



Towards Sustainable Fisheries and Aquaculture in Southeast Asia: A Call for the Development of Regional Fisheries Management Strategies

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Fish is by many, the preferred source of food as it is low in cholesterol and with high nutritional value. The Southeast Asian countries (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam) are major producers of fish contributing about 15% (about 24 million metric tons) to the world's total fisheries production in 2006 (capture and aquaculture combined) which was about 160 million mt (**Table 1**). While the region's capture fisheries over the past two decades showed a 5-year average increase of 11%, aquaculture performed much better with a 5-year

average increase of 34%. On the other hand, inland capture fisheries showed a 5-year average increase of 14% from 1981 to 2006.

Trends of Marine Capture Fisheries, Aquaculture and Inland Capture Fisheries of Southeast Asia

Trends referred to with regards to marine capture fisheries in the Southeast Asian region in the context of this document, are in principle based on landings of aquatic products

Table 1. Fish production trend of Southeast Asia (SEA) and China by five-year averages (mt)

	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006
SEA Total	8,568,544	10,557,224	13,198,772	15,543,652	20,042,475	23,948,854
Inland Capture	982,141	983,393	1,048,013	1,172,835	1,548,503	1,889,803
Marine Capture	6,542,085	8,065,140	9,793,830	11,212,775	12,904,211	13,762,586
Aquaculture	1,044,318	1,508,691	2,356,929	3,158,042	5,590,761	8,296,465
China Total	7,129,908	12,559,052	24,148,501	43,617,421	55,881,144	62,712,523
Inland Capture	441,756	731,163	1,222,910	2,089,733	2,367,668	2,549,199
Marine Capture	3,252,190	5,062,912	8,593,286	14,367,860	14,698,594	14,866,757
Aquaculture	3,435,962	6,764,977	14,332,305	27,159,828	38,814,882	45,296,567
World's Total	83,604,545	102,089,234	113,731,499	133,739,382	150,187,506	159,897,138
Inland Capture	5,502,299	6,160,741	6,610,436	8,108,997	9,028,666	10,069,279
Marine Capture	68,769,172	80,837,610	82,542,454	86,153,783	85,374,730	83,081,146
Aquaculture	9,333,074	15,090,883	24,578,609	39,476,602	55,784,110	66,746,713

Source: FAO FishStat Plus 2008

that are caught within the region (EEZ's, archipelagic waters, etc.) and not outside of national jurisdictions. To manage the fisheries in the region it is necessary to take into account various factors that include the migratory nature of the fish stocks, the fishing licenses provided to foreign vessels, unregulated nature of domestic fisheries, the whole perspective of small-scale fisheries, and the high regional mobility of fishing crew. Considering such factors that could impede the sustainable development of fisheries in the region, there is an imperative need to address the management of fisheries both at national and regional level.

Moreover, illegal, unreported and unregulated (IUU) fishing has been receiving increased attention in the region as well as in the international arena, as reflected in ASEAN Heads of States urging for increased efforts to combat illegal fishing as well as eight of the ASEAN Member Countries signing up on the Regional Plan of Action (RPOA) to combat IUU fishing. For the long-term sustainability of fisheries, Southeast Asian countries could also consider operating in neighboring waters while at the same time improve the regulations and management of their respective domestic fisheries.

Box 1. Identified sub-regional fishing areas in the Southeast Asian region

1. Lower Mekong River Basin (LMRB), a very important freshwater and floodplain fisheries area shared by Cambodia, Lao PDR, Thailand, and Vietnam (CLTV)
2. Gulf of Thailand which features a large amount of small-scale and coastal fishing operations and large-scale fishing as well as reported IUU fishing and unreported landings across boundaries, shared by Cambodia, Malaysia, Thailand, and Vietnam (CMTV)
3. Eastern and Southern South China Sea and Sulu Sulawesi Sea area characterized also by a large amount of small-scale and coastal fishing, small-scale vessels, large-scale fishing, and IUU fishing, bordered by Brunei Darussalam, Indonesia, Malaysia, Philippines and Vietnam (BIMPV)
4. Timor-Arafura Sea which features small-scale traditional fishing, industrial fishing for larger pelagic fish including licensed fishing by foreign vessels and IUU fishing, bordered by Australia, Indonesia, Papua New Guinea and Timor Leste (AIPT)
Note: Australia, Timor Leste and Papua New Guinea are not members of the ASEAN
5. Andaman Sea (and Malacca Straits) which shows the same pattern of small-scale, large-scale fisheries and IUU fishing, shared by India, Indonesia, Malaysia, Myanmar, and Thailand (IIMMT)
Note: India is not a member of the ASEAN
6. Northern South China Sea and the Gulf of Tonkin with similar characteristics as that of the Gulf of Thailand, is shared by China, the Philippines and Vietnam (CPV)
Note: China is not a member of the ASEAN

Therefore, the establishment of appropriate regional and sub-regional fisheries management mechanisms for Southeast Asia has been progressively pushed forward. Specifically, the establishment of the ASEAN Regional Fisheries Management Mechanism (ARFMM) covering both marine and inland fisheries was envisaged to address fisheries management issues. Although ARFMM is a broad and more general mechanism, it will not address stocks or species in particular but more on specific habitats and fish species at the sub-regional level.

The region's sub-regional areas (**Box 1**) have specific profiles and challenges to address, but the common elements to be worked out for each sub-regional area management mechanism, could include information exchange on fisheries activities (officially recognized fishing and IUU fishing), shared and migratory stocks, results from port monitoring activities (landings by foreign vessels), social mobility of fisheries-related workforce, and laws and institutional arrangements. Other aspects for cooperation at the sub-regional level could include networking on Monitoring, Control and Surveillance (MCS), mutual support in the implementation of port State and flag State measures as well as consultations and agreements on the design and zoning of special "management" areas such as refugias, protected areas, etc. While this could be outside the mandate of national fisheries agencies, the settlement and definitions of corresponding maritime boundaries should also be pushed ahead.

Aquaculture, which is mostly done as national operation and well within national policy frameworks, is also confronted with many constraints that impede its sustainable development (Ekmaharaj, 2009). The very fluctuating oil prices led to increased costs of inputs and other operating costs such as feeds and transportation, making it difficult for the fish farmers to continue their operations. Although aquaculture production has increased, farm gate prices of aquaculture products continue to decrease. This situation results in less profits for the fish farmers and the whole aquaculture operation is becoming more risky. Although increased stocking density in ponds could be an option, it could also lead to more frequent water pollution followed by diseases outbreaks.

On top of this, the farmers still have to face the impacts of other natural disasters such as floods and storms. Furthermore, recent demands by consumers to trace the products (traceability) throughout the production chain, has led to the need for aquaculture products to be labeled, i.e. eco-labeling (Ekmaharaj, 2006). This in turn adds more costs for farmers although meeting such international requirements would also provide them with increased market

opportunities. Moreover, in order to mitigate environmental impacts and address social concerns, some improvements on farm routine practices are needed but this could potentially mean additional investment costs.

Inland capture fisheries on the other hand, exploit mostly the wild freshwater aquatic species including migratory species that move from the oceans to freshwater bodies. The region abounds in natural lakes, rivers, swamps and wetlands, and reservoirs that constitute important fishing grounds. However, little information is available on the real-time production from inland capture fisheries even considering that this sector has been providing the rural populace in many countries with sufficient source of animal protein, job opportunities and livelihoods as well as income. Lack of information remains a main drawback, making the assessment of inland fish stocks very difficult to undertake.

With such situation, it is impossible to evaluate whether the inland fisheries resources of the region have been over-exploited or under-exploited based only on the reported decreasing or increasing production. Moreover, the detailed analysis of the catch trends with regards to species composition could not also be established. The case of Cambodia's inland capture fisheries production for example, is something that should be reckoned with. While in the early 80s, its production from inland waters was reported to be only a little over 50,000 mt, production in 2006 has increased by more than 800% (Table 2). More than 80% of Cambodia's freshwater fishes are produced from the Tonle Sap Great Lake, a natural flood reservoir of the Mekong River which during the flood season the lake water area could rise to 10,000-12,000 km² with a water depth of about 10-14 m, while in the dry season the water

area is about 2,000-3,000 km² with an average depth of less than 1.0 m. During the monsoon, the water area expands to the inundated forest creating an enormous area of about 6,000 km², very ideal for fish breeding, spawning, nursery and feeding grounds.

The Mekong River region in Cambodia is one of the richest natural resources in the world in terms of ecological diversity. The high productivity is a result of the annual inundation by the Mekong River of the large floodplains around the Tonle Sap Great Lake in central Cambodia and the Mekong floodplains near its capital city Phnom Penh. It is in these areas that important fish habitats such as flood forests are located. Like in Cambodia, the region's inland fisheries should also be evaluated in terms of potentials considering the vast freshwater resources that include rivers, streams, lakes, reservoirs, ponds, channels, low-lying paddy-fields, etc., which are favorable for fishing (Table 3). However, the freshwater resources in the region could be overfished due to lack of protection and appropriate management measures.

The data in Table 3 seemed to indicate a different rate of production from the country's inland fisheries. This is something that should also be reconciled through improved collection of statistics using pre-established indicators. Considering that lake and reservoir fisheries are also commonly operated in the region, and are important for the socio-economic wellbeing of the peoples in the rural communities. Such resources should be properly managed in order to avoid over-exploitation.

It should also be considered that most of the man-made reservoirs or dams are constructed for development purposes such as irrigation and hydropower supply with fisheries

Table 2. Southeast Asian production from inland capture fisheries by five-year averages (mt)

	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006
Brunei Darussalam	105	123	33	23	12	10
Cambodia	57,010	60,632	69,800	137,762	325,610	422,000
Indonesia	267,094	283,898	312,516	314,918	310,426	301,140
Lao PDR	22,702	20,400	21,682	24,158	30,768	29,800
Malaysia	4,665	1,654	2,241	3,835	3,885	4,165
Myanmar	141,230	139,598	143,368	160,206	348,206	631,120
Philippines	280,752	240,130	212,804	156,140	136,424	160,498
Singapore	431	141	21	-	-	-
Thailand	103,362	108,740	166,330	203,707	200,319	197,270
Vietnam	104,790	128,077	119,218	172,086	192,853	143,800
SEA Total	982,141	983,393	1,048,013	1,172,835	1,548,503	1,889,803
World's Total	5,502,299	6,160,741	6,610,436	8,108,997	9,028,666	10,069,279

Source: FAO FishStat Plus 2008

Table 3. Inland freshwater resources of selected countries in the Southeast Asian Region

Country	Total freshwater resources (ha)	Production in 2006 (mt)	Major Species Harvested
Cambodia (Great Lake Tonle Sap)	200,000-300,000 ha (dry); 1,000,000-1,200,000 ha (flood season)	422,000 (ave: 1,700 kg/ha (dry) or (ave: 400 kg/ha (flood))	Major species caught are cyprinids (49%) and snakeheads and others (51%), the most common species harvested are: mud carp, climbing perch, snakehead, moonlight gourami, mystus catfish, small shrimps, etc.
Indonesia (Java, Sumatra, Kalimantan, Sulawesi, Irian Jaya, Bali)	55,000,000	301,140 (ave: 6 kg/ha)	Snakeheads, catfishes, featherback, freshwater prawns, clams, climbing perch, carps and other cyprinids, eel, gourami, silver barb, tilapia, etc.
Malaysia (Peninsular, East)	100,000	4,165 (ave: 42 kg/ha)	Carps, catfish, tilapia, freshwater prawns, etc. Aquarium fishes are also caught (recorded in pieces).
Myanmar (Rivers, ponds, reservoirs)	8,200,000	631,120 (ave: 77 kg/ha)	Carps, rohu, hilsa, catfish and other freshwater fishes, freshwater prawns
Philippines (north and south)	496,100	160,498 (ave: 325 kg/ha)	Water snails (37%), tilapia (23%), carps (7%), mudfish (6%), lizard fish (4%), theraponids (3%), prawns (3%), gourami (3%), catfish (4%), climbing perch (1%), others (10%).
Thailand (Lakes, swamps, dams, village ponds)	1,285,400	197,270 (ave: 155 kg/ha)	Climbing perch, carps, pangas and other catfishes, silver barb, gourami, snakeheads, tilapia, etc.
Vietnam	32,956,000	143,800 (ave: 5 kg/ha)	Freshwater fishes, Siamese crocodile, natantian decapods, aquatic invertebrates

considered only partly for economic purposes. Efforts should therefore be exerted to optimize the exploitation of the fisheries resources in such freshwater bodies. Napaporn and Ekmaharaj (2008) cited that in the case of Thailand, after the application co-management and rights-based concepts in reservoir fisheries management, many rural fisheries communities have been able to earn sufficient incomes from reservoir and lake fisheries.

Changes in Fisheries and Aquaculture Production from Southeast Asia

There are major and evident changes in the fisheries and aquaculture sectors of Southeast Asia, in terms of production and consumption. Comparing the changes in fish production of the Southeast Asian countries with the world's total and that of China, the Southeast Asian countries contributed in 1986-1990 an average of 10% while China contributed an average of 12% to the world's fisheries production. This

trend was changed in 1996-2000 when the Southeast Asian countries contributed 12% while China's contribution was up by 33%.

Similarly in 2006, about 15% was contributed from the region to the world's fish supply while 39% was contributed by China (Table 1 and Fig.1). In a similar way, the production pattern of the other countries varied, while in 1986-1990 the average contribution from the other countries was 78%, this decreased to 55% in 1996-2000 and further to 46% in 2006. This trend has led to the present situation where the Southeast Asian countries and China now contribute 54% to the world's total production.

Looking at the contribution of the Southeast Asian region to the total fish supply since the early 80s, the trend shows that the contribution from capture fisheries has been almost static while that from aquaculture has been steadily increasing (Fig. 2).

Fig. 1. Contribution of SEA and China to World's Total Fish Production

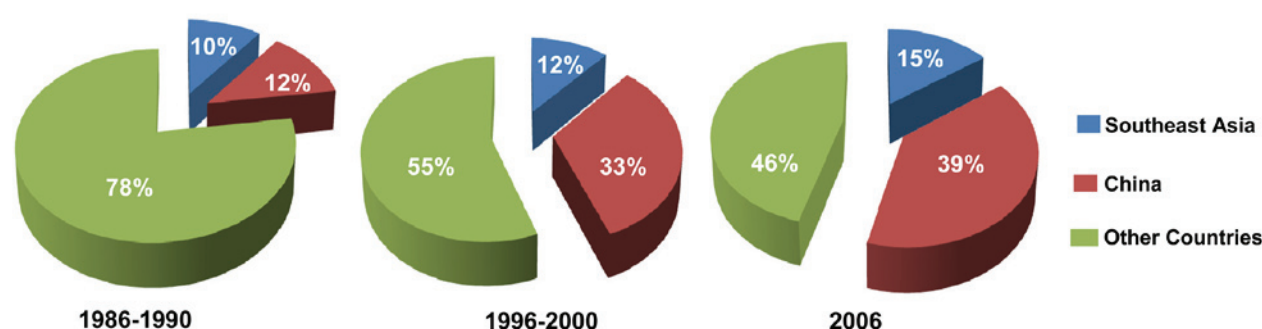
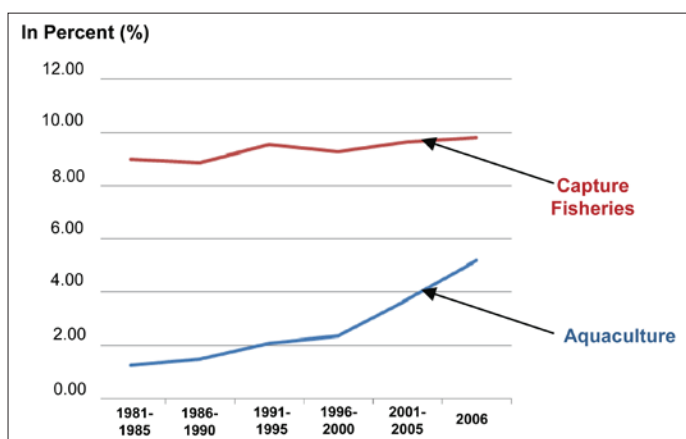


Fig. 2. Per cent contribution of Southeast Asia's capture fisheries (marine and inland) and aquaculture to the world's total fish supply



In 2006, the relative fisheries production for Southeast Asia showed 8% for inland capture fisheries, 57% for marine capture fisheries and 35% aquaculture (Table 4). The total production was about 24 million metric tons with the main part coming from marine capture fisheries and aquaculture. Southeast Asia provides almost 15% to the total fish production in the world. Indonesia has the highest production in Southeast Asia contributing about 29% followed by Philippines, Thailand and Vietnam providing 18%, 17%, and 15% to the total fish production of Southeast Asia, respectively.

On the other hand, the average apparent per capita fish consumption in Southeast Asia in 1997 was 22.9 kg and considering its total population of 491.3 million (SEAFDEC, 2001), the fish requirement of the region in 1997 was about 11 million mt or about 72% of the region's fish production (15 million mt) was consumed. In 2006, the average per

capita fish consumption in Southeast Asia increased to 26.8 kg (NOAA, 2003). With the region's estimated total population of 564.2 million in 2006 (Population Reference Bureau, 2006), the total fish consumed was 15,120,560 mt or about 63% of the region's total fish production of 23,948,854 mt. Comparing with China, its relative per capita fish consumption in 2006 was about 25.4 kg (NOAA, 2003) and with an estimated total population of 1,321.9 million during the same period its fish requirement for the same year was about 33,576,260 mt or 54% of its total fish production in 2006 (62,712,523 mt).

Sub-regional Fishing Areas in Southeast Asia

Considering the vast water resource of the Southeast Asian region, the areas suitable for sub-regional management arrangements, can be divided into six sub-regions that cover two or more countries including one for inland fisheries (Fig. 3).

At present, initial discussions to set sub-regional area planning has been done for Sub-regional Areas 1, 2, 3 and 4. The Sub-regional Area 1 (LMRB) has a strong and active cooperation in terms of technical and policy aspects under the Mekong River Commission (MRC). With respect to Sub-regional Area 5 some dialogues have been conducted as a result from the post-tsunami activities while for Sub-regional Area 6, recent development has taken place through bilateral talks between China and Vietnam. The main features of the six sub-regional areas are shown in Box 2. Indications are apparent for Sub-regional Area 4 to be sub-divided in order that it covers Northern Borneo and Sulu Sulawesi, only.

Table 4. Total fish production of the Southeast Asian countries by five-year averages (mt)

	1981-1985	1986-1990	1991-1995	1996-2000	2001-2005	2006
Brunei Darussalam	3,034	2,947	2,893	4,345	2,508	3,100
Cambodia	64,694	87,277	110,763	184,773	406,024	532,700
Indonesia	2,197,566	2,917,612	3,898,826	4,823,700	5,948,006	6,989,033
Lao PDR	25,200	27,600	32,950	50,315	94,271	107,800
Malaysia	789,188	914,008	1,134,854	1,340,900	1,465,790	1,498,732
Myanmar	605,799	710,903	783,721	930,636	1,716,781	2,581,780
Philippines	1,991,068	2,290,023	2,677,314	2,869,181	3,648,507	4,414,310
Singapore	21,495	15,925	12,739	11,858	7,621	11,676
Thailand	2,149,494	2,694,825	3,343,835	3,583,823	3,915,486	4,162,096
Vietnam	721,006	896,104	1,200,876	1,744,121	2,838,481	3,647,627
SEA Total	8,568,544	10,557,224	13,198,772	15,543,652	20,042,475	23,948,854
Inland Capture	982,141	983,393	1,048,013	1,172,835	1,548,503	1,889,803
Marine Capture	6,542,085	8,065,140	9,793,830	11,212,775	12,904,211	13,762,586
Aquaculture	1,044,318	1,508,691	2,356,929	3,158,042	5,590,761	8,296,465

Source: FAO FishStat Plus 2008

Box 2. Main features of the six sub-regional areas in Southeast Asia

(1) Lower Mekong River Basin (LMRB)

The Mekong River is one of the world's most productive freshwater bodies with an estimated production of 2.5-3.0 million mt each year. The area is mainly floodplain where riverine fisheries with a great variety of fishing gear are practiced and with a very high involvement of rural people and farmers in fishing (part-time or full-time). Critical for the reproduction of fish is the seasonal changes in the monsoon and the importance of annual floods. The threat to the resource is more from infrastructure rather than the fisheries itself as this could affect the flooding patterns. The increasing fisher population (more people involved in fishing) and infrastructure development (dams and reservoirs construction) is one of the major threats to the sustainability of Mekong fisheries. In addition, there are conflicts within the fishery itself in terms of different land and water uses. Opportunity lies in securing the seasonal flooding, fish migration paths and dry season management of freshwater fish broodstock. Fish products from the LMRB are very important for local consumption and for a substantial regional export. Although export data is not readily available, the potentials for increased export in the region and elsewhere are good. The Mekong River is one of the world's most important rivers in terms of aquatic biodiversity providing habitat for the world's biggest freshwater fish, the giant catfish (*Pangasianodon gigas*) which is on the IUCN and CITES lists for being highly endangered. MRC was established "for the sustainable development of the Mekong River Basin" with Cambodia, Lao PDR, Thailand and Vietnam as signatories, the same countries that border the LMRB. The MRC Agreement also calls for fisheries management for the region. There are now fisheries management arrangements based on additional agreements, such as fishing quota for the giant catfish in the LMRB. Although China and Myanmar are the only riparian states that have not signed the MRC Agreement, these countries have observer functions at official MRC meetings.

(2) Gulf of Thailand

The Gulf of Thailand used to have one of the highest resource potentials in the Southeast Asian region due to its shallow topographic bottom features that forms the Gulf into a large basin less than 85 meters deep. Many important rivers bring down nutrients into the Gulf, especially in the upper Gulf. Fisheries in the Gulf are diverse with small-scale coastal and large-scale fishing operations in the offshore areas. The major fisheries focus on shellfish, various demersal species, small pelagic species such as Indo-pacific mackerel, round scads, etc. (Ekmaharaj, 2007). At present, due to the absence of fisheries management and the practice of open access fisheries, the resources especially the demersal resources are depleted. All types of fishing in the Gulf have caused high pressure on the resources. The catch per unit effort (CPUEs) showed that 20 years ago the catch was 300 kg/hrs while presently it remains only at 20 kg/hour (DOF, 2007). In addition, due to the depletion of resources, many problems arise such as conflicts between groups of fishermen, IUU fishing and trans-boundary fishing. This in turn reduces the opportunities for domestic and export markets and impacts the livelihoods of the fishermen.

(3) Timor-Arafura Sea

In addition to its coastal resources, the Timor-Arafura Sea is also a significant source of large pelagic species. Fisheries in this area have two distinct features, namely: coastal traditional fisheries; and commercial fisheries using large vessels (including license foreign vessels) fishing large tunas, etc. Some fisheries are under high pressure while other resources are still believed to be abundant. Like in the Gulf of Thailand, there are also conflicts among the groups of fishermen, IUU fisheries and trans-boundary fishing. To strengthen the position of the traditional fishermen, there is a need to secure the traditional fishing rights in the coastal areas. There still exist good opportunities for export of large pelagic fish species if the resource is well managed and controlled.

(4) Southern and South Eastern South China Sea and Sulu-Sulawesi Sea

This sub-regional area can be separated into three parts: (1) South and southeastern part of the South China Sea (SCS), (2) Sulu Sea, and (3) Sulawesi Sea covering Banda Sea, Molucca Sea, Flores Sea and Celebes Sea. This sub-regional area has a great biodiversity in terms of coastal and offshore resources. It is noted for many important habitats existing in the area, such as marine turtle habitats, tuna breeding and spawning grounds (Tim L. O. Davis., 2008). The topography of bottom indicates that almost 80% of the sea areas are deep, with depths ranging from 200 to 5,000 m. Its coastal areas are not suitable for trawling therefore demersal resources are underexploited. In addition, many fishing gear such as purse seine and ring-net are being used in the area targeting small pelagic fishes, namely: neritic tuna, round scads and mackerel. Opportunities in the sub-region for future fisheries development include the challenge to further explore the potentials of deep sea fisheries where oceanic squid is also one of the potential resources. The major problems of the sub-region include: (1) IUU fishing by foreign vessel and neighboring IUU fishing vessels and frequent illegal fishing targeting sea turtles, especially around the Turtle Islands in Sulu Sea; (2) small pelagic fisheries by purse seine with Fish Aggregating devices (FADs) also catch the juveniles of yellow fin and big-eye tunas, affecting the tuna stock and thus, responsible fishing technology and practices need to be enforced (Siriraksophon, 2008); and (3) important pelagic fish species are straddling and highly migratory species which implies a need for joint approaches to management.

(5) Andaman Sea

The Andaman Sea faces and connects the Indian Ocean, but is almost semi-enclosed due to the Andaman and Nicobar Islands that are "fringing" the Andaman Sea in the eastern part. The geographic and bottom features are quite distinct compared to the Gulf of Thailand. The area includes a large continental shelf in the northern part of Myanmar and a deep basin down to 2,000 m in the central part of the Andaman Sea. Many rip-currents occur where two water masses meet producing an abundance of small pelagic fishes in the offshore waters. This area has great biodiversity on its continental shelf and continental slopes as well as further offshore. Many commercial fish species thrive on the continental slopes where the depth varies between 150-300 m, and there is an abundance of fish species in the Ayeyarwaddy delta. Even further offshore and into the deeper waters, especially in the northern part near Myanmar waters, large pelagic species are also abundant such as the yellow fin and bigeye tunas, sword fish, marlin, sailfish and thresher sharks (Promchinda S. and Siriraksophon S., 2007). Seasonal changes such as the northwest and southeast monsoons are beneficial and could be taken advantage of in order to reduce the rate of over-exploitation and to build up conservation measures to allow the fish stocks to recover. Fishing activities practically stop during the southeast monsoon and closed seasons could be introduced. Considering the tuna resources in the Andaman Sea, opportunities could include exploring new tuna fishing grounds including the potentials in the Thai EEZ, and the development of deep sea fisheries on the continental slopes from 200-800 m. However, the potentials are limited and recovery rates of deep sea resources are not fully known. Therefore, there is a general need to closely monitor new developments to ensure long term sustainable use of the area's resources.

(6) Northern South China Sea and the Gulf of Tonkin

The area is presently not considered a sub-regional focal area for the RPOA-IUU or other regional initiatives for Southeast Asia. For the Gulf of Tonkin part, dialogue and agreements are discussed between Vietnam and China. In terms of fisheries resources, type of fishery and social dimensions, the area would present similar features as the Gulf of Thailand. Subsequently, pressure on the resources and problems, conflicts and opportunities would show some similarities although different countries are involved.

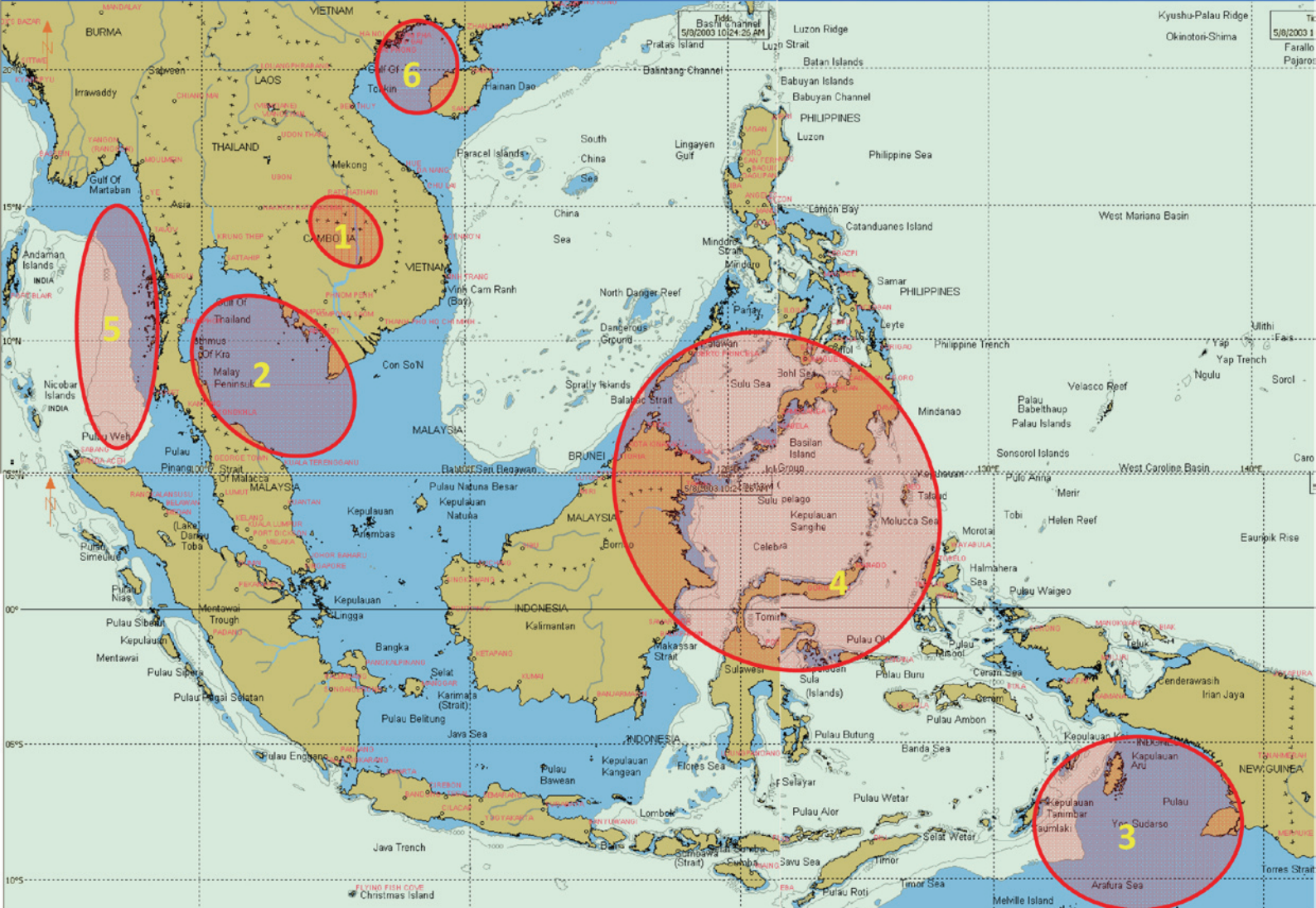


Fig. 3. Sub-regional areas suitable for management arrangements, within the Southeast Asian region

Need for Regional Fisheries Management Strategies in Southeast Asia

Throughout Southeast Asia, signs of decreasing resources are seen and there are frequent reports on over-fishing leading to calls for improved management and reduction in terms of fishing effort. Instances of IUU are widespread which led the countries to get together to formulate a Regional Plan of Action (RPOA) in combating IUU fisheries. The requirements to be able to trace catches, to certify the products (for various reasons) and the increasing demands for labels are things that the fishing industry should cope with. For countries that catch up in addressing such requirements, new avenues for better market opportunities await them. Global, regional and national requirements are becoming more stringent in terms of demands to mitigate impacts on the environment. With the high level of mobility (across borders) of fish workers and the large number of people involved in the fishing sector (fishing and processing) the sector is increasingly being scrutinized in terms of social performance and social well-being and, subsequently, new “demands” can be expected.

While recognizing the dominating role of the Southeast Asian countries in the international seafood trade, it can be envisaged that after establishing sub-regional management mechanisms this would help the ASEAN countries to

better manage the fisheries and help maintain and increase their fisheries exports. Good systems of traceability, certification and eco-labeling should also be established. Whatever management measures, the fisheries resources need to be managed and a key element is to limit the fishing capacity while IUU fishing by foreign countries and domestic sources should be prevented. The proposed Regional Fisheries Management Strategies is envisaged to provide a framework for better management and to provide a platform for cooperation within the region or sub-regions, and to comply with the various requirements covered in international instruments and to facilitate the implementation of international standards/procedures and related requirements.

Sub-regional Management and Opportunities for Future Action

Indications have been made that a regional management mechanism or forum covering the whole of the ASEAN (inland and marine areas included), need to be supplemented by arrangements at sub-regional levels to address more area-specific issues, such as habitats, fish species and trans-boundary potential conflicts. A series of consultations to initiate sub-regional arrangements, have been held in three sub-regions since 2008, and for the LMRB under the Mekong River Commission since 1995. Sub-regional

Box 3. Key elements that need be addressed to support the sub-regional fisheries management

- Agreements on information exchange among member countries on various important aspects relevant to fisheries and habitat management (including social aspects)
- Monitoring, Control and Surveillance (M, C and S) are key to common approaches that would be needed to combat IUU fishing
- Support system among members to implement port State measures (FAO Guidelines)
- Implementation of flag State measures
- Development of framework for fishing vessel registration (vessel record and inventory)

working groups are starting to emerge and a Technical Advisory Body (TAB) have been actively working with the MRC Fisheries Programme. The key elements that should be addressed jointly by countries, in support of the sub-regional management are shown in **Box 3**. The demands and requirements from markets around the world are moving towards increasingly detailed information on products with the possibility of tracing the movement of the products from the fishing areas to the “plate”.

An ASEAN Fisheries Consultative Forum (AFCF) is also being developed within the institutional framework of the ASEAN. Under the AFCF, sub-regional management arrangements are being considered to better accommodate management needs, habitats functions and type of fisheries in a defined water area, in ways that an ASEAN-wide mechanism alone would not be able to accommodate in a smooth way.

Increasingly, documentations following the production chains should be linked to the process of certification. With this requirement, there is obvious need to upgrade the whole chain of management throughout the various stages of production. With the establishment and development of the sub-regional management arrangements (in support of an ASEAN-wide Forum), countries in the region should cooperate to make fishing operations more sustainable and promote information sharing, improved port monitoring, etc. in order that demands for traceability can be complied with.

Moreover, for the sustainability of aquaculture, Ekmaharaj (2009) suggested various strategies that include: intensifying rural aquaculture, implementing adaptive measures to address the impacts of climate change to aquaculture, adopting mitigating measures for environmental impacts and social welfare, conducting R&D on new aquaculture technologies, and enhancing human resource development (HRD) to enable all stakeholders to develop and improve their skills, knowledge, and abilities. In fisheries and

aquaculture, HRD is important so that the stakeholders would become aware and would be able to adopt the various fisheries instruments, commitments and requirements, e.g. the Code of Conduct for Responsible Fisheries, as well as the recently evolving international market-driven requirements, e.g., eco-labeling and traceability.

Rural aquaculture development is a key challenge to open up livelihood opportunities for the rural poor who are oftentimes confronted with many constraints, particularly impediments in terms of technological and management practices due to such factors as lack of access to capital and resources, vulnerability and aversion to risks. Aquaculture operations require access to appropriate skills, land and water, financial

Box 4. Strategies and interventions for sustainability of rural aquaculture

- Adopt low-input technologies with access to credit and infrastructure development as well as other public and private institutional support mechanisms
- Promote integrated agriculture-aquaculture systems considering that the wider adoption of these systems will permit sustainable expansion of aquaculture where it is most needed, improve the productivity and sustainability of farms and reduce impact on the environment (by recycling farm wastes). For example, the adoption of small-scale environmentally friendly mollusks and seaweeds culture by coastal artisanal fishers, as an alternate rural livelihood, has the added benefit of reducing pressure on wild fish stocks and cleaning the coastal waters
- Develop common property water resources such as flood plains, swamps, reservoirs and irrigation structures that can be leased to poor households that otherwise lack productive assets while areas in rural areas that are not suitable for agriculture and which are not critical habitats, can often be used for aquaculture (e.g. saline soils)
- Develop a mechanism that could assess the needs of rural poor and their resources, and promote the adaption of pro-poor technologies considering their local conditions
- Promote pro-poor technologies by addressing a number of concerns such as limited institutional, human and financial capacity, institutional barriers, government restructuring, and lack of government services for development
- Break-down barriers to adoption of aquaculture or improved technologies by the poor such as lack of security of tenure or a well-defined system of land and water use rights, difficulty in accessing inputs, credit and markets, and inappropriate technologies, political influence, and lack of technical assistance
- Institute policies and appropriate institutional arrangements that could channel services to the poor including cooperation among several concerned agencies and enhancing public-private partnerships
- Allow small-scale aquaculture to function largely as a private sector activity in order to sustain its contribution to rural livelihoods
- Ensure that the less advantaged producers such as the rural poor farmers have access to export markets, and fair share of benefits from the production chain
- Promote participatory processes for small-scale producers and organizations of producers into groups and associations in order to extend trade and market links.

capital, organizational arrangements, physical facilities, and infrastructure in order to adopt, operate and sustain relevant aquaculture practices. Bueno (2008) indentified various strategies and interventions for the sustainability of rural aquaculture (**Box 4**) in the Southeast Asian context.

In general, one of the major aspects of sustainability is responsible fisheries management practices. In order to be able to implement such practices, it would require the improved skills and human capacity on the part of all the stakeholders. It has been recently recognized that the success in fisheries management could be attained through the participation of fishing communities and resource users in management through the co-management approach. Here, human resource development would play an important role as the fishing communities as well as the resource users would require new levels of capacity to be able to participate in co-management. This could be attained through intensive training and massive information dissemination.

Better cooperation around management will improve possibilities to certify products, thus provide a better chance for ASEAN countries to develop and maintain the export opportunities for ASEAN fisheries products. Improved traceability and certification provide a good framework to develop various types of labeling schemes, such as eco-labeling. The fisheries resources can be managed by limiting fishing capacity within the sub-region and by integrating fisheries management into habitat management to open up for the wise use of fishery resources. Of growing importance is the need to build upon social responsibility. The sub-regional mechanism would need to address large migration of workforce employed in fisheries, in capture fisheries, aquaculture and in processing plants. Lastly, by working together IUU fishing from foreign countries can also be prevented.

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