of fisheries and enhance the contribution of fisheries to food security of the Southeast Asian region towards the coming decade. During the Conference, the ASEAN-SEAFDEC Ministers responsible for fisheries adopted the “Resolution” and “Plan of Action” on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020”, as important direction in formulating and implementing programs, projects, and activities through the appropriate ASEAN-SEAFDEC mechanisms. These two instruments, the “Resolution” and “Plan of Action”, therefore serve as policy guidance for the countries in the region in developing priority actions aimed at attaining sustainability of the fisheries sector in support of international demands.

The tendency of the fisheries sector to maximize the exploitation of resources should be perceived as means of increasing the supply of fish to cater to the rising global demand for food fish and other aquatic products brought about by the increasing global population and enhanced capacity of more people to purchase high value and quality food including food fish. As a result, the sector has gone through a very fast pace of development risking its ability to continue providing stable livelihood to fishing communities while at same increasingly over-fishing the important resources with increasing difficulties to, in sustainable way, supply the requirements of the fishing industry and post-harvest sector. These concerns should be mitigated in order to achieve food security in the Southeast Asian region.

As defined by FAO, food security is attained and is in place when food is available for everybody’s access, when people do not go hungry or do not fear of possible starvation, and when all people have physical and economic access to sufficient and safe food at all times. The main aspects of food security could therefore be associated with the availability of nutritionally adequate and safe food including food fish, and the accessibility to such foods through socially acceptable means. Fisheries in the Southeast Asian region had always played the major role of accelerating economic development and generating livelihood opportunities, and in many ways, contributing to the region’s food security, considering that

**Table 60.** Population, fish production and consumption of the Southeast Asian countries

Countries	Population (millions)				GNI PPP <sup>4</sup> Per capita (US\$: 2009)	Ave per capita fish consumption <sup>5</sup> (kg/person/year)	2009 Fish Production <sup>6</sup> (metric tons)	% Population below US\$2/day <sup>7</sup> PPP 2000/2009
	2009 <sup>1</sup>	Mid-2011 <sup>2</sup>	2025 <sup>3</sup>	2050 <sup>3</sup>				
Brunei Darussalam	0.5	0.4	0.5	0.6	-	44.04	2,418	-
Cambodia	14.8	14.7	18.0	22.3	1,820	32.97	515,000	57.0
Indonesia	240.3	238.2	273.2	309.4	3,720	31.43	10,064,140	51.0
Lao PDR	6.3	6.3	7.9	10.3	2,200	24.86	105,000	66.0
Malaysia	28.3	28.9	35.3	43.6	13,710	54.40	1,729,002	2.0
Myanmar	50.0	54.0	61.7	70.8	-	42.75	3,491,103	-
Philippines	92.0	95.7	120.2	150.1	3,540	53.49	5,084,674	45.0
Singapore	5.0 <sup>8</sup>	5.2	5.8	6.1	49,780	23.0 <sup>8</sup>	5,687	-
Thailand	65.0	69.5	72.9	71.0	7,640	37.97	3,137,672	27.0
Vietnam	88.1	87.9	100.4	109.3	2,790	41.47	4,782,400	38.0
<b>Southeast Asia</b>	<b>590.6</b>	<b>600.8</b>	<b>696.3</b>	<b>793.2</b>	<b>4,490</b>	<b>27.00</b>	<b>26,917,096</b>	<b>42.0</b>
<b>World</b>	<b>6,705</b>	<b>6,987</b>	<b>8,084</b>	<b>9,587</b>	<b>10,240</b>		<b>145,000,000 <sup>9</sup></b>	<b>48.0</b>

**Sources:**

<sup>1</sup> 2009 World Population Data Sheet, Population Reference Bureau, Washington DC, USA

<sup>2</sup> Mid-2011 Populations: estimates are based on recent census and official national data. The effects of refugee movements, large numbers of foreign workers, and population shifts due to contemporary political events are taken into account to the extent possible

<sup>3</sup> Projected Populations 2025 and 2050: Based on reasonable assumptions on the future course of fertility, mortality and migration

<sup>4</sup> GNI PPP per capita 2009 US\$: Gross national income (GNI) in purchasing power parity (PPP) divided by mid-year population. GNI PPP refers to gross national income converted to “international” dollars using a PPP conversion factor. Based on World Bank data

<sup>5</sup> Fishery Statistical Bulletins for the South China Sea Area (SEAFDEC, 2010); Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)

<sup>6</sup> Fishery Statistical Bulletin of Southeast Asia (SEAFDEC, 2011)

<sup>7</sup> Percent of population below US\$2 per day: Percentage of population living in less than US\$2 per day at 2005 international prices. Based on World Bank data

<sup>8</sup> Agri-Food & Veterinary Authority of Singapore

<sup>9</sup> The State of World Fisheries and Aquaculture 2010 (FAO, 2010a)

the peoples in the region are fish eating by tradition and habits. However, pressure from the growing population and demand for food together with the shifting paradigm in food consumption (fish and other products) could lead to food insecurity in the future. When such situation is not improved, food insecurity in the Southeast Asian region could get worse considering that the region's average per capita gross national income of below US\$ 5,000 falls short by about one-half of the world's average of more than US\$ 10,000.

**Table 60** shows that the world's population increased from 6,705 million in mid-2008 to 6,987 million in mid-2011 and is expected to hit more than 8,000 million in mid-2025 and about 9,590 million in mid-2050. For the Southeast Asian region, the total population increased from 590 million in mid-2008 to 600 million in mid-2011, and by mid-2025 the region's population could reach 700 million and about 800 million by mid-2050. These figures seem to suggest that the demand for food would increase in the next five or so decades with subsequent increasing pressure on most food items, including fisheries and other aquatic products. Considering also the increased capability of more people to spend more on food fish and for health concerns as well as the availability of fish supply, consumption pattern for food fish worldwide has already shifted where more people are now consuming more fish protein than other animal protein – the negative side of this is that poorer groups of people would have less access to fish and aquatic products to sustain food security and their well-being.

From the point of view of the Southeast Asian region, the rapid growth of its population and increasing demand for food is expected to add pressure on the natural resources and increase the dynamism and competitiveness of the multiple uses of water and terrestrial resources. Thus, it will be increasingly necessary for the countries in Southeast Asia to maintain a resources-based equilibrium between fish and aquatic resources and the available resources in order to attain food security. Therefore, the need to balance conservation and exploitation of the aquatic resources through sustainable development of habitat and fisheries should be continued. In addition, in the development and management of fisheries and aquatic resources there is also a need for countries to strike a balance between the contribution of improved fisheries to national economic growth and to food security and improved livelihood among coastal and inland groups of people throughout the Southeast Asian region.

### 3. Increasing Demands for Environmentally and Socially Sustainable Development of Fisheries and Aquatic Resources in Southeast Asia

Fisheries, marine and coastal habitats, and inland flood plains and wetlands are recognized priority areas for socially just and sustainable development, for the ASEAN and Southeast Asian countries. The common objective of such development is for fisheries and aquatic resources to continue to cater to the needs and requirements of the rapidly growing population including the need to provide broad and diversified income and livelihood opportunities while ensuring future food security for the people. For more than a decade, initiatives have been undertaken to promote the FAO Code of Conduct for Responsible Fisheries (CCRF), a global voluntary instrument that provides a broad framework and guidance for national and international efforts towards sustainability of the fisheries sector. The importance of the CCRF in promoting food security and fisheries sustainability is well recognized by all countries in the Southeast Asian region.

In the 2011 Resolution and Plan of Action which is heavily hinged on the CCRF and in the ASEAN Community Blueprints, several aspects have been identified as priority areas to be promoted in the region. These include sustainable use of fishery and aquatic resources with specific attention which should be given to the importance of integrating or coordinating fisheries management and habitat management. In the process, the importance of managing fishing capacity (large- and small-scale) should be recognized as top priority since this could result in reduced over-capacity, curtailed destructive and illegal fishing, and eventually no IUU fishing.

Many development actions recommended for the coming decade clearly point towards increased attention to social matters and aspects related to poverty reduction, and maintaining a healthy and productive environment. Efforts to mitigate the impacts of climate change and to build up adaptive capacity are cutting across all activities in the region and relate to all sectors. Therefore, all sectors and all segments of society in the region should work together in reversing the trends of environmental degradation and loss of biodiversity, and in securing the means of maintained livelihood for rural (coastal and inland) communities. In addition, improving the working conditions and status of migratory workers/fishers should be addressed with emphasis on the important role of women in local and national development perspectives, the latter being one of the key priorities in the ASEAN Blueprints.

In the entirety of the 2011 Resolution and Plan of Action, and the ASEAN Economic Community Blueprint, it is necessary to enhance governance in fisheries, promote sustainable aquaculture development, and improve the utilization, and safety and quality of fish while at the same time also promote trade and compliance with international trade requirements (quality, equity, traceability, legal status). In other words, all these sum up to the need to undertake initiatives that would reduce practices that impede the sustainable development of fisheries and the aquatic environment, in order that in the coming decades food security could be achieved.

### **Sustainability of Marine and Aquatic Resources**

Marine capture fisheries in the Southeast Asian region have been the major contributor to total fishery production in the region where contributions come from both the larger and smaller scale segments of the sector. The larger vessels which are more urban-based are landing at fishing harbors while the smaller vessels predominantly land at smaller coastal landing sites or on the shore. The smaller scale fishing efforts contribute to the basic livelihood, food security and job opportunities along coasts throughout the region, while contributing a vital part of the rural/coastal social and livelihood structure. Fisheries and the fishing industry are major contributors to income generation, job opportunities and economic development. The larger vessels employ large groups of migratory crewmembers including migrants from other countries. In a similar way, the processing industry in Southeast Asian countries is a major employer with a majority of them constitutes the female workers.

However, sustainability which at present necessitates high level of involvement of people along the coasts and in urban areas is being questioned due to diminishing fishery resources and degradation of stocks coupled with the deterioration of natural habitats which had led to decreased total production from marine capture fisheries in many countries of the region over the past decade. As a consequence, some countries like Thailand for example, imports large quantities of fish and aquatic products to keep canneries and other processing industries going at high capacity.

Under the circumstance where deterioration of fishery resources has taken place, attempts have been made by several countries and relevant organizations in the region to explore new potential fishery resources including demersal and deep-sea resources in order to cope up with the ever-increasing demand for fish. Careful consideration should be given on the fact that fishery resources in these areas could be very scarce in nature. Without adequate information on the status of these resources, effective management mechanism could not be put in place for the

sustainable utilization of the resources. In addition, since these new fishing areas may not be easily accessible, the returns that could be derived from exploiting these resources might not be able to cover the operations costs, not even to mention the cost for undertaking the research and exploration activities in the first place.

### **Improving Governance and Management for Sustainable Fisheries**

The rapid and largely uncontrolled development of fisheries throughout the region during the past decades where especially the larger scale fishing operations have increased their share of production, are often in conflict with the needs and rights of smaller fishing communities to fish and maintain their livelihoods as well as their share of the aquatic resources. There is now a substantial over-capacity among larger fishing vessels as a result of the uncontrolled expansion in the sector. Moreover, an increasing number of people are getting involved in coastal small-scale fisheries and the number of vessels also increased which in turn lead to over-capacity in many coastal areas. Increased fishing efforts, including encroachment of larger vessels in coastal waters, comprise threats to the sustainability of the fisheries in coastal areas.

Fishery resources are common property and belong to no one and no country, unless caught. This signifies special challenge for government agencies in each country and the region as a whole, to adopt sustainable fisheries management measures with clear mandates on their roles and responsibilities, including the proclamation of restricted areas, conservation zones which should be complied with by those involved in fishing operations (large-, as well as small-scale). One of the big challenges that lie ahead is to manage fishing capacity (reduce over-fishing), combat IUU fishing, and curb resource degradation, where the latter is a special challenge as it requires cooperation across sectors including non-fisheries activities that are equally damaging the environment and coastal habitats. In Southeast Asia, there is a growing recognition that in order to have good chances to succeed, the countries in the region should cooperate either as part of the whole region or as part of sub-regional arrangements.

A growing concern has been made known at global level and regional levels such as in Southeast Asia, on the need to manage fishing capacity to reduce over-fishing and to combat illegal and destructive fishing to ensure sustainable utilization of the fishery resources. In responding to such concern, countries in the region have increased their efforts in the promotion of responsible fishing technologies and practices in order to improve fisheries management and to manage fishing capacity.

There is also an increasing strong consensus in the region on the need to strengthen measures to combat Illegal, Unreported and Unregulated (IUU) fishing, particularly through port state measures, flag state measures and other measures as practical. The FAO Legally-binding Instrument on Port State Measures to Prevent, Deter and Eliminate IUU Fishing and the European Commission Regulation to Establish a Community System to Prevent, Deter and Eliminate IUU Fishing are indications that increased emphasis is being given to strengthen the role of port states in monitoring fish and fishery products, check the validity of catch documents, vessel records, crew lists and any other documents that could verify the legal status of the catch. In order to provide proper documentations, flag states should improve their records as the port states are carefully inspecting the documents issued by the flag states to verify that fish and fishery products are derived from legal fishing operations.

Further efforts to manage fisheries to combat IUU fishing, as indicated above, should also be pursued by flag states, particularly through the intensification of vessel registration and record systems, development of appropriate catch documentation system and mechanism, and strengthening of monitoring, control and surveillance measures to improve management of fishing capacity and to combat IUU fishing. Local communities, fishing industry and relevant stakeholders should, as relevant in each area, be involved throughout the processes. The need to develop the harmonized catch certification system for countries in the Southeast Asian region has recently been recognized and will continue to be on the agenda, not only to enhance the competitiveness of countries in trading their fish and fishery products to the international markets, but also to ensure the sustainable utilization of fishery resources in the region. Concerted actions are therefore growing among the Southeast Asian countries with the objective of enhancing capacity to develop the legal framework for fisheries management that could address among others, such concerns as excess fleet capacity; significant amount of by-catch and discards; monitoring, control and surveillance (MCS) networks for fishing operations; and collection of fishery data and information.

**Governance:** It is important to have different approaches in improving governance with regards to large-scale fishing and coastal fishing operations, considering that the large-scale or commercial fishing is to a large extent urban-based, while the coastal fisheries which are considered to be the “traditional” fisheries sector are available all over the region in coastal/rural areas. For the large-scale segment, stricter rules for registration of vessels, rules to issue licenses to fish and regulations with regards to the working conditions of crew members including proper documents for all (including migratory

workers) should be imposed. On the other hand, improving governance in coastal fishing operations and the well-being of communities, could be achieved by enhancing the participation of the communities in fisheries and environmental management, and promoting effective accountability of the resources by the users.

Improving local organizations based on “rights” as specified in local regulations, is increasingly recognized as a key element in strengthening the communities not only within fisheries but also to a broader aspect, the livelihood base which includes other sectors. This implies that initiatives should be undertaken to strengthen local institutions and enhance the roles and functions of community members, including those of women, in rural development as well as in fisheries and habitat management. This approach is expected to strengthen the position of coastal communities in ensuring their continued existence and the sustainable utilization of fisheries products and other resources, especially in situations where there is increasing pressure from other resource users including encroachment of other sectors in coastal areas. Another important impact when communities are strengthened would be their improved adaptive capacity and resilience to respond to the effects of climate change.

Fisheries cannot be managed in isolation but through the integration of fisheries and habitat management considered from the broader point of view in terms of improved governance and sustained efforts to combat illegal and destructive fishing. In an effort to improve management and social well-being in a broader context, FAO has launched the Ecosystems Approach to Fisheries (EAF), which in general refers to efforts to increase the contribution of fisheries to sustainable development, the promotion of ecological pursuits such as habitat protection and conservation, and the ways of maximizing socio-economic benefits including increased and equitably distributed wealth and sustainable livelihoods. Looking at the socio-economic benefits, the adoption of EAF should be pursued by the countries in the region.

***Habitat Conservation, Restoration and Rehabilitation:***

There is an increasing commitment among fisheries agencies in the Southeast Asian region to give more attention to initiatives that support the management of habitats and important ecosystems in order to sustain fisheries production and conserve aquatic resources in coastal areas. Several initiatives had been put into practice in the region, including the establishment of conservation zones such as Marine Protected Areas, fisheries *refugia*, wildlife sanctuaries and other “fisheries resource conservation areas”. These initiatives are going to increase and thus, should be promoted giving due considerations to the linkage between specific locations

and critical life-cycle of important aquatic species, and eventually improve cooperation among countries and relevant agencies. In addition to habitat conservation and restoration, resources enhancement should be carried out, particularly in areas where the fishery resources/stocks have fallen below the ecosystems' carrying capacity. This could also include deployment of artificial reefs (ARs) as means of addressing the concern on fish habitat degradation and overfishing, taking into consideration the real purpose of ARs whether these are for fisheries or for coastal resource enhancement, which should be clarified.

### **Sustainability of Inland Fisheries**

Although coastal marine capture fisheries have been providing very significant portion of the region's total fisheries production, the substantial importance of inland fisheries in Southeast Asia in terms of its contribution to livelihood and food security should be recognized. Very large groups of people depend on the availability of natural resources such as freshwater resources, for their livelihood. In Cambodia alone, more than eight million people are dependent on the country's freshwater aquatic resources. Even if statistics on inland fisheries production are available in most countries in this region, but it has been generally recognized that such figures could be very much under-reported as large portion of the catch from inland fisheries goes directly to local or household consumption, since there are not many stations near inland water bodies that do the information gathering.

The unavailability of accurate data on inland capture fisheries make it difficult to value its importance as well as those of related ecosystems (wetlands), and hence, it is quite improbable to point out that the inland fishery resources have been exploited above the maximum sustainable yields. Countries in the region should therefore strengthen their efforts to improve data collection on inland fisheries as the information could serve as basis for evaluating the extent of exploitation of their respective inland fishery/aquatic resources, and for enhancing the awareness of stakeholders on the importance of inland fisheries, especially the planners, policy makers and other resource users in order to minimize cross-sectoral conflicts.

The largest threat to inland aquatic resources and wetlands includes the numerous construction activities and infrastructure developments that are prominent in the region. Structures being developed such as dams and reservoirs, weirs among others, could endanger the aquatic resources due to the disrupted inter-connectivity of inland habitats and threaten the extinction of certain aquatic species, particularly those whose life cycles

depend on upstream/downstream migration. In the like manner, other structures and developments such as roads, urban and industrial estates, and filling up of flood-plains, rice fields and wetlands, also create impacts to the aquatic resources. In this regard, mitigation measures appropriate for the region which could include as appropriate, the development of fish pass models and installation of culverts under road systems that could provide channels for the migration of inland aquatic species should also be explored.

### **Sustainability of Aquaculture Development**

Over the past decade, reduction of fishery resources/stocks and deterioration of habitats in many countries had led to declining trend in the total production from capture fisheries. On the contrary, the contribution of the aquaculture sub-sector to the sustainability of fish production in the Southeast Asian region has significantly increasing. Such development has been brought about by the fast development of culture technologies and introduction of new or genetically improved aquaculture species with promising future. As a result, production from aquaculture has almost doubled over the past decade.

In order to support the sustainable development of aquaculture in the region, research and development (R&D) on appropriate culture technologies for all culture stages of important aquatic species should be undertaken. Specifically, R&D to improve technologies that ensure steady supply of good quality seeds should be backed by necessary supportive national policies that aim to promote better hatchery management practices as well as responsible collection and use of wild broodstocks and seeds.

In addition, priority should be given on the development of technologies that minimize the dependent of culture activities on fishmeal and fish oils as ingredients for fish feeds, *e.g.* by exploring appropriate plant-based meal substitution and enhancing the digestibility of plant-based feeds. In controlling the occurrence of new and emerging aquatic diseases, surveillance of disease transfer into wild populations should be enhanced by embarking on regional initiatives that aim to harmonize disease control standards and implementing contingency plans to handle the incidence of diseases. In this regard, the concept of healthy and wholesome aquaculture, which includes curtailing irresponsible culture practices that threaten food safety and create negative impacts on the ecosystem, should be promoted. More particularly, the use of efficient feeds to optimize production of quality farmed aquatic species with the least negative impact on the environment should also be pursued.

During the past decade, a growing number of certification requirements (quality, health, hygiene) including those developed by the private sector for the trading of aquaculture products in the international markets had emerged. This has created additional constraints to most aquaculture farms in the region in complying with all the requirements. With the recent development of the FAO Technical Guidelines on Aquaculture Certification, requirements for certification could be harmonized by making these more straightforward, to ease any unnecessary burden on the part of aquafarmers. Although the FAO Technical Guidelines is voluntary in nature, countries in the region should explore the possibility of developing their respective national certification systems which should be harmonized with the FAO Guidelines, to facilitate trade and to make the countries more proactively prepared for any new requirements on trading of aquaculture products that could come to light in the future.

#### **Improving Safety of Fish and Fisheries Products: ASEAN Requirements**

The importance of improving the safety of fishery products for regional utilization is rapidly gaining recognition especially with respect to the integrated economic status which is being established under the ASEAN Community framework. In spite of the difficulties encountered in enhancing the safety of fish and fishery products due to scarce resources, considerable efforts had been gradually carried out in the region especially on the development of HACCP plans for fish and fishery products, adoption of GMP/SSOP plans for SMEs producing traditional products, establishment of regional methodologies for analyzing chemical residues in fish products, harmonization and validation of laboratory methods, and implementation of proficiency testing. Given all these means, the countries in the region should be able to enhance their capacity to monitor food safety and food quality, although efforts should also be re-focused to take into consideration additional requirements that could arise in the next decades.

Initiatives have also been undertaken by the countries in the region to enhance their capacities especially in validating analytical methods of detecting important chemical and drug residues in aquaculture products, which together with the promotion of appropriate aquaculture technologies, aim to minimize chemical residues and prevent possible technical barriers to trade of the region's fish and fishery products. In addition, efforts to assure the quality and safety of fish and fishery products for domestic and local consumption, particularly the traditional fish products that are widely produced and consumed by local populace, should be sustained.

Furthermore, significant improvements in terms of improving and developing post-harvest facilities, have also taken place in the region over the past decades, which involved the construction of more cold storage and ice plant facilities as well as infrastructures for fish handling, distribution and marketing, and the development and adoption of techniques to improve fish handling onboard fishing vessels in order to maintain the quality of catch. Modern fish processing factories have also been established in many countries for generating high-value and high-quality fish and other fishery products.

In the midst of the increasing demand for fish for human consumption in the region, the present supply and the pressures from the markets lead to more quantity of fish being diverted for non-human use. It is feared that over the next decade, more low-value fish would be diverted from direct human consumption due to the rapid expansion of the aquaculture sub-sector. Meanwhile, catch of the so-called low-value fish could include juveniles of high-value species, while high-value species could be transformed into low-value fish due to poor handling onboard fishing vessels, particularly in the case of small fishing vessels. Onboard fish handling technologies that are appropriate for small fishing boats should therefore be developed to improve the quality of catch and minimize discards. Parallel to proper onboard handling, onshore technologies should also be promoted for efficient handling and maximizing the utilization of catch so that more fish and fishery products could be used for human consumption.

Moreover, the development of value-added products from low-value fish should also be pursued with much intensity. Considering that technological innovations in transforming low-value fish into value-added products are already available, for example in the development of the surimi industry, assessment of such innovations throughout the entire supply chain should be continued, with the objective of developing more appropriate technologies that are aimed at producing higher quality fishery products to improve economic returns, reduce wastage, and enhance processing by-product utilization.

#### **Enhancing Trade in Fish and Fishery Products**

In 2007, the Southeast Asian countries exported 7.4 million metric tons of fish and fishery products valued at US\$ 14.4 billion (SEAFDEC, 2010), accounting for about 30% of the region's total fish production in terms of quantity and 60% in terms of value, with Thailand and Vietnam among the top ten exporting countries. The annual growth rate of food fish exported from Southeast Asia was recorded at 7% as of 2009 (WTO, 2010). With this record, it could be gathered that export of fish and

fishery products from the region continued to increase, implying further that the fisheries sector has been producing more fish and thus, has continued to provide employment opportunities for more peoples in the region.

The demand for fish and fishery products has increased together with the increased concerns of consumers for good quality and safety of the products, prompting the call for sustainable utilization and harvesting as well as proper management of the fishery resources. Exporting countries have to comply with the demand, requirements and other trade-related measures in order to maintain their niche in the markets and boost their respective economies. Meanwhile, importing countries continue to enforce several measures as conditions for trading of fish and fishery products, which include voluntary instruments and non-voluntary agreements. In particular, important measures and requirements imposed by importing countries include those on traceability, certification, labeling, fisheries subsidies, and welfare of fishing crew and fishing labor. In order to strengthen the export of fish and fishery products from the Southeast Asian region, countries should examine carefully and consider complying with the relevant measures and instruments which are now commonly practiced in international trade and has also been increasingly becoming part of the basic requirements for trade among the ASEAN countries.

The drive towards sustainability has also taken an important angle in the ambitions to protect and conserve the aquatic biodiversity. Increasing attention had already been given on specific species such as cetaceans, several tuna species, marine turtles, and sharks among others. Therefore, conservation and management measures had been put in place to protect the endangered species while trade regulations had been imposed under the UN Conventions to ensure sustainable exploitation of the species. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is one of the conventions that regulate international trading of species that are threatened to extinction. While the regulations imposed by CITES had been under debate in many countries in the Southeast Asian region, countries should continue to undertake measures to ensure the sustainable exploitation of endangered aquatic species.

### **Addressing Emerging Challenges and Cross-cutting Issues**

**Data and information:** The growing requirements for sustainable development and management of fisheries require the availability of adequate, improved and reliable data and information. To keep up with the fast pace of development in fisheries, real-time fisheries data will increasingly be required, especially for providing better

understanding of the status of fishery resources/stocks, including information on species that are considered to be endangered and receiving special international attention. Identifying the data required and strengthening the capacity of countries in the collection, analysis and utilization of fisheries data and information for science-based policy formulation and management of fisheries, constitute additional areas of concern for countries in the region. More particularly, in order to obtain time-series data for understanding the status and trend of fisheries and for the sustainable management of fisheries, collection of fishery information and statistics should be improved and strengthened at the national and district levels since such information could also serve as basis for national planning and management, and eventually for compilation and analysis at regional and global levels. Considering however, that collection of sufficient statistics requires sufficient human resources and budget, appropriate non-conventional methodologies should be explored and applied, since the results could also be used by the countries in deriving better statistical data in the future. In addition to scientific and statistical data, the importance of traditional/local knowledge should also be recognized and appropriately compiled and utilized.

**Climate Change:** Considerable attention has now been focused on the potential impacts of climate change and on the need for countries to take up measures to adapt and mitigate such impacts to fisheries and aquaculture, and the people involved in and dependent on the aquatic resources and wetlands. While scientific ability to predict changes in weather, climate and water circulation remains limited, the magnitude of the potential impacts of such changes on fish stocks and the ecosystem is even more difficult to foresee. The nature of impacts which is fairly well-known could be used in building up adaptive capacity in coastal and inland communities, which are already well adapted to respond to any “climate variability”. Since seasonal patterns never look the same to the extent that people now need to cope with longer the dry season and large amount of rainfall in the wet season including large accumulation of water in various areas, countries would need to develop appropriate adaptation and mitigating initiatives, and establish precautionary approach which should be built upon their capability to cope with the changes. Research and inventory of relevant data and information especially focusing on local/traditional knowledge should be pursued, since the results could provide better understanding on the extent of climate change and the potential impacts. Furthermore, the fact that the impacts of climate change are very much area specific should be well recognized as there could be no common approach applicable for each and every area of the region. Furthermore, measures on safety at sea (and on land) including improved working conditions



should also be adhered to. In addition, fisheries and aquaculture sectors should also exert efforts in reducing carbon footprints to mitigate environmental impacts from the sectors which lead to climate change.

***Working Conditions of Fishers Including Migratory Work Force:*** The ASEAN Community Blueprints give high priority to the improvement of working conditions and the status of migratory workforce, especially applicable to vessel crew members and fishers as well as those working in processing industries. Recommendations from countries in the ASEAN region dovetail towards the development of a regional standard which should be in accordance with international requirements, especially on health and safety standards for crew members on fishing vessels as well as for safety at sea of small fishing boats. In the like manner, improved standards should also be applied in the fish processing industry. While initiatives have been undertaken by the Southeast Asian countries to comply with the health and safety standards, consideration should be given to ensuring good employment practices in fishery-related activities in line with respective domestic laws and regulations, while adhering to regional and international requirements. Efforts should therefore be exerted to mainstream and integrate the safety issues into the respective national policies on management of fisheries and post-harvest industries, taking into account the fact that in the Southeast Asian region, coastal and inland fisheries are mainly small-scale and artisanal that include subsistence activities, and involve children and women, particularly in the post-harvest activities and trading of fish and fishery products. Similarly for the larger-scale segment of the fisheries and related activities in the region, where large numbers of migrant laborers could be involved, possibly reaching several millions although the official/accurate data are not available. This could also mean that there could be several millions of workers specifically in the processing industry which comprise mostly women.

***Human Resources Development:*** While progressing towards global and regional competitiveness, countries in the region should ensure that qualified human resources are available in relevant disciplines (fisheries and non-fisheries). This concern has increasingly become crucial with the approaching establishment of the ASEAN Community in 2015. During the past decade, the areas of human resource expertise in fisheries of most countries are moving towards those that provide higher economic benefits, such as capture fisheries and aquaculture, as well as in post-harvest and processing enterprises. While attention is now shifting towards economics and areas that could generate higher returns (for fewer people), the scarcity of expertise in several fundamental subjects has

become very noticeable, particularly in fisheries biology, laws and legislation, as well as in emerging concerns such as social and migration aspects. The countries should therefore review the availability of expertise in order to establish a clear picture of their respective current available human resources and be able to nail the important gaps in the existing expertise. This also implies the need to match the existing available human resources in wide-ranging disciplines and the demand to fill up future requirements.

#### 4. Future Direction and Way Forward

There is no doubt that the fisheries sector of the Southeast Asian region could continue to play the vital role of ensuring food security and improving the economies of the region. However, this goal can only be achieved if the prevailing issues in the fisheries sector are addressed, while the possible adverse impacts of emerging issues that come to light in the coming decade are mitigated. This requires that the countries should continue to muster their collective efforts for the next decade in accordance with the region's mission of achieving Fish for the People 2020.

It could therefore be foreseen that by 2020 and beyond, the region would attain the age of golden fish harvest, and with much optimism, fish produced from the region would be among the high value food commodities of the world or even the best of its kind. What is necessary to boost such confidence is to maintain a level of equilibrium where in the fish demand and supply equation, the exploitation and utilization of the fishery resources should not outweigh the increasing demand for food fish as enhanced by capacity of consumers to buy fish for health reasons, notwithstanding the fair benefits that could be reaped by the fishers to sustain their livelihoods.

Meanwhile, it is very likely that in the midst of a very competitive fish market, the number of international and even regional instruments would continue to increase for the sustainable development and management of fisheries worldwide. Such situation makes it necessary for the countries in the region to get together and come up with common means of complying with such instruments, taking into consideration the uniqueness of fisheries in the region which remain small-scale and exploiting the multi-species resources, by beefing up fisheries governance and measures to conserve and rehabilitate the natural resources. While requirements for safety, welfare and sound working conditions of fishers would prevail in the international arena, countries in the region should adopt good employment practices in line with their respective domestic laws and regulations, which also complying with the international requirements.

Therefore, in the perspective of achieving the goal for regional economic integration by 2015, countries in the region should also consider the adoption of resource audit schemes to make the resource users accountable for the natural resources that they have been exploiting. This also implies that the countries should educate the stakeholders on how to fish responsibly and adopt traceability of fish and fishery products. Considering that the peoples in the region are fish-eating, countries should ensure that food fish which is nutritionally adequate in

terms of quantity, quality and variety, is available for all peoples at all times, which in turn also addresses poverty especially in rural areas. In a broader sense, a well-balanced demand and supply of food fish should be set as the ultimate goal to reach the age of golden harvest in fisheries. After all, when all factors come into reality, it could be surmised that the region's fisheries would be one sector which could take care of food security for the future generations of the Southeast Asian region.