SPECIAL REPORT

Management of Small Pelagic Fishery Resources in the South China Sea and Andaman Sea Areas

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landings in terms of quantity (MT) followed by Malaysia and Thailand. The production in Singapore is negligible.

Fig. 1: Production trends of scads and mackerels (MT) in selected Southeast Asian countries (2000-2008)

Introduction

Fishes could be grouped into two broad categories: those that live at or associated with the seafloor known as the demersal group of fish, and those that live mainly in the water column above the seafloor which are the pelagic group of fish. Pelagic fishes, particularly the small pelagics are important elements of the ecosystems in relation to their trophic linkages (Sherman, 2008), which give them special significance when it comes to identifying the marine ecosystem (Skjoldal and Misund, 2008). Fast-swimming and schooling, pelagic fishes generally eat whatever prey is available in terms of size, catchability and abundance. The broad range of prey for pelagic fish includes zooplankton, squid as well as other pelagic fish, even the younger stages of their own kin. In addition to being eaten by other pelagic fish, small pelagics are also eaten by a wide range of predators in the marine and coastal ecosystems. Among the important small pelagic species are from the groups of herrings, anchovies and sardines (Clupeiformes), and mackerels and scads (Perciformes).

In the Southeast Asian region, two important families of small pelagic fish are the family of mackerels, tunas and bonitos (Scombridae), and the family of jacks, pompanos and scads (Carangidae). Scads and mackerels are the two most important small pelagic fishes which contribute to more than 39% of the small pelagic or 10% of the total capture production in 2008. However, production data shows fluctuating increment trends for the past ten years until 2008 in the five countries with available data (**Fig. 1**). The production of small pelagics is more significant in Malaysia, Brunei Darussalam and the Philippines as shown in Table 1. Among the five countries, Indonesia and the Philippines lead the highest volume of
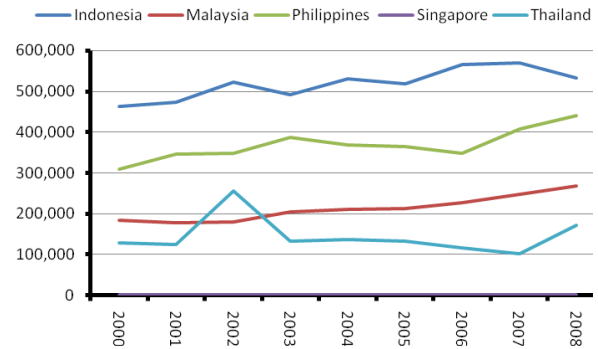
Distribution of Scads and Mackerels by Ecosystem

In 2008, scads were found to be more dominant in the South China Sea, contributing up to 25% to the total small pelagic production or 7% of the fish total production. As for mackerels, it contributed about 15% to the total small pelagic production or 4% of the fish total production. On the other hand, mackerels was more dominant in the Eastern Indian Ocean contributing more than 26% to the total landings of the small pelagic as compared to only 12% contribution by the scads. A comparison of the production of Indonesia, Malaysia and Thailand showed that scads have been predominantly caught in the South China Sea rather than in the Eastern Indian Ocean except for Thailand. However, mackerels which are less dominant in the South China Sea of Indonesia and Malaysia were found to be more dominant in the Gulf of Thailand than in the Andaman Sea of Thailand. This indicates that species dominance in the Gulf of Thailand may be different than that of the other parts of the South China Sea.

It is interesting to observe the status of scads and mackerels in the EEZs of Thailand and Malaysia in the Eastern Indian Ocean and in the South China Sea. The fish stocks in these adjacent EEZs of the two countries are most likely shared. Therefore, an over-exploitation of stocks in one of the EEZs may be replenished by the recruitment of those species that originates in the other country. But over-exploitation in both EEZs of the same stocks could lead to stock decline or even collapse.

Table 1: Contribution of scads and mackerels to the total catch and to the total small pelagic fish production in the South China Sea and Eastern Indian Ocean in 2008 (Source: SEAFDEC)

Area	Country	Total Landings (MT)	Total Pelagic Production (MT)	Total Round Scad Production (MT)	Total Indian Mackerel Production (MT)
South China Sea	Brunei Darussalam	2,346	879	258	147
	Cambodia	84,550	0	0	0
	Indonesia	3,286,260	994,075	266,787	157,076
	Malaysia	721,934	228,507	59,457	30,724
	Philippines	2,367,017	1,020,151	297,892	142,258
	Singapore	1,598	112	43	0
	Thailand	940,088	274,785	3,731	44,196
	Vietnam	1,718,900	0	0	0
	Total	**9,122,693**	**2,518,509**	**628,168**	**374,401**
Andaman Sea	Indonesia	1,768,223	595,834	60,580	109,211
	Malaysia	672,597	236,107	37,492	139,597
	Myanmar	1,679,010	0	0	0
	Philippines	20,563	0	0	0
	Singapore	25	25	0	0
	Thailand	704,711	188,873	22,514	15,214
	Vietnam	227,700	0	0	0
	Total	**5,072,829**	**1,020,839**	**120,586**	**264,022**

Status and Trends of Mackerel and Scad Production

Mackerel stocks are exploited by three main fisheries: purse seine, trawl and drift/gill net fisheries. The fishing grounds of purse seiners and trawlers are more offshore than the drift/gill netters. This requires analysis of landing data by species since distribution of the species might be different in these fishing grounds. Results of a study by MFRDMD showed that the Indian mackerel (*Rastrelliger kanagurta*) made up about 25% of the total catch of purse seines in the South China Sea off Malaysia, while the short mackerel (*Rastrelliger brachysoma*) only contributed about 2% (Raja Bidin and Ku Kassim, 2007). In the Andaman Sea, purse seines using FADs and light purse seine are catching more quantities of the Indian mackerel, while the short mackerels are caught mainly by Thai purse seines. However, trawlers using high opening trawl nets mainly catch the short mackerels.

An analysis of the ten-year fishery statistical data provided yearly in the published SEAFDEC Statistical Bulletin for Southeast Asia was able to show the trends of landings by group of fish: scads and mackerels. However, the trends could only be interpreted as describing the status of the fish stock
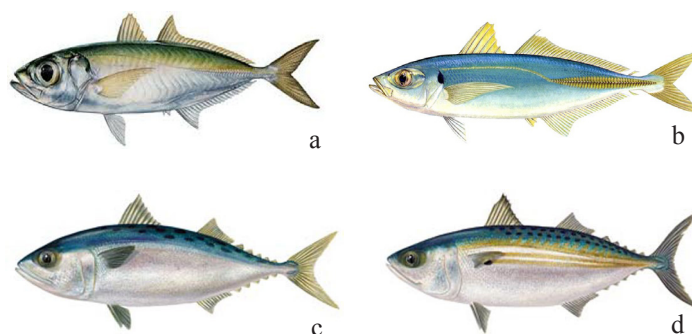
*Some common small pelagic fishes of the region: a) Bigeye scad (*Selar crumenophthalmus*); b) Round scad (*Decapterus maruadsi*); c) Short mackerel (*Rastrelliger brachysoma*); and d) Indian mackerel (*Rastrelliger kanagurta*)*

if it was done at species level. As fish distribution is more by ecosystem rather than by national boundary, stock assessment is required for the whole South China Sea or Andaman Sea, the two main ecosystems of the region. In order to pursue this, all Member Countries in the region should provide the required data at the level that could be used to describe the status of the fish stock. This information will help to promote a better management, particularly for shared stocks in the region.

SEAFDEC Initiatives

Started by SEAFDEC/MFRDMD in 2013, the "Comparative Studies for Management of Purse Seine Fisheries in the Southeast Asian Region" is one of the new projects under the Japanese Trust Fund which would be completed by 2017. The project involves compilation and comparison of annual and/or monthly CPUE where data from the region are available during the last three decades, comparison of TAC systems in the world, genetic study of a commercially-important pelagic species, and charting of management strategies for sustainable purse seine fisheries in the Southeast Asian region. Since catch-effort statistics are available in Malaysia and Thailand while CPUE is an indirect measurement of abundance of a target species in fisheries, MFRDMD will make its first attempt to examine the trend of resource level using CPUE during the last three decades. At the same time, MFRDMD will review and compare the TAC systems in the world to examine which TAC system is applicable for management of small pelagic fishery in the region. Moreover, a genetic study would be conducted to understand the extent of admixture of target species between South China Sea and Andaman Sea and/or within South China Sea for small pelagic fishery management. At the end of the project, MFRDMD will review available information including stock levels and together with the Member Countries, will examine management strategies applicable for sustainable purse seine fisheries in the region.