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SUSTAINABLE FISHERIES, ENVIRONMENT AND THE PROSPECTS OF REGIONAL COOPERATION IN SOUTHEAST ASIA

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ABSTRACT

Fisheries is very important in Southeast Asia. It provides inexpensive sources of protein, increases job opportunities, revenue for foreign exchanges, sustained economic activity and maintains the environment quality. The region produces over 8.0 million metric tons live weight of marine fish, about 10 percent of world total catch. In addition, more and more coastal areas are converted for aquaculture of shrimps and fish, a booming industry of economic importance in the region.

However, currently the Southeast Asian countries facing serious problem in maintaining the integraty of the resource base sustained economic activity. Population pressure associated with economic activities in the last decades have caused large-scale destruction of the region's valuable resources and the degradation of the environment. It is also noted that conflicts on fisheries resources among countries in the region as well as with the distant fishing countries are getting more and more serious. The artisanal fisheries are now being displaced with the more modern commercial fishing technology. This paper outlines the development and problems of fisheries in Southeast Asia and the prospects of regional cooperation.

INTRODUCTION

Blessed with warm, humid, tropical climate and high rainfall, the Southeast Asian region allows productive ecosystems to flourish along the coastline.

The important ecosystems for consideration for the Southeast Asian region are:

- estuaries, common within the mouths of larger river systems - mangroves, associated with low laying coastlines, estuaries and rivers; - coral reefs, associated with most smaller islands and those coasts on larger islands lacking large inputs of freshwater or sediment from river systems.

Estuaries, mangroves and coral reefs are among the most productive ecosystems known to man as measured by both primary productivity and biomass yields (SOEGIARTO and POLUNIN, 1981). Production and export of organic materials in estuaries contribute to estuarine, coral reefs and offshore fishery nutrition. The leaf litter production of mangroves is strongly correlated with fisheries production within the mangrove system, represented by fish, bivalves and crustaceans, and by diverse fisheries production in the nearby estuaries, coral reef, and seagrass communities. Coral reefs, very efficient in recycling nutrients and utilization of nutrients from adjacent systems, support sizeable fisheries for numerous organisms which are harvested by coastal people and provide a significant portion of their protein consumption (GOMEZ, 1980; MURDY and FERRARIS, 1980).

Upwelling areas, which are also common in the region, are capable of producing over ten times as much organic matter per unit area per unit time as offshore waters. This very high production of organic matter is transformed into tremendous variety of econo- mically valuable fishery products used by the people in the region.

Due to the economic benefits that could be derived from these rich and diverse ecosystems, the coastal zones of Southeast Asia are densely populated. Over 70% of the population in the region lives in the coastal areas, resulting in a high level of exploita- tion of the natural resources. Population pressures associated with several economic activities have caused large-scale destruction and serious degradation of the coastal and marine environment. Increasing pollution, land as well as marine based, in the last decade has compounded the problems. If this trend continues countries of

the Southeast Asian region will have heavy burdens and tasks of restoring the damaged resource and environment base. It is hoped that the regional cooperations could be used to alleviate those problems.

THE GEOGRAPHICAL SETTING

The waters and islands between Asia and Australia and between the Pacific and the Indian oceans form one geographical unit. In geographical terms, the whole region is part of Asia and is refered to as Southeast Asia. The region consists of highly fragmented land area interspersed among wide stretches of sea surface and extremely long coastline. Physically, the region is divided into a continent- al or part of the mainland Asia, which consists of Burma or Myanmar, Thailand and the Indo Chinese states of Laos, Cambodia or Kampuchea, and Vietnam. The rest of the region, including Peninsular Malaysia, Brunei Darussalam, Singapore, Indonesia and the Philippines, is regarded as the archipelagic parts of Southeast Asia (CHIA LIN SIEN and MacANDREWS, 1979).

From the terminology used in the Law of the Sea Convention, the States in the Southeast Asia can be described: Indonesia and the Philippines are the two archipelagic states; Brunei, Cambodia, Malaysia, Myanmar and Thailand are zone-locked states; Singapore is geographically disadvantaged and Laos is the only land-locked state. Vietnam, which faces the open sea to the East, falls into none of the above geographical categories. There is no high seas lying between the Southeast Asian states (KITTICHAISAREE, 1993).

In oceanographic terms, however, the waters of this region are part of the Pacific Ocean, which is separated from the Indian Ocean by the islands of Sumatera, Java and the Lesser Sunda (Nusa Tenggara). The Southeast Asian waters consists of the Andaman Sea, the Straits of Malacca, the Straits of Singapore, the South China Sea, the Gulf of Thailand, the Java Sea, the Flores Sea, the Banda Sea, the Arafuru Sea, the Timor Sea, the Celebes Sea, the Sulu Sea, and the Philippines Sea. The whole body of the waters approxi- mately covers 8.94 millions km2 in area, which represents about 2.5 percents of the world's ocean surface (SOEGIARTO, 1985). Figure 1 and Table 1 are geographic information on Southeast Asian region, in particular the members of the Association of the Southeast Asian Nations or ASEAN (SOEGIARTO, 1991).

Located between Asia and Australia and the Indian and the Pacific Oceans, the Southeast Asian region is strongly influenced by monsoons. The Southeast Asian waters are thus ideal for studying

the effects of the monsoons. Both water circulation and the seasonal distribution of its physical, chemical, and biological properties, including fisheries, are governed by the monsoons. The north monsoon in Southeast Asia lasts from December to March and the south monsoon from July to September. The rest of the year represents the transition from the north to the south and vice versa. The variation of the atmospheric circulation strongly governs the corresponding variation of the water circulation. Because of the rather high constancy of the monsoon and the regularity of their appearances, the ocean currents show the same characteristics. Just as the monsoons change direction twice a year and are practically reversed at the time of their strongest development, the oceanic circulation is also reversed over large areas. This complete reversal is typical of the circulation in these waters (WYRTKI, 1961; SOEGIARTO, 1985).

Storms and typhoons are observed only over the northern parts of the South China Sea and the Philippines, the Andaman Sea, and the north of Australia. The presence of typhoons has a very marked influence on the state of the sea, and in turn will increase both the wave and swell conditions and also change their direction. Both the state of the sea as well as the strength and general patterns of currents will have a marked influence on the productivity, fish migration as well as on the potentials and the direction of dispersement of pollution in the region.

FISHERY PRODUCTION

Fisheries are a valuable resource in the region. Indeed, the Southeast Asian seas support one of the world's most productive marine fisheries. Total annual catch from the region in recent years has been approximately eight million metric tons, with certain fisheries capable of providing still greater yields. Table 2 shows the annual marine fish landings of each country in the region from 1986 to 1992. The table indicates that all countries in the region almost always increase the volume of the catch. The major fishing nations in Southeast Asia are Thailand, Indonesia, the Philippines, Vietnam and Malaysia. The total landings in Southeast Asia for 1992 was 8.3 million tons of live weight, or about 23 percent of all Asia or about 10 percent of world total catch (FAO, 1992).

Table 3 shows the values of exports of seven fishery commodities by countries in Southeast Asia. Similar trend of increase in the export values is also observed in almost all countries in Southeast Asia, in particular those of the ASEAN member countries. Unfortunately, no data are available from Cambodia and Laos. While that of Vietnam can only be estimated from available source (FAO, 1991). The total export value from Southeast Asia was about 5.4 billion US dollars in 1991, or about 44 percent of that of Asia and 14 percent of the world total. As a comparison, Table 4 indicates the value of imports by the Southeast Asian countries between 1986 and 1991. The total import was 1.8 billion US dollars in 1991, or about 11 percents of all Asia and only 4 percents of world total.

Excluding the Gulf of Thailand, the Chinese and Vietnamese continental shelf in the South China Sea yields the greatest total annual catch in the region, nearly a million tons. Historically, these abundant fishery resources have been harvested in inshore and coastal waters with a variety of traditional fishing gears and have been an important source of food, animal protein and employment for many of the region's coastal populations. Whole market and barter systems with networks extending to the interior are based on these fisheries.

The early mechanized fishing efforts of Japan in the region have been joined in recent years by fishing fleets from Taiwan and South Korea. Modernization and expansion of the region's coastal fishing fleets began in earnest some twenty years ago with the introduction of trawl fishing in Thailand, followed by other countries in the region. Coastal country trawling fleets have now become established in much of the region, fishing the inshore and coastal waters for demersal fish, crustaceans, and molluscs. Coastal country purse seining fleets have also become established in many areas in recent years, providing increased catches of coastal and oceanic pelagic fishes. Mechanized fishing for export provides a significant source of foreign exchange and the infrastructure supporting these fisheries is a further source of income and employment, e.g., freezing, cold storage, processing, boatbuilding, and net making and mending.

The marked increase in regional fishing effort during the past twenty years, encouraged by the rapidly increasing local and international demands for fishery products has subjected many of the

region's inshore and coastal fisheries to intense fishing pressure and has resulted in the over-exploitation of several important species. Concurrent with these events and adding to these difficulties have been the loss of important spawning and nursery grounds of many valued species due to increased coastal pollution and the widespread development of coastal lands.

The variability in fishing pressure is directly reflected in the total fishery catch of a given area. In general, the areas with the highest total catch are also the areas which are most intensely fished, i.e. the areas where the fish and invertebrate populations, are under the greatest stress from fishing activities. Any additional stress on these intensely fished areas, such as oil pollution may have an immediate negative impact on existing fishery catches from the affected areas. In less intensely fished areas, the detrimental effects of marine pollution on catches is likely to be less obvious.

Very heavy fishing intensity (>1,000 kg/km2) is concentrated in the Gulf of Thailand, particularly in the Thai portion of the Gulf, the central Malacca Strait, in the Andaman Sea immediately west of the Isthmus of Kra and northwest through most of the Mergui Archipelago, off the mouths of the Mekong and Pasig Rivers, and in the central Philippines.

Heavy fishing activities (100-999.9 kg/km2) are recorded in the northern and southern Malacca Strait, along the east coast of the Malay Peninsula, in the southern Gulf of Thailand and over parts of the central Sunda Shelf, along the entire coast of Vietnam, and northward along the entire Mainland Shelf, around Taiwan, in most Philippine waters, off East Malaysia and Brunei, around southern Sulawesi and in the central and southern Makasar Strait, in the Bali Strait, along the north coast of Java, around the Riau archipelagoes off eastern Sumatera, and off norhtwest Sumatera (see also SOEGIARTO, 1993a).

CONFLICTS OF RESOURCE EXPLOITATION

The Southeast Asian countries exported over five billion US dollars/year from marine fisheries alone (Table 3). With the ever increasing demands for fishery products, both for domestic consumptions as well as for exports, forcing each country to develop their fishing fleets and the fishing technology. Extended jurisdiction of 200 miles economic zone offers the possibility of enhancing offshore production. Unfortunately, however, this extended jurisdiction claims could also overlap each other, thus increasing potentials of conflicts on fishery resources among the neighboring states. In recent years more and more incidents have occured, whereby fishing boats are captured, confiscated or being shot at. Among the Southeast Asian countries, perhaps Thai fishermen are getting the highest share of being captured or shot at by the neighboring countries (VALENCIA, 1990; MATICS, 1994) because they are encroaching their fishery resources. For example, in 1989 out of 974 foreign vessels operating in the Indonesian EEZ, 354 were those of Thailand (see Table 5).

More serious problems of conflicting use of resources in the region come from the distant-water fishing countries, such as Japan, Korea, Taiwan and recently China. They have more powerful boat, more advance fishing technologies as well as post harvest technologies. Valuable species such as tuna, skipjacks, mackarels, even shrimps in the coastal waters, are fished regularly by the distant water fishing countries. Thus, high value species are exported out of the region to developed countries, while intraregional offshore and artisanal fishermen compete with each other for dwindling coastal resources, often violently (VALENCIA, 1990). Therefore, there is no doubt that fisheries will become a new source of conflicts in Southeast Asia.

Negotiations, fishing agreements, joint ventures and licencing are some of the way out to minimize the conflicts. Indonesia, for example, has established joint ventures with Taiwan to catch tuna in the EEZ waters, in the Indian Ocean, south of Java; with Thailand for mackarel in the Natuna Sea (southern part of the South China Sea); with Japan for shrimp fisheries in Java Sea, Arafura and the Mollucca Seas. It is understandable therefore, Japan has provided substantial amount of bilateral and multilateral assistance in fisheries in this region. A good example is the Japan support to SEAFDEC (Southeast Asian Fishery Development Council). Other bilateral cooperations can be mentioned (from MATICS, 1994): Thailand-Malaysia Joint Authority, agreement between Cambodia and Vietnam established in July 1992, Malaysia and Vietnam (June, 1992) and Thailand and Vietnam (June, 1993).

ENVIRONMENT PROBLEMS

Human existence depends on a stable and sustainable natural resource base. The marine and coastal environment in Southeast Asia harbors such a resource base. Overuse of marine resources has implications for their long-term viability. This could create tensions and conflicts between policies for developing marine and coastal resources on one hand, and conserving and protecting them on the other. The environment issues include overfishing, destructive fishing methods, habitat devastation, endangered marine species and marine pollution.

The overfishing issue has been discussed in the earlier chapter of this paper. The introduction of new fishing technology by private as well as state controlled companies has seriously disrupted the fishing methods used by artisanal fishermen. Trawlers, for example, has intensified the pressure on coastal fish stocks and increase potential of conflicts with the local tradisional fishermen. Therefore, the trawls has been banned completely in Indonesian waters since 1984. Unfortunately, the enforcement of this ban is not been too effective.

The most serious problems of destructive fishing methods are the use of explosive and chemicals, such as potassium. These destructive fishing methods are still practiced widely in Indonesia, the Philippines and Vietnam, used rather limited in Thailand and Malaysia. These methods destroy the coral reefs and habitats of the valued species as well as the destruction of the spawning grounds. The results of recent surveys in Indonesia for example, shows that only 7 percent of coral reefs is in excellent conditions, 33 percent is in good conditions, 46 percent in poor conditions and 14 percent is in critical conditions (BAPPENAS, 1992). Efforts are now being launched to mitigate these destructive methods through training and education, law enforcement and by establishing community seawatch in certain critical coastal waters.

From various sources (e.g. GOMEZ et al, 1988; SOEGIARTO, 1989) it was noted that in general the level of pollution in Southeast Asian waters relatively is still low, except in a number of critical areas, such as in and around highly populated and industrial centers. The following is a brief information on the major and potential pollutants in Southeast Asian coastal and marine waters (after SOEGIARTO, 1989) :

Sediments : millions of tons of sediments are transported annually by rivers to the coastal areas. They extend the coastline seaward, particularly in the river deltas. They provide excellent grounds for mangrove succession and contribute to the increase of productivity and fisheries in the surrounding waters. However, in many localities these millions of tons of sediments block

navigational and port channels for shipping and trade, smother coral reefs and change the physical, chemical and biological environment of the surrounding waters. The source of the sediments generally is erosion due to bad land management in the watershed region.

Solid Wastes : a good percentage of large cities are located in the coastal areas. Generally, these cities could not yet manage rationally their solid wastes or garbage. As a result, a large percentage of these solid wastes are transported by rivers and other surface water runoff to coastal areas or even to the open sea. In turn, they creates problems and give severe stresses to the coastal and marine environments.

Sewage : just as solid wastes, sewage is discharged raw into coastal waters directly or through rivers and waterways. Elevated fecal coliform levels are detectable around population centers in Southeast Asia. Associated with seawage discharge is the process of eutrophycation (enrichment) in coastal waters. In recent years, more red-tides phenomena has been reported in Southeast Asian waters. Red-tides can be toxic or non toxic. A number of incidents involving paralytic shellfish poisoning have been recorded in various countries of Southeast Asia. In a number of cases, the dinoflagellate Pyrodinium bahamense var. compressa was identified as the causal organism. The elevated coliform counts in some coastal waters are indications of the presence of pathogenes in the water. Some pathogenic bacteria have also been reported occasionally. Petroleum and their associated products : aside the locally produced petroleum (about 2 millions barrels/day), and natural gases (about 5 billions cubic feet/day), the Southeast Asian waters are also used extensively for transporting these products from the Middle East and Africa to Japan, United States of America and other destinations. Southeast Asia has a quite share on the incidents of oil spills, in particular in the relatively shallow and treacherous Straits of Singapore and Malacca.

Industrial Wastes : due to easier access, industrial estates have been established in many parts along the coast of Southeast Asia. Except in a few sites, the industrial estates have been able to contained and managed their industrial wastes. However, in the future they could become a potential threat to the coastal environment of Southeast Asia, if countries in the region develop their industries without proper regulation and management of their wastes.

Among the pollutants listed above, probably oil pollution is the most serious thread to fisheries. Although the impact of oil on tropical estuaries is not yet well known, it may be surmised that the most significant effect, from high toxicity in the water columm would be that on shoreline fauna and flora. Since estuaries receive up to 50% of their organic matter from mangrove ecosystems, the impact on mangroves is of importance. Mangrove (and coastal marshes) have been ranked as the ecosystem most sensitive, or vulnerable to oil, owing to the persistense of oil in that environment and the slow recovery time of the ecosystem, estimated at 20 years or more (ODUM and JOHANNES, 1975). The vulnerability of coral reefs to oil depends on the level of toxicity in the water columm (RAY, 1980), presence and degree of mixing, and degree of direct exposure of corals and other organisms to the oil.

Thus, many of the region's fisheries are already under stress. Spilled oil can have direct and indirect lethal and sublethal effects on eggs and juveniles of species as well as on adults. More important species of fishes may be tainted and fishing gear may be fouled by oil, resulting in socio-economic depression of the fishing industry and, thus, indirectly affecting all those who depend upon their food and livelihood. Marine and coastal pollution is not only give negative impacts to the ecosystems,

but it also causes financial loses and has some economic bearings as well. Just a few examples (after GOMEZ et al, 1988) :

- Pollution caused a considerable amount of financial losses to mariculture industry in Hong Kong and certain parts of Indonesia.
- Hundred of millions of Singapore dollars have been used to restore marine life to the Singapore River and Kallang Basin.
- Clean up operation in one major oil spill like the Showa Maru in 1975 costed several millions US dollars. The ecological damages of such oil spill even now has not yet be determined, but the Indonesian government has claimed to be near US$ 15 millions.
- Millions of tons of sediments have to be dredged annually from major rivers, harbours and navigational routes in Indonesia and Malaysia. A substantial amount of budget has to be allocated every year by the respective governments. Similar problems are faced by Thailand and the Philippines.
- Microbial and heavy metals contamination on shellfish resulted in the heavy loss of earnings as well as causing human health problems.

As results of the UN Conference on Environment and Development (UNCED), in particular the Agenda 21, for the purpose of protecting the environment and in some cases also for economic considerations, all countries in the region are now taking measures to combat pollution. These measures include pollution control, environmental impact studies, national and regional legislation to prevent and response to oil spills, and participating in international conventions on the protection of marine and coastal environments. Although the stresses on the marine and coastal environments are likely to continue, countries in Southeast Asia have committed more and more of their resources to prevent and combat pollution. At present there is one GEF (Global Environment Facilities) supported program entitled Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas. This program is implemented by UNDP/IMO (United Nations Development Programme/International Maritime Organization) from its Manila office, the Philippines.

PROSPECT FOR REGIONAL COOPERATIONS

The Third United Nations Conference on the Law of the Sea (UNCLOS III) provides Southeast Asia with an important opportunity to avoid and to settle amiably resources disputes in an interna- tional framework. On 16 November 1993, sixty States had ratified or acceded to the Convention. Thus, the Convention will enter into force on 16 November 1994, after the 60th instrument of ratification or accession was deposited. While only two Southeast Asian countries, namely Indonesia and the Philippines, have ratified the UNCLOS Convention, there is a strong regional interest in this issue (MATICS, 1994).

The UNCLOS III opted for coastal states to manage their fisheries within 200 nautical miles. Exclusive Economic Zones (EEZs). The great endeavour in fisheries diplomacy encompassed by UNCLOS III was designed to improve the management of world fishery resources. At the same time, it was with the good intention of ensuring that marine fisheries be managed properly and effectively to benefit all types of States, be they coastal States, distant water fishing States, geographically disadvantaged States, or even land-locked States. This is apparant from the relevant provisions of the UNCLOS III, namely Article 61 (conservation of the living resources in the EEZ), Article 62 (utilization of the living resources in the EEZ); Article 63 (cooperation regarding shared stocks and straddling stocks); Article 64 (cooperation regarding highly migratory species); Article 69 (the right of land-locked States); Article 70 (the right of geographically disadvantaged States); and Article 123 (cooperation of States bordering an enclosed or semi-enclosed sea on the management, conservation, exploration and exploitation of the living resources of the sea). Shared stocks are those shared between or among two or more neighboring States, while stradling stocks are those to be found in both the EEZ and the adjacent seas.

International cooperative arrangements through international fishery institutions have been in existence in Southeast Asia for some decades. For examples, the Indo-Pacific Fishery Commission (IPFC) of the Food and Agriculture Organization (FAO), the South China Sea Fisheries Development and Coordinating Programme (SCSP) was established in 1968 to encourage rational stock management policies primary through sponsorship of scientific research. Unfortunately, the SCSP was disolved in late 1970's due to mis- management. The Southeast Asian Fisheries Development Center (SEAFDEC) was founded in 1967 as a regional technical body for training and research in fisheries. Although Indonesia participated in the program, but as a matter of principle, i.e. membership of Japan, Indonesia is not member of SEAFDEC. The International Center for Living Aquatic Resources Management (ICLARM) was set up in 1975 to conduct and accelerate research on all aspects of fisheries and other living aquatic resources. The Committee for the Development and Management of Fisheries in the South China Sea (CDMSCS) was established in 1980 within the framework of the IPFC to define policies of fisheries resource management and development and to coordinate and facilitate international development and management activities within an overall regional programme.

The Association of the Southeast Asian Nations (ASEAN) can also be used to settle resource disputes in the region. The six members of ASEAN are Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore and Thailand. Recently, two other countries, namely Laos and Vietnam have signed the Treaty of Amity and Cooperation with ASEAN. Thus, they are eligible to be associate members. It is hoped that in the future Combodia and Myanmar will be open for a closer relations with ASEAN. There are a number of subsidiary bodies of ASEAN that could be used to develop cooperations in the field of research, development and management of marine resources and the environment. For examples (SOEGIARTO, 1993b) ASEAN Committee on Science and Technology (COST), in particular the Sub-Committee in Marine Science, and the ASEAN Senior Officials on Environment (ASOEN). In addition, it could also be mentioned the ASEAN Fisheries Forum, an association of private sectors on fisheries in ASEAN and the SEAPOL (Southeast Asia Programme in Ocean Law, Policy and Management).

In the last three years Indonesia has initiated a series of informal Workshops on South China Sea. The primary aim of these Workshops is to resolve overlapping claims by States around The South China Sea through developing regional cooperation of mutual benefits. A model which was successfully developed between Indonesia and Australia in the Timor Gap area. Two political regional cooperation have been agreed upon in the South China Sea. They are: Marine Scientific

Research and Resource Inventory and Assessment. Unfortunately, however, the implementation of these agreements are still questionable. Since apparantly, China, Vietnam, Malaysia, and the Philippines still steadfastly maintain, even in some cases strengthen their military existence in South China Sea.

The Asia-Pacific Economic Cooperation (APEC) is a wider regional cooperation that can also be used to develop cooperation and settle disputes. APEC was established in January 1989 and operating on consensus building. Its founding purposes are to foster regional growth and development and to discuss ways and means for economic cooperation among its members. APEC has established 10 (ten) working groups. Two of them are relevant to fisheries. They are: "Conservation of Marine Resources" and "Fisheries". The forthcoming meeting of APEC will be held in Indonesia in November 1994.

In the field of marine scientific research, it could also be mentioned the Subcommission of the Western Pacific (WESTPAC), a subsidiary body of the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

CONCLUSION

In conclusion Southeast Asian marine and coastal waters is one of the most productive area in the world. Fisheries are important resource in the region, in particular for the livelihood of the traditional coastal communities. However, due to the population pressure, marked increase in regional fishing efforts in the past twenty years, coupled with the increase in pollution and the environment degradation, these waters have been experience a tremendeous pressures. If this trend continues countries of the Southeast Asian region will have heavy tasks and burdens in order to restore the destroyed resource base. It is probably not too late to make a concerted and coordinated effort to alleviate those problems. Regional cooperations, such as ASEAN, IPFC, SEAFDEC, ICLARM, APEC or IOC-WESTPAC could serve as a vehicle for such cooperation.

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