Chasing The Same Fish: Collaborative Management Initiative For Shared Fish Stocks Among The ASEAN Countries

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ABSTRACT

Overexploitation and severe depletion of marine fisheries resources in Southeast Asia continue to be a source of great concern to many regional fisheries managers. The fact that ASEAN countries bordering these waters are highly depended upon marine fisheries as the main source of revenue, employment, and food security, it is crucial for them to address these fisheries problems. This is especially the case with respect to the management and conservation of commercially important shared pelagic fish stocks, particularly in the South China Sea and Celebes Sea. As the spatial migratory range of these stocks transcends across many politically drawn maritime zones of littoral States, it is highly impossible for one State, acting independently, would be able to manage these fisheries effectively within its own national jurisdiction. Perhaps the best approach in dealing with this problem is through collective management and conservation of fish stocks. Hence, this paper examines interstate cooperative arrangement for the management of shared fishery stocks among ASEAN countries. It begins by providing brief definition, biological and migratory profile of transboundary shared stocks. The second part covers existing international legal and policy framework that embraces the principle of interstate cooperation for managing such stocks. Finally, the paper provides recommendations of how ASEAN member States can address the issues and challenges of managing shared fish stocks in a more holistic and coordinated manner within the framework of interstate cooperation

Keywords: responsible fisheries, ASEAN, shared fish stocks, institutional framework, cooperation

INTRODUCTION

The growing depletion and overexploitation of marine fisheries resources in numerous offshore and coastal fishing grounds of Southeast Asia have been a source of great concern to both regional fisheries managers and policymakers. Nowhere of these problems are more acute than in the Malacca Straits, South China Sea, and the Gulf of Thailand (Stobutzki *et al.*, 2006; Pauly & Thia-Eng, 1988, p. 202). A number of works in the literature reveal a multitude of factors contribute to the declining trend of these aquatic resources. Among these factors include the use of destructive fishing gears and methods, excessive fishing capacity, illegal, unreported and unregulated (IUU) fishing, degradation of marine ecosystems and habitats, to ineffective national fisheries management policies and systems (Morgan, Staple, & Funge-Smith, 2007; Wilkinson, Caillaud, Vantier, & South, 2006; Morgan, 2006; Thia-Eng *et al.*, 2000). This alarming trend has an adverse repercussion, threatening not only the conservation and sustainable use of fish stocks, but also the long-term viability of regional marine fisheries industry in general.

One must recognize that marine captured fisheries industry is of great importance to many littoral States in Southeast Asia. To the member countries of the Association of Southeast Asian Nations (ASEAN)

bordering the regional seas - Malaysia, Indonesia, Thailand, and the Philippine, fisheries sector has long been the principal source of revenue, livelihood, and food security. All four countries are traditionally known as a major fishing nation, and for over the past ten years, the last three consistently ranked among the top ten fisheries producers in the world (FAO, 2010, p. 13; Pew Environment Group, 2010). In terms of employment, roughly 100 million people in the region are directly depended on fisheries, either involved as fishermen or engaged in supporting fisheries industries. In the Celebes Sea, for example, Palma and Tsamenyi (2008) stated that fisheries resources provide employment to nearly 20 million people who live in the surrounding sea (p. 9).

Substantial social-economic gains generated from the already dwindling marine fish stocks entail the adoption of a more viable and sound cooperative fisheries management regime that transcends across political boundaries. Through joint management among these ASEAN members, the desirable common long-term goals of achieving sustainable, healthy fisheries and rebuilding depleting stocks can finally be attained. This is especially case with respect to the conservation of transboundary shared fish stocks. In view that the migratory range of such stocks typically spreads across politically drawn maritime jurisdictional zones of more than one State, a meaningful ways for the affected States to sustainably manage the stocks is highly likely through their collaborative efforts.

This paper intends to examine the nature and extent of interstate cooperative measures currently in place at regional level to manage transboundary shared fish stocks of Southeast Asia. It will examine interstate cooperative arrangement for the management of shared fishery stocks among ASEAN countries. The paper begins by providing brief definition, biological and migratory profile of transboundary shared stocks. The second part covers existing international legal and policy framework that embraces the principle of interstate cooperation for managing such stocks. It is, however, beyond the scope of this paper to explore the effectiveness of these cooperative management measures and international framework in terms of achieving their objectives. Finally, the paper offers recommendations of how ASEAN members can address the issues and challenges of managing shared fish stocks in a more holistic and coordinated manner within the framework of interstate cooperation.

PROFILE OF TRANSBOUNDARY SHARED FISH STOCKS IN SOUTHEAST ASIA

Before one proceed with the detailed discussion on transboundary shared fish stocks, it is essential to understand first the terminology of "shared stocks," as well as biological and migratory profile of the stocks, particularly from the perspective of Southeast Asia.

DEFINITION

There is currently no universally accepted and accurate terminology and category of shared fish stocks. However, a number of writers do provide the aforementioned terminology and category. Martosubroto (1998), for example, simply referred "shared stocks" in the context of South China Sea as of those transboundary stocks shared by countries on a bilateral or multilateral basis (p. 154). Meanwhile, Caddy (1997) defines "shared stocks" as followed:

> ...a group of commercially exploitable organisms, distributed over, or migrating across, the maritime boundary between two or more national jurisdictions, or the maritime boundary of a national jurisdiction and the adjacent high seas, whose exploitation can only be managed effectively by cooperation between the States concerned... (as cited in Munro, Van Houtte, & Willmann, 2004, p. 3).

Different categories of shared stocks can also be traced to several published reports and technical papers issued by the Food and Agriculture of the United Nations (FAO). One particular FAO fisheries technical paper provides such categorization (Munro, Van Houtte, & Willmann 2004):

(i) fish resources crossing the exclusive economic zone (EEZ) boundary of one coastal State into the EEZ(s) of one, or more, other coastal States- transboundary stocks;

(ii) highly migratory species, as set forth in Annex 1of the 1982 UN Convention on the Law of the Sea (LOSC), consisting primarily of the major tuna species (being highly migratory in nature, the resources are to be found, both within the coastal State EEZ, and the adjacent high seas);

(iii) all other fish stocks (with the exception of anadromous/catadromous stocks) that are to be found, both within the coastal State EEZ and the adjacent high seas - straddling stocks; and

(iv) fish stocks to be found exclusively in the high seas- discrete high seas fish stocks.

A further note of caution should be added that certain fish stocks can be interchangeably classified to different categories of stocks mentioned above. As such, Van Houtte (2003) argued that the absent of precise categorization and definitive, universally accepted terminology of shared stocks is a source confusion (pp. 30-31). For the purpose of this paper, it only deals with "transboundary shared fishery stocks" - similar stocks or stocks of associated species occurring within two or more territorial seas/EEZs of coastal States.

Biological Feature and Spatial Distribution

Fisheries inhabiting the tropical waters of Southeast Asia are typically complex and highly diversified in terms of their species composition; with the demersal and pelagic fishes represent the most dominant species of transboundary shared stocks in the region. Despite of being less mobile than pelagic species and commonly found in relatively shallow coastal waters, demersal species can be categorized as "shared stocks" by virtue of their geographical distribution that extends across boundaries of several national jurisdictional waters. Specifically, FAO/SEAFDEC report implies that the stocks of demersal fishes should be categorized as transboundary shared stocks if their fishing grounds encompass the boundaries of two EEZs claimed by different littoral States (FAO/SEAFDEC, 1985, p. 2). Key examples of such species or species group of demersal include snappers (*Lutjanus* spp.), threadfin breams (*Nemipterus* spp.), groupers (*Epinephalus* spp.), and croakers (*Pennahia* spp.). Trawl nets, stationary traps and lift nets are among the most frequently deployed fishing gears to capture these species.

Transboundary shared fish stocks can also be divided into pelagic species. Based on a general survey of national catch statistical data of ASEAN countries, a sizable number of small pelagic species are typically caught in the regional waters. The most common species include mackerels (*Rastrelliger* spp.), round scads (*Decapterus* spp.), anchovies (*Engraulidae* spp.), Spanish mackerels (*Scomberomarus* spp.), and hardtail scads (*Megalaspis cordyla* spp.). Other dominant species under the category of transboundary shared stocks are tuna species. These species are mostly comprised of neritic tunas that include longtail tuna (*Thunnus tonggol* spp.), frigate tuna (*Auxis thazard* spp.), bullet tuna (*Auxis rochei* spp.), and kawakawa (*Euthynnus affinis* spp.). Depending on their locations and weathers, these pelagic species are predominantly caught by purse seines, hook and lines and gillnets.

As pointed out earlier, the geographical range of transboundary shared fish stocks of Southeast Asia extends across the boundaries between two or more maritime jurisdictional zones (e.g. EEZ, archipelagic waters, and territorial sea). Given their migratory characteristic, shared fish stocks, as rightly affirmed by

Williams (2007, p. 3), "show no regards for national borders." The distribution corridors of demersal and pelagic stocks in the region overlap several national maritime jurisdictional zones (e.g. territorial seas, EEZs) claimed by two or more States. The spatial range of demersal fish stocks movement is typical in the Gulf of Thailand, Andaman Sea, Northwest of Borneo, Gulf of Tonkin, and Sunda Shelf. For example, shrimp stocks such as penaeid shrimps can be found in the coastal waters between the maritime boundaries of Thailand and Malaysia in the northern corridor of the Malacca Straits, and between Cambodia and Thailand in the northern Gulf of Thailand (Martosubroto, 1998, p.156). For shared pelagic stocks, their distribution range in the regional waters can be divided into several corridors, with each of them overlapping national maritime jurisdictional areas of more than one single State (Yanagawa, 1998). Hardtail scads and round scads are found between the EEZ waters of Vietnam and Thailand in the Gulf of Tonkin, the territorial seas of Malaysia and Thailand in the Malacca Straits, and Thailand and Vietnam EEZs in the Gulf of Thailand. Mackerels are shared in the EEZ waters of the Malacca Straits (Malaysia, Indonesia and Thailand), Gulf of Thailand to Singapore (Thailand and Malaysia), Gulf of Tonkin (Vietnam and Thailand), and Andaman Sea (Thailand and Malaysia). The distribution range of round scads covers the Malacca Straits, Gulf of Thailand to Sunda Shelf, and eastern South China Sea (FAO/SEAFDEC, 1985, p. 6).

BEYOND INDIVIDUAL STATE-CENTRIC APPROACH IN FISHERIES RESOURCE GOVERNANCE

Dictated by the limits of its jurisdictions, rights and authorities, a coastal State has the discretion and flexibility in determining how fisheries resources in the seas adjoining its coast are to be developed and managed. Garcia and Hayashi (2000) suggested that such approach to marine resource governance is a result from the current partition of oceanic frontiers into several distinct zones of national jurisdiction, extending seaward up to a distance of 200-nautical mile (or more) from the territorial sea baseline (p. 468). This concept of spatial division of national jurisdiction defined by demarcation lines or boundaries is sanctioned by the LOSC. Under the Convention, States are accorded with the rights and duties within each maritime zone to protect and manage fisheries resources and their surrounding marine environment this jurisdictional delineation of maritime space dictates the manner in which coastal and fishing States formulate and implement their fisheries policies and regulations.

No other maritime jurisdictional zone recognised by the LOSC has made substantial transformation to international legal and policy framework for marine fisheries management more than the EEZ regime. The universal claim to this extended zone radically transformed the distribution pattern of global marine capture fisheries, with substantial portions of the world's exploitable marine fisheries resources are now fall under the exclusive control of coastal States. By virtue of the EEZ regime found in Part V of LOSC, coastal States enjoy socio-economic gains obtained from the preferential rights and greater access to the fisheries resources created by the regime. Coastal States also have the sovereign rights and considerable discretion under Article 61(2) of the Convention in determining the manner in which fisheries resources are to be utilized and developed, but fell short of having the right to overexploit or deplete them. In relation to this, Edeson (2005) asserted that the considerable benefits obtained by coastal States from such exploitation are being balanced by their regulatory and enforcement responsibility to protect and conserve these resources. Coastal States are not only direct beneficiaries but also regulators of fishing activities and marine living resources, including species of fish with their migratory range extending into the EEZs of other countries (Hey, 1999, p. 22).

In reality, however, the above fisheries management framework has not been able to fully achieve its objective due to the inherent weakness of the Convention's provisions, combined with the failure of States to effectively exercise their obligations of protecting fishery stocks effectively (Juda, 1997, p. 148). According to Rayfuse (1999), the jurisdictional framework embedded in the EEZ regime of LOSC has proven to be an "inappropriate mechanism for the resolution of fisheries conservation and management issues" (p. 111). The enclosure of vast offshore marine areas under the coastal States' EEZ jurisdiction

did not deliver the expected conservation benefits needed to address the problem of overfishing and environmental degradation (Matt, 1976; as cited in Tangsubkul & Fung-Wai, 1983, p. 9). Nor did the regime provide greater incentive for States to be more responsible in the way they utilized and managed fish stocks.

REASONS TO PURSUE COLLABORATIVE MANAGEMENT OF SHARED FISHERY STOCKS

The underlying weakness of LOSC's fisheries framework lies behind its emphasis on a zonal approach to manage marine fisheries. As stated earlier, this particular approach has largely failed to overcome the continuing deterioration of commercially important transboundary fisheries populations. This ineffectiveness is one that is intrinsically linked to the universal partition of oceans and seas under multiple, functional jurisdictional zones established under the Convention. The approach to manage fisheries resources within the spatial perimeter of States' jurisdictional zones disregards both the temporal and biological distribution of various species of fish, along with the ecological interaction between the fish stocks and their surrounding marine ecosystem (Kirk, 1999, p. 69). Churchill and Lowe (1999) have observed that the Convention's EEZ regime on fisheries seems to "convey the impression that most of the fish stocks only confine themselves to the EEZ of a single State" (p. 294). In reality, Hoel and Kvalvik (2006) asserted that the boundary lines of EEZs in many parts of the world rarely coincide with the natural migratory boundaries of shared fish stocks. Both commentators also concluded that the poor institutional fit between the migratory nature of the stocks and the legal boundary set of maritime jurisdictional zones raises the question on the validity of the LOSC's zonal management approach as an effective regime for achieving the long-term conservation and sustainable utilization of transboundary shared fish stocks.

As can be recalled, it is impossible for a single State alone to implement effective and holistic management measures for shared fish stocks within its own national waters. Even if an individual State has adopted and enforced stringent conservation and regulatory measures for these shared stocks under its jurisdiction, there is always the possibility that these national initiatives would be hampered by ineffective conservation effort and uncontrolled fishing in the EEZ of other States (Tangsubkul and Fung-Wai, 1983, p. 875). In relation to this, if there is incompatibility of conservation regime for shared fish stocks in one side of jurisdictional areas and with those on the other side of borders, Xue (2005) affirmed that the risk of mismanagement and/or inequality could deprive the involving States from gaining the full benefits of exploiting such stocks. This situation, which is currently happening in the Southeast Asian waters, could detrimentally affect the quality and quantity of shared species. A new approach in resource management governance is needed, one which involved joint efforts involving ASEAN members sharing the same stocks, either directly with the concerned States sharing the same stocks or through regional fisheries organization.

INTERNATIONAL LEGAL AND POLICY FRAMEWORK FOR THE MANAGEMENT SHARED FISH STOCKS

The principle of interstate cooperation in the management and conservation of marine fisheries, either directly with other State(s) or through regional fisheries organization, represents one of the cornerstones of responsible fisheries management. This particular principle can be found many multilateral treaties, non-binding instruments and resolutions. Mostly adopted under the purview of the FAO or the United Nations, some notable instruments include the LOSC, 1992 Declaration of the International Conference on Responsible Fishing, and the 1995 FAO Code of Conduct for Responsible Fisheries. Additional set of voluntary instruments that made indirect reference to cooperative measures in fisheries resource protection and law enforcement are found in the four non-binding International Plans of Actions (IPOAs). These instruments individually deal with specific issues in fisheries management that explicitly cover seabird by-catch, fishing capacity, shark management, and illegal, unreported and unregulated (IUU) fishing. Of these four instruments, IPOA-IUU and IPOA-Capacity are of most relevance in promoting

State's engagement in interstate cooperation applicable to the conservation of transboundary shared stocks.

LOSC

Arguably the closest reference to global legally-binding framework requiring States to cooperate in the conservation and development of shared fish stocks is found in the LOSC. The Convention apparently affirms the requirement for coastal States to pursue cooperative arrangement when dealing with the conservation of transboundary fish stocks shared between their EEZs. This is evident in Article 63(1).

> *Where the same stock or stocks of associated species occur within the exclusive economic zones of two or more coastal States, these States shall seek, either directly or through appropriate subregional or regional organizations, to agree upon the measures necessary to coordinate and ensure the conservation and development of such stocks without prejudice to the other provisions of this Part.*

Furthermore, States bordering an enclosed or semi-enclosed sea are duty bound under Articles 123 of LOSC to cooperate on various areas relating to fisheries conservation and management. Albeit the same article does not provide explicit reference to any specify category of fish stocks, it does applies to all marine fisheries. Hence, one can assume that this legal provision covers transboundary shared stocks. For this reason, this provision can be directly applied to many Southeast Asian States bordering the regional semi-enclosed seas, such as the South China Sea and Celebes Sea. Within these vast expanse seas, the national EEZs of these States abound with those stocks. According to Article 123(a) of the Convention, coastal States have the specific duty to coordinate the management, conservation, exploration and exploitation of fisheries resources. The areas of coordination also include the protection and preservation of marine environment (Art. 123(b)), and scientific research policies (Art. 123 (c)).

NON-BINDING FISHERIES-RELATED INSTRUMENTS

Besides the LOSC, several non-binding fisheries-related instruments promote and encourage interstate cooperation directed to the conservation and management of fisheries resources, including transboundary shared stocks. With the exception of the FAO Code of Conduct, the following instruments - the 1992 Declaration of Cancun, IPOA-IUU and IPOA-Capacity - do not contain explicit reference of the need for States to cooperate in the conservation and management of transboundary shared fishery stocks. They do, however, contain provisions that encourage States to cooperate in fisheries-related matters, which one can assume to be applicable to the conservation and protection of shared fishery stocks.

According to 1992 Declaration of Cancun, one the central elements of promoting responsible fisheries is for States to cultivate cooperation at international level. The recommended scope and activities of these cooperative fisheries management arrangement are varied. It includes fostering international cooperation and collaboration on matters relating to joint research, and facilitating the transfer and exchange of technological information on matters relating to fisheries (para. 16). Other suggested areas of cooperative arrangement that State can undertake include eliminating illegal fishing (para.18), and providing financial support required to improve surveillance and enforcement capacity in exercising their sovereign rights (para. 17).

The non-binding requirement for the littoral States to undertake cooperative measures in fisheries has also found its way in the FAO Code of Conduct. Consistent with the objective of the Code, States are encouraged to cultivate and support cooperation, either directly or through regional organization, in all matters pertaining to fisheries (Art. 2(e)). Such cooperation may involve neighboring States to facilitate the sustainable use of coastal resources and the conservation of the environment (Art. 10.3.1). Unlike the UN Fish Stocks, the scope of the requirement for interstate cooperation established under the Code are

much broader, encompassing not only different types of fisheries (including inland fisheries) but also all categories of migratory fish species, such as shared stocks, straddling stocks and highly migratory fish stocks, and high seas fish stocks (Art. 7.1.3). In achieving this, the level of cooperation is not restricted to bilateral arrangement involving States sharing the same stocks but rather expanded to sub-regional or regional fisheries organization or arrangement (Art. 7.1.5). As endorsed by the Code, another of form of cooperative arrangements relevant for the protection of transboundary shared fish stocks is for the concerned States to ensure the compatibility of fisheries conservation and management measures in the EEZs and beyond their national jurisdiction (see Arts. 6.1.2 and 7.3.2).

IPOA-IUU has been developed within the framework of the FAO Code of Conduct. The measures outlined in the former do not deal directly with transboundary fish shared fish stocks *per se*, but rather specifically address numerous issues of IUU fishing. Even one should realize that irresponsible, destructive practices and behaviors of fishermen and fishing operators engaged in IUU fishing, nonetheless, if occurred in the EEZs may cause harmful effect in terms of jeopardizing the biological population of transboundary shared stocks. A closer examination on the text of IPOA-IUU shows the considerable important of State to cooperate and coordinate directly or through regional fisheries organization in combating this irresponsible fishing practice. A list of suggested activities or areas of cooperation can be found under the title: Cooperation between States. One critical area involving interstate cooperation in combating IUU fishing is the exchange and sharing of information and data (para. 51.2). Specifically, States should exchange and share information on the detailed profile of authorized fishing vessels (Para. 28.2); fishing-related activities (para. 28.2) and vessels engaging in IUU Fishing (para. 80.4). States are also encouraged to share information that deal with law enforcement activities, specifically control, monitoring and surveillance (MCS) matters (para. 28.7). In sum, it appears that the provisions under the IPOA-IUU that promote interstate cooperation in fisheries management, surveillance and law enforcement attest the instrument's relevancy in contributing the development of the international normative and policy framework with the aim of ensuring long-term sustainability of fish stocks, including transboundary fish stocks, through fisheries cooperative arrangement.

RECOMMENDED INTERSTATE COOPERATIVE MEASURES FOR SHARED FISH STOCKS IN SOUTHEAST ASIA

A number of bilateral and regional cooperative mechanisms or programs on fisheries-related matters are currently in place in Southeast Asia. Such joint initiatives, nevertheless, remain arguably inadequate and often less meaningful in attaining the long term goals of effective conservation and sustainable development of fish stocks shared across various States' maritime jurisdictions. In terms of implementation, cooperative fisheries management regime in the region is still confronted with many institutional and policy challenges. For this reason, the following measures are recommended for the ASEAN members to undertake in strengthening the existing cooperative arrangement:

EXCHANGING AND DISSEMINATING INFORMATION AND DATA

There is a need for ASEAN members sharing the same fish stocks to foster and establish cooperation and collaboration in various fields of research activities, especially on marine fisheries resources and oceanography, and their ecosystem components. This cooperative arrangement should also be broadened to include analysis, transferring, dissemination and exchange of information and data acquired from research activities. In recent years, most of the regional partnerships directed toward the conservation and protection of shared fishery resources are centred upon the pivotal role played by regional intergovernmental advisory bodies, such as the Southeast Asian Fisheries Development Center (SEAFDEC) and Asia-Pacific Fisheries Commission (APFC). Perhaps the most successful and concrete regional research initiatives directed toward the conservation of such stocks are of those instigated under the purview of SEAFDEC. Based in Kuala Terengganu, Malaysia, it has taken the function of initiating, coordinating and implementing joint research projects and programs toward the conservation of

commercially important fish stocks and endangered marine ecosystem and its habitat in the South China Sea and Andaman Sea. Research focus of the organization are mainly on the population assessments of fish stocks and endangered aquatic species (e.g. marine turtle and sharks), health status of marine ecosystem and its habitat, and migratory pattern of selected small pelagic species. Recent examples of research projects funded by the Japanese Trust Funds (JTF) program include the "Tagging Program for Economically Important Pelagic Species in the South China Sea and Andaman Sea," and "Research for Stock Enhancement of Sea Turtles in the Southeast Asian Region" (Kadir & Yaacob, 2007; Kadir & Abe, 2010).

Another important field of research initiatives set up by SEAFDEC is the development of selective, environmentally safe fishing gears. Through the expertise sharing and cooperation with its member countries, SEAFDEC has successfully developed and tested a number of suitable types of 'turtle excluding devices' (TEDs) that could minimize incidental catch of marine turtles (Matic, 1997, p. 243). At national level, both Malaysia and Thailand have individually conducted experimental trial on these TEDs to test their suitability and efficiency for their respective shrimp fishing trawler fleet, without significantly reducing catch rate or increasing fuel consumption during fishing operation.

Notwithstanding the existence of coordinated research programs in marine environment and fisheries, conspicuous missing is the available information on the latest knowledge and trend on the biological and ecological parameters of certain transboundary shared stocks. According to Doulman (2007), reliable timely and accurate information on marine fisheries and biodiversity within the regional seas are fundamental for policy deliberation and for the sustainable management and conservation of fish stocks and fisheries ecosystem (p. 204). In the context of Southeast Asian region, such information are generally inadequate, if not unavailable. And yet, the governments and stakeholder communities have no choice but to rely heavily on this questionable data as part of their policy planning and decision-making process. Of varied reasons attributing to this problem, marine scientific research is a difficult, time consuming and costly exercise (William, 2007, p. 50). Confronted with limited financial, technical or human capacity, it is indeed a daunting task for many developing littoral States in the region to individually conduct marine scientific research on tropical marine fisheries and ecosystems, as well as studies on oceanographic and climatic variations affecting regional fisheries (Alam, Omar, & Squires, 2002, p. 336).

One of the main challenges hampering the attainment sustainable management of shared fish stocks in the regional water of Southeast Asia is the questionable catch statistical database operated in each individual State. A significant barrier in determining accurate sustainable harvesting limits for specific species groups of shared stocks can be in part explained by the inefficient catch reporting and capacity assessment mechanism at national level. For example, in the context of Indonesia's dispersed multi-gear and multispecies fisheries, statistics on catch rates are very difficult to collect due to outdated sampling system for collecting fisheries statistics (Mous *et al.*, 2005, p. 262). The problem of incomplete statistical data and information is also aggravated by the deficiency of financial and human capacity which is a prerequisite to monitor and compile fishery landings effectively.

Another obstacle to sustainable fisheries management is the unavailability of accurate information and data of the actual amount of shared fish stocks and species composition caught by both local and foreign fishing fleets in national waters. This deficiency includes the exact quantity of catches unloaded in the latter home countries. The problem of underreported catches for statistical purposes is more acute on pelagic stocks of longtail tuna species, which are characterized by their migratory nature inhabiting several EEZs of countries bordering the South China Sea (Yonemori, Yanagawa, & Pong, 1996). Compounding this problem is the difficulty of regional fisheries manager to trace the actual catch efforts by fishing vessels engaged in unauthorized fishing activities, namely IUU fishing, in the regional waters (Varkey, Ainsworth, Pitcher, Goram, & Sumaila, 2010, p. 228; Willouhby, Monintja, & Badrudin, 1999).

As way back as the late 1990s, information collected independently by, and found in the national inventory of regional States has been reportedly lacking in terms of their comprehensiveness (Saikliang

and Boonragsa, 1998, p. 135). Even if the inventory exists, the challenge lies on the difficulty of other interested parties to access it. In the context of Asia in general, *Morgan et al.* (2007) concluded that it is difficult for the interested parties to access the latest information pertaining to IUU fishing and fishing capacity due to two reason: (i). Much of the information is restricted by the country's Ministries; and (ii). Neither of the information has been frequently published in media nor widely available (p. 3). This in turn has led to a state of affair where fisheries managers and policymakers have been unable to make informed decision in establishing a sound fisheries development policy and responsible fisheries management regime within their own national EEZ. Because of the inadequacy, unreliability and inaccuracy of the biological/ecological information and fisheries statistical data, some coastal States have in the past delayed and even failed to establish effective and coordinated regional cooperation in fisheries management.

To overcome the above problems, the concerned States need to consider of establishing and strengthening cooperative mechanism designed to facilitate the exchange of information and data on fisheries among the interested parties, This approach should not only focus on integrated and systematic collection and dissemination of data relating to both shared and transboundary fish species, but also the analysis and interpretation the data. On the whole, the quality and quantity of scientific data and information on fisheries science and technology on transboundary shared stocks can only be enhanced through joint partnership with all parties sharing and harvesting the concerned stocks.

ECOSYSTEM APPROACH TO FISHERIES MANAGEMENT

One of the recommended measures to effectively manage transboundary shared fishery stocks is through the adoption of ecosystem approach to fisheries management (EAF) in regional cooperative arrangement. It is desirable for transboundary shared fishery stock to be managed over their entire area of biological distribution, which in the context of Southeast Asia, covering not only different areas of national jurisdiction but also a myriad and unique marine ecosystem and habitats. Accordingly, given the close interactions and interdependency between shared fishery stocks and their surrounding ecosystem, the destruction of fragile fisheries habitats and loss of biodiversity would likely have detrimental impact on the overall health of stocks concerned. For this reason, the principle of EAF entails cooperation among relevant governments, and regional fisheries and environment organizations to conserve, protect and restore the health and integrity of the regional ecosystem and its habitat. This collaborative approach is critical given that biological and physical components of ecosystems in the region, as previously pointed out, typically extend beyond the jurisdictional boundary of a single State. Moreover, EAF has generally been perceived to be more efficient and effective in addressing environmental problems of a transboundary nature than the initiatives taken by individual States alone. This signifies a departure from the traditional species-centric management approach (Ahmad, 2011). Nevertheless, many commentators agreed that the EAF is not envisioned as a revolutionary approach deviating from the conventional fisheries management regime (Sinclair *et al.*, 2002, p. 264). It is rather seen as an approach embracing a more integrated and holistic way of managing resources without disregarding fragile fisheries environment and its habitats (FAO, 2005).

In giving effect to the EAF, littoral States sharing the same fishery stocks need to implement a number of measures. States should adopt fisheries conservation and management measures with the aim of not only ensuring the long-term sustainability of fish stocks but also protecting and maintaining marine aquatic ecosystem within which the stocks live. The LOSC, in particular, accords special protection to marine ecosystem and its components, including different groups of fish species (i.e. target or non-target) and fragile habitats. In line with this obligation, coastal States under Article 61(3) must take into consideration the dynamic interaction and interdependence between fish stocks and marine ecosystem when deciding the appropriate conservation measures to prevent overfishing in the EEZ.

Moreover, as stipulated in Article 6.8 of 1995 Code of Conduct, EAF entails coastal States to ensure the marine aquatic ecosystem and its habitats are subject to protection against the harmful impact of human

activities. In giving effect to this principle, the Code has made it clear that States must establish appropriate measures for prohibiting the use of poison (e.g. cyanide fishing), dynamite (e.g. fish bombing) and other destructive fishing practices (e.g. *muroami* fishing and towed-bottom fishing gear, including pair trawling, push nets and otter trawling) (Art. 8.4.2). The Code also places stronger emphasis on regional collaborative arrangements and coordinated efforts to develop and implement environmentally friendly fishing gear, technology, and operational methods, which reduce the loss of fishing gear (Art. 8.4.6).

Reducing the incidence of by-catch and discard mortality in fisheries population underpins the key management measures under the EAF framework. Littoral States needs to cooperate and make a firm commitment towards protecting non-targeted species (i.e. juvenile and low-value species) against indiscriminate catching. A widespread practice of by-catch and a high rate of discard mortality of undesirable marine species are increasingly becoming a norm in tropical multi-species resources and multi-gear fisheries in the regional EEZs. An obvious example of this problem can be seen in the quantity of trash fish generated from by-catch of both coastal and offshore fishing activities, which constituting the highest percentage of species composition landed in Malaysia, Thailand and Indonesia. Thus, it is in the best interest of regional governments to cooperate in conserving target fishery resources and protecting non-target species from incidental capture by unselective fishing gears and methods. Achieving this objective would necessitate cooperative technical management measures, and common legislative and policy instruments. More specifically, the aforementioned measures may include inter-agency projects for developing technologically advanced selective fishing gear, community-outreach education programs, and regulatory restrictions on gear and mesh size.

STRENGTHENING *OF MONITORING, CONTROLLING AND SURVEILLANCE (MCS) SYSTEM*

Interstate cooperative arrangement in monitoring, control and surveillance (MCS) activities for fisheries is broadly viewed as one of the integral elements of ensuring regional transboundary fish stocks are to be harvested in a sustainable manner. Wide spectrums of MCS measures have been commonly implemented at national level, with most of their implementation have been strengthened by legislative, policy and institutional reforms. These government initiatives focus on tightening of fishing and vessel licensing conditions, adopting stringent sanctions and effective prosecution against fisheries offenders, and enhancing fisheries law enforcement and monitoring capability. These national efforts may have improved the conservation of shared fishery resources at national fisheries jurisdictional waters, but arguably fall shall short of protecting the overall population of the resources in question throughout their entire spatial migratory range. Exacerbating the problems of fisheries law enforcement in the region is the absence of formalized regional mechanism with command function to coordinate fisheries surveillance and enforcement operations, coupled by limited enforcement capability and capacity suffered by individual coastal States. Insofar as vessel boarding and inspections are concerned, there is gap in the standardized operational procedures at regional level. Consequently, the aforementioned challenges provide reasons why littoral States should take into consideration of institutionalizing a coordinated MCS system at regional level.

Joint surveillance and law enforcement exercise become even more critical due the enormous size of individual EEZ and fishing grounds to cover in the Southeast Asian region. The prohibitive operational costs of implementing MCS measures - a situation that placed heavy burden to many regional developing States - can be equally shared or even lessened through the coordinated use of maritime surveillance and enforcement assets. Concerted action and cooperation in MCS becomes more acute when managing transboundary fish stocks. Because of varying socio-economic interests and different management approach among the States to regulate those stocks in their respective EEZs, there is an obvious need for coordinated MCS measures applicable throughout the entire migratory range of the concerned stocks. To add, much more needs to be done on strengthening fisheries surveillance and enforcement efforts among ASEAN countries given that IUU fishing incidents have long been pervasive in the regional waters.

Institutionalized mechanism for joint fisheries law enforcement, as stated earlier, is currently non-existence in the regional water; with the cooperative programs on fisheries surveillance and law enforcement have been mostly focused on intelligence and information sharing on illegal fishing activities. Different cooperative arrangements involving ASEAN members are presently in place. There are already examples relating to such arrangements, such as coordinated maritime surface and aerial patrol initiative aimed at addressing non-traditional security challenges, including transnational crimes (e.g. piracy, sea robbery and human trafficking), and promoting navigational safety (e.g. search and rescue) in the Malacca Straits (Koh, 2013). Other relevant example of maritime surveillance and law enforcement cooperation arrangement in the region is the agreement signed Malaysia, the Philippines, Brunei and Indonesia, which have agreed to conduct regular joint patrol in border areas surrounding the Celebes Sea (*Jakarta Post*, 2005). While the ultimate objective of these joint patrol exercises is to secure overall maritime security in the regional waters, subsidiary benefit generated from these collaborative efforts is likely to spill over towards the protection of fisheries resources from the threat of illicit activities, such as IUU fishing (e.g. foreign fishing encroachment, fish bombing, unauthorized transhipment of fish at sea).

A number of joint actions relevant to strengthening the existing MCS system can be implemented by the regional littoral States. These include exchange of intelligent information on IUU fishing activities, formulate standardize procedure for catch documentation, vessel inspection and boarding, and establish coordinated port State control measure for fishing vessels. The fact that "no country can go alone" in fisheries enforcement and surveillance efforts reinforces the need to develop a stronger cooperation and coordination between/among neighbouring States sharing the said resources.

CONCLUSION

A prerequisite to any present and future policy direction at reaching a more meaningful cooperation for sustainable and equitable management of transboundary shared fishery stocks necessitates a close engagement and strong political will among the neighboring ASEAN States. Because the geographical distribution of these transboundary shared stocks typically spanning across multiples jurisdictional zones, interstate cooperation for the management of such stocks has become increasingly critical. Given this circumstance, even comprehensive conservation efforts of an individual State within its national jurisdictional waters might be rendered futile. Further reason for reinforcing the need to increase the level and scope of regional cooperation and coordination is the ongoing overlapping maritime boundary disputes and contested maritime features in large portions of national EEZs. Whilst the definite resolution of overlapping maritime boundary and features remains the subject of political and diplomatic negotiation, it is not an excuse for the affected States not to pursue some forms of cooperative measures to protect and regulate the access to these shared fishery resources. This warrants proactive and collective government intervention and participation aimed at securing a more equitable and responsible fisheries management and long-term utilization of resources in the region.

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