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Exploring an Eco-Management Scheme for Migratory Marine Species: Perspective from Asia and the Pacific

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A new approach to the marine resource management for migratory species is proposed, using seven examples from Japan (three cases), Malacca strait, Indonesia, Laos (Mekong river) and Solomon Islands. Daily and seasonal migration of fish and whales and associated fishing activities are described. Despite the common-pooled nature of migratory marine life, it became apparent from case studies that migratory marine life is not for open access, but likely to particular limited entry rules in terms of fishing space, and the resources are appropriated as particular ownership by local clan and communities. Conflict resolution process in different fisheries over the claim for migratory species suggest the people's perception as local commons. Migratory marine life has also the potentials as public and global commons. Henceforth, for the ultimate goal of international management scheme for migatory resources, multiple and region-oriented approach is necesary.

Keywords: marine resource management, daily and seasonal migration of fish and whales, migratory marine life.

Ⅰ. INTRODUCTION

The purpose of my lecture is to explore a new approach to the marine resource management for migratory species from maritime anthropological viewpoint. The goal of this paper is first to explore diverse nature of practices given to migratory marine species in coastal communities in Asia and the Pacific, and secondly, to seek logics and discourse in which how migratory marine species are either appropriated to particular ownerships or subject to open access in the local, regional and global contexts. Third, I will propose a possible generalization for

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the future sustainable use of migratory marine resources. As the status of migratory resources have been less sufficiently taken into account in the discussion of resource management than that of sedentary marine life, it may give lights upon future sustainable model for marine resource management as a whole.

In theories regarding sustainable use of marine resources, Gordon [1954] initially debated possible occurrence of the tragedy of the open sea resource before Hardin claimed “the tragedy of the commons,” using a pasture model [Hardin 1968]. Since then, Feeny *et al.* [1990] have demonstrated Hardin's shortcomings by referring various ethnographic case studies in which resources have been managed in diverse ways before “the tragedy of the commons” being manifest. Yet, how such open access resources as migratory fish can be well managed have not been examined in the ecological and social contexts [Berkes 1985, 1998].

1. Asia and the Pacific Focus

In the comprehensive discussion on marine resource management to date, great efforts have been devoted to Asia and the Pacific region. This is quite understandable as a number of small-scale maritime communities have existed in these region where customary resource management practices have been found [Johannes 1978; Ruddle and Akimichi 1984; Ruddle and Johannes 1985]. Unfortunately, contributions so far made have least argued on migratory species as the open access resources, and to the contrary, much concerns have been directed to coastal and sedentary marine resources as important matters for the discussion of the commons. Yet, it is well-known that even coastal fishing communities in Asia and the Pacific have a long history to harvest such migratory species as tuna, skipjacks, mackerels, sea turtle, and whales, depending on the season and through fishing expedition. They have had unique customary knowledge and practices as to fishing techniques, time allocation, and use of fishing grounds as a basis of resource management. In this regard, focus to Asia and the Pacific region merits for evoking more attention as well as delivering a new approach to marine resource management.

Fishing traditions in these coastal communities of Asia and the Pacific are not the same as before [Akimichi 1997]. Serious depletion of marine resources have been reported during the past few decades. Particularly in tropical and sub-tropical regions, coral reefs have been deteriorated to a great extent due to land-based anthropogenic activities (e.g., logging, land reclaim, agricultural land reform, disposal of waste). Also, destructive fishing practices such as blast fishing, and use of cyanide [APEC-MRC-WG 1998] have made the marine environments much worse than before. Likely, in temperate waters in east Asia, near-shore environments have been rapidly altered and deteriorated due to similar but more intense and wide-range human activities than elsewhere in the world. Land reclaim for residential, industrial and construction of airport have deprived resource base of coastal fishing communities [Akimichi 2004a].

Given these threats to coastal communities, it is not wise to seek a generalized almighty management scheme without consulting local conditions. On the contrary, I would suggest that wholistic approach focusing upon maritime institutions in each fishing community [Ruddle and Akimichi 1984] has merits in testing to different communities, regions and states worldwide. For instance, Japanese fisheries cooperative association (FCA) which is a local institutional asset that defines its territorial use rights (TURF) within limited waters [Christy 1982], and holds self regulatory mechanism in marine resource management, has been claimed as a model in comparison with institutions which bear similar or distinct structures and functions in other parts of the world. How similarities and differences between institutions and communities may be implemented for a creation of more effective management scheme is an interesting question.

In this lecture, focus is specifically directed to management measures applied to migratory species, rather than marine resources in general. Although migratory marine resources are generally acknowledged as the commons, local communities tend to, on the contrary, claim for particular ownership as we will see below. Henceforth, gaps given to migratory species among different communities become a major target for our concern.

Ⅱ. TWO TYPES OF MARINE RESOURCES AND THE COMMONS

In the beginning, I will briefly summarize the significance of species oriented approach to marine resource management [Akimichi 2001], by distinguishing sedentary and migratory marine species in assessing marine resource management in the ecological and social terms [McCay and Acheson 1987].

1. Marine Sedentary Species

In coastal waters of the world, there is a number of benthic marine organisms that have been utilized as resources by coastal inhabitants. These include such invertebrates as gastropod, bivalve, sea urchin, worms and corals. Edible plant species in near-shore waters are also used. These species are harvested mostly by simple techniques and with a small capital investment. Fishing activity is small-but economic gains are, on the contrary, high enough to sustain local fishers' livelihood. For instance, in Southeast Asia, abalone shell (*Haliotis*), pearl shell (*Pinctada*), green snail (*Trochus macrostomus*), and agar-agar (*Eucheuma* and *Glacilaria*) are important species as exporting commodities as well as local consumption [Sopher 1977; Akimichi 1995b].

Due to high economic values, but the limitation of harvestable zones, conflicts over the use of coastal fishing grounds often occur where sedentary species densely exist. To respond to conflict resolution, and to seek measures for sustainable sedentary resource use, a variety of institutional regulations have been devised. For an example, regulations to limit season and time for harvest, number of fishers, as well as a quota system, minimum harvestable size, and to control number and type of tools employed are generally found [Johannes 1978; Akimichi 1995]. Territorial and rotational use of fishing grounds are also common. Poaching by neighboring communities is another factor that becomes threat to resource management scheme of the community. Generally speaking, management measures are basically space-oriented as benthic resources are immovable or almost remain at the same spot.

Although these regulations are either enforced by community leaders, local associations or informally recognized among stakeholders, access rights to particular space are primary concern for the resource management. Ultimately, these measures are aimed not only to avoid resource depletion but also ease or terminate disputes and conflicts among fishers. The governance over sedentary resources can be manipulated even within a small local community, although the effectiveness of measures being deviated from the goal.

2. Marine Migratory Species

Contrary to sedentary resources, marine migratory species cannot be allocated within a limited area. Migratory marine organisms involve not only oceanic long-distance migrators, but also near-shore stocks migrating between feeding and spawning areas in limited waters. Large cetaceans, tuna (*Thunnus*), bonito (*Katsuwonus*), salmon (*Onchorynchus*) and green turtles (*Chelonia*) are examples of long distance migrators. Herring (*Clupea*), flounder (*Pleutonectidae*), mullet (*Mugil* and *Liza*), mackerel scad (*Decapterus*) and grouper (*Epinephelus*) are typical coastal migrators in the latter category.

In the efforts for sustainable use of migratory species, it is self-evident that a single community has not the exclusive responsibility to moving species. Given management measures being implemented in location A, the future of migrating fish is not predictable and it may lead to depletion at location B due to over-fishing or some other reasons. In this scenario, however, migrating species cannot be *a priori* held by particular individuals nor groups unlike the case of sedentary species.

3. The Pre-Harvest and the Post-Harvest

From comparison of sedentary and migratory marine species, it becomes quite apparent that two types of resource allocation can be distinguished between pre-harvest and post-harvest stages. Broadly speaking, it can be well acknowledged that no prior ownership for fish can be claimed until capture [Firth 1938]. It does

not, however, necessarily mean that any kinds of fish are subject to common property resource use at the pre harvest stage. Ownership of fishing grounds, and fishing gears [Akimichi 2004] are reported as being claimed as customary practices in the pre-harvest stage. Even after harvest, ownership for some species is *a priori* claimed by ruler, king, and clan head [Titcomb 1975; Carrier 1981].

If sedentary resources are perceived as common property for the community at the pre-harvest stage, how these resources are harvested and distributed among members depend on institutional premises. Although migratory species are also generally claimed as common property at the pre-harvest stage, the process and nature of ownership may differ from sedentary resources after capture. This has two connotations; the first is derived from free-swimming nature of fish; the second is that the fishing ground for migratory organisms is defined as open access to any fishers. Conflicts over migratory species are therefore rooted fundamentally from these two assumptions.

As migratory habits of marine organisms provide ecological basis of creating various ownership patterns in local, regional, national and global contexts, management of these resources has implications in designing and testing how to use common property resources at the sustainable basis in the ocean regime.

Several evidences are withdrawn from cases for migratory resource management, using historical and contemporary cases from Japan, Indonesia, Thailand/Malaysia and Lao PDR. in the next chapter.

Ⅲ. MARINE RESOURCE MANAGEMENT FOR MIGRATORY SPECIES

Fish migration is a very common phenomenon in the aquatic environment, and we cam extend our discussion to such migratory aquatic life as whales and sea turtles, besides fish. To define more adequately, fish migration includes not only daily-based but also seasonal activities. The former is the periodic phenomenon, onset by tidal and daylight rhythm whereas the latter occurs between feeding and

spawning grounds. Also, fish migration occurs between shallow and deep waters. To these migratory habits of fish, marine sciences have contributed much to demonstrate the route and onset of migration, change of food habits, spawning behavior and the stock assessment. Findings so far made are expected to be effectively applied for the sustainable management of migratory fish, although it may be hard to understand comprehensively how and how much fish is harvested and managed at each location. On the other hand, how migratory fish are managed at each locality are little reviewed unlike sedentary resources as we have discussed in the preceding chapter.

In terms of the usufruct and ownership, migratory fish is generally taken as common-pooled resources for any users [Ostrom 1990]. It is comparable to the notion that the public sea is the commons for everybody. Apparently, it is not easy to manage migratory fish only in one location.

Local fishers have, however, succeeded various facets of indigenous local knowledge and practices to migratory fish species regarding the precise time of migration and associated fishing techniques, and labor allocation in communal fishing. Among of all, how migratory fish is managed seems to be an attractive theme to be examined in terms of management scheme. Based upon these assumption, this chapter highlights various aspects of management measures for migratory fish species, using several case studies in Asia and the Pacific.

1. Daily migration of reef fish and ownership of fishing sites (Malaita Island, Solomon Islands)

In the northeastern part of Malaita Island, in the Solomon Islands, an extensive barrier reef develops. The Lau-speaking fishers have utilized the reef for the sustenance of their living. Fishing is Lau's main subsistence activity, and about 96 fishing methods are distinguished, among of which fish drive-in net techniques most develop. Reef fish are major target and the largest one require 10 canoes and 50-60 fishers. [Akimichi 1978].

In terms of ownership, the sea is divided into two; the owned area(limited entry) by particular clan or lineage, and the un-owned area (the open access).

While open sea, channel, and shallow sea-grass beds are free to use, the owned area covers most of the shallow reef, which include reef edges where the net is hauled up at the last stage of the drive-in net fishing activity. The reef edge is abundant in coral rocks, and include particular spots used in net hauling. Lau designate these spots generally as *gouna alata* (head of the fishing ground) and each of which is individually named [Akimichi 1978, 1992]. *Gouna alata* is virtually fish shelter or the fish pass between shallow and deep waters. It is noted that the owner area is usually closed as the fish reserve, and only occasionally become open when a large amount of fish is required on festive and ritual occasions. Ownership of *gouna alata* is significant social institutional appropriation for the Lau in terms of sustainability of food and society. It is also apparent that ownership of *gouna alata* is deeply associated with migration pattern of reef fish. No particular practice to limit fishing during the spawning period is not known except the case of rabbitfish. In March, fishing for rabbitfish used to be prohibited in any place for one month [Akimichi 1978, 2004b].

2. *Sasi* enforcement to migratory fish (Maruku, eastern Indonesia)

In eastern Indonesia, *sasi*, prevailing customary practices devised for community-based resource management, is applied for not only sedentary resources such as sea cucumber and trochus shell, but also migratory fish [Bailey and Zerner 1992; Akimichi 1995a]. *Sasi lompa* is one example on Haruku Island [Kisaya 1993; Monk *et al.* 1997]. *Lompa* (*Thryssa baelama*) is a kind of anadromous fish which moves nocturnally out to the sea for feeding and then return to the river early in the morning. During the spawning (April and May) and the growth period until winter, *lompa* fishing is banned. When *lompa* fish became matured in the river, a ceremony is held to open sasi (*panas sasi*: to heat *sasi*), community members share a great catch for one or two days. It suggests that seasonal run of *lompa* fish is combined together with the community-based management scheme as a traditional custom.

In El Rarang village, consisting of nine hamlets (*dusun*) is located along the central-west coast of Kai Besar Island. In this village, sasi for sardine (*naru:*

Sardinops spp.) and horse mackerel (*masalid: Selar* spp.) is lifted once a year during April and September when a big seasonal run into the bay occurs. In such an occasion, opening of sasi is declared upon the decision among heads of nine hamlets. In the fishing, about 20 to 40 numbers' of bamboo fenced traps with bamboo wings on both sides (*vean, sero* in Indonesian), are prepared by connecting individual fenced trap together so as to make an encircling fence in the shallows inside the bay. Along the center of this fence trap formation, the village head's trap is set. Incoming school of fish is chased from the outside toward traps, and once trapped, the catch becomes private property of each trap owner. Those who do not have fenced trap are freely able to catch fish that are swimming around in the bay with scoop net, small net, and by using fish poison [Akimichi 2004b]. Although in-coming migratory fish is generally perceived as the common property of the village, a village leader, trap owners can preferentially claim fish as their own while those who fish in the free waters without trap as open access. This group fishing substantially reflects social hierarchy in the community of El Rarang to migrating resources.

3. Spawning aggregation of epinephelid and lethrinid fish (Yaeyama Islands, Okinawa, Japan)

In the westernmost part of Okinawa prefecture, southern Japan, there located Yaeyama Islands where extensive Sekisei Lagoon develops. It is surrounded by the barrier reef, within which shallow coralline habitat provides good fishing grounds for small-scale fishers belonging to Yaeyama FCA [Kuchikura 1977].

During the last few decades, coral reefs in Yaeyama waters have gradually been deteriorated. This trend is mostly due to the land-based anthropogenic activities and rapid economic development in the Yaeyama which commenced since after 1973 when Okinawa was restored to mainland Japan. In the fishery sector, although small-scale reef fisheries have long persisted for a few hundred years, and no definite trend of decline in the catch for reef fish being found during a few decades or so, unexpected decline of reef fish such as *taman* (*Lethrinus nebulosus*) was reported around Okinawa's main Islands around the mid

1990s. It eventually prompted local fishers being aware of a need of conservation of reef fish resources.

Under the circumstance, Okinawan Prefectural government proposed a resource management program for lethrinid fish in the area. Following this proposal, there had a two-year lasting debate on the management of spawning sites of grouper and lethrinid fish in Yaeyama waters [Akimichi 2001]. Meetings were held several times in 1996-97, in which not only fishers but also administrative officers of the city office and the Okinawa prefecture, anglers' shop owner, and marine scientists took part.

Focus of debate was how many sites for the sanctuary can be declared for the conservation, particularly during the spawning season of reef fish. Location for the possible sanctuary sites is generally distributed around the outer part of reef channel about 20-30m deep where spawning aggregation of groupers and lethrinid fish specifically occur [Johannes 1997]. The reef channel is also an important fish passage where fish move between the Sekisei Lagoon and the deeper waters outside of reef margin. In Yaeyama Islands, fishers used to designate these reef channel as *kuchi* (lit., mouth), and individual *kuchi* is named, respectively.

As local fishers were well aware of these fishing sites, some insisted that an excessive ban might lead to a decline in fish yields, and become a threat to their living. Furthermore, they were anxious if it may bring about conflicts among fishers in other fishing sites. Other fishers also suggested that there is no need for them to restrict their fishing efforts, and to exclude recreational and amateur anglers out of the fishing area is more effective measures for the management.

As the proposed sites for sanctuary are located within the fishing territory retained by the Yaeyama FCA, it was quite natural for professional fishers to feel that their fishing rights might be threatened by the final decision-making. Unlike sedentary resources such as giant clam and sea urchin, fish cannot be legally claimed as their own property by fishers belonging to Yaeyama FCA, but is regarded as open access to everyone by law. This is the reason why local professional fishers strongly opposed to the entry of recreational anglers to important fishing grounds. Anyhow, the final decision was made in 1998, and four sites were decided as the sanctuary during April and May. From the above, it

becomes evident that seasonal migration of epinephelid and lethrinid to particular sites for spawning is the major cause for the debate in Yaeyama Islands in which the aggregation sites for spawning are the foci, rather than the migration route.

4. Seasonal migration of mackerels and scad (The Andaman Sea and the Malacca Straits)

Near-shore waters from the Malacca Straits to the Andaman Sea are important fishery grounds shared by Indonesia, Malaysia and Thailand. Fishery in these waters is characterized by dual composition; small-scale and large-scale. Here, the case of Thailand will be described. In Thai fishery sector, the proportion of commercial large-scale fishing is only 10-20percent in the Andaman Sea, the other is predominated by small-scale coastal fishing with simple technology. small vessel and minimum capital investment. The situation is just the reverse in Gulf of Thailand where commercial sector accounts for over 80percent.

With the development of Thai commercial fishing since the 1960s, the marine fishery production for demersal resources and shrimp have greatly risen. This is surely due to the introduction of new fishing technology and larger vessels and high capital investment. In terms of fishery conflict, expanding commercial fishing has brought about international and domestic issues.

Until the establishment of exclusive economic zones (EEZ) in 1977, Thai commercial fleet used to exploit fish widely not only in her territorial sea, but also in the coastal waters of neighboring countries. It should be noted that Thai was the last nation in Southeast Asia to declare of EEZ in 1981, opposing the declaration of EEZ by neighboring nations as some fishing areas are overlapping between the countries. Practically, to be excluded from once open-access fishing grounds means to lose more than half of the catch harvested in the waters claimed by other nations EEZ [Samson 1985]. Even after 1980s, Thai trawlers were often reported to fish illegally to Malaysia, Myanmar, Vietnam and Cambodia.

Growing number of vessels and fishing efforts by commercial fishing sector also have given pressures to coastal fishing. In the coastal water of Andaman Sea, large-scale fishing vessels frequented near-shore waters for exploitation. After the

establishment of fishery law in 1972 to prohibit trawlers to enter within 3km of the shoreline, commercial trawlers and push netters often encroached into shallow waters and even to Marine Reserves [Ruohomäki 1999]. Complaints by coastal small-scale fishers has made the government to implement artificial reef program to block illegal fishing for resource conservation and for the benefit of coastal fishermen. In the Gulf of Thailand, similar conflicts has been witnessed between large-scale and small-scale fishermen [Flaherty and Karnjanakesorn 2002]. As a remedy to avoid such conflict, replacement policy for alternative fishery from trawling and push netting to cage culture and gill netting has recently been under process for the sustainable use of marine resources by the government [Jate per.comm.].

Fishery conflict over demersal fish and shrimp in Thailand and the neighboring countries lies as the issue of territorial claim of EEZ among neighboring countries, and Thai legislation to protect coastal fishermen whose fishing territory is within 3km of the shoreline.

In Malacca Straits, fishing conflicts have been frequented especially along the sea border areas [Tawa 2002]. These conflicts are not in essence associated with the fish migration itself, but national border issue. However, the contemporary conflict in the Andaman Sea is closely relevant to the ecology and conservation of migratory fish.

Contrary to this, pelagic fish poses different set of management scheme. In the Malacca Straits and Andaman Sea, Thailand, Malaysia and Indonesia have exploited a large amount of pelagic fish species such as mackerels (*kembong: Rastrelliger* spp.) and scads (*Decapterus* spp.) mainly by purse seines and often by trawls. Since the introduction of purse seines to Malacca at the beginning of the last century, especially fishery for mackerel has become the major fishery along provinces of Kuala Kedah, Pangkor and Mersin in Malaysia [Mohsin 1996].

In the Straits of Malacca area, production of mackerels in Thailand was about 28,000ton in 1985 [Boonragsa 1987] while in Malaysia it was about 55,000ton in 1985 which dropped from 69,000ton in 1984 [Isa 1987]. In Indonesia, catch of mackerels in 1985 was about 23,000ton [Tambolon and Merta 1987]. Since 1985 onward, fishing efforts for mackerels and scads has further increased, a need for

management for mackerels and scads has arisen. In 1999, FAO organized a workshop on the fishery and management of short mackerel (*Rastrelliger* spp.) on the west coast of Peninsular Malaysia as FAO Norway Government Cooperative Program in Penang. Although in 1997 spawning sites along the Straits as well as the possible migration route of mackerels were only partially clarified, conservation of spawning grounds was recommended as important measures for the management by the Malaysian scientists at this stage of the discussion. It is quite natural that Malaysian government can demand shares of fish catch from Thai as the conservation measures in Malaysia made possible the catch in Thai waters.

Although two species of mackerels (*Rastrelliger brachysoma* and *R. kanagurta*) exhibit hypothetically different migration pattern, the spawning sites might be thought around the coastal waters off Penang of Malaysia, and that the fish stock migrates seasonally upwards to the Andaman Sea area in Thailand waters in a clockwise way, and then back to the Malacca Strait. Based on these hypothesis, Malaysian sides claimed the uncontrolled fishery in Thailand, even if they claim a need for the conservation measures at spawning sites in Malaysian waters.

In this way, resource management of mackerels in the Malacca Straits involves the discussion on not only the stock-assessment measures such as quota system among three countries, but also the possible consensus on the shared concept of migratory fish catch.

5. Allocation of set net for yellowtail (*Seriola*) (Toyama Bay, central Japan Sea during feudal and pre-modern period)

In Japan Sea, yellowtail or buri (*Seriola quiqueradiata*) is known to migrate with Tsushima warm current northward as far as Hokkaido for feeding and then return to the south for wintering. Along the migration route of yellowtail, various kinds of fishery are conducted according to the seasonal migration. Set net, purse seine, gill net and line fishing are major techniques employed for yellowtail, and seasonality in fishing reflects migration pattern of this fish.

Toyama Bay which is approximately located at the central part of Japan Sea, is known as good fishing grounds for yellowtail and it is said that a large-scale

set net fishery in Japan originated from this area possibly since the late 16th century [Yamaguchi 1969; Himi Kyoiku Iinkai 1997]. In the Himi area, being located at the inner part of Toyama Bay, coastal areas have provided good fishing grounds for migratory fish. At least since after 17th century, set net operation became seasonal activities of three kinds of net per annum; spring net for sardine, summer net for tuna, and autumn net for yellowtail. As a rule, set net of the nearest to the coast (*hongishi*) used to be connected to the off shore nets one by one; from hongishi net to the second net off-shore side (*niban*: the second), from the second net to the third net off-shore side (*sanban*: the third) and so forth until the sixth or the seventh. Sometimes, another net was set at coastal side of *hongishi* net during summer season. In early 1830s, number of spring net was 94, summer net as 57, and autumn net as 25 [Himi Kyoiku Iinkai 1997].

During the feudal period, fishing ground in the Himi was formally given to Himi community from the local fief government in exchange of tax payment as fishery product. The right of fishery was then sold to individual fisher of the community through tender system. The bid price varied according to the location of net and the expenses for net materials also fluctuated year by year.

For the practical net allocation, lottery system (*kiza*) was practiced every year around summer. The lottery system in set net fishery has persisted until the present time. It suggests that harvest of migratory fish by set net varies a great deal according to the location of set net. For the social equity, but not precisely for the resource management goal, the lottery may have played an important role over these few hundred years.

6. Coastal whaling and ownership of migrating whales (Nagato area, Japan, the period just before the introduction of Norwegian modern whaling)

In Nagato of western part of Honshu, Japan, coastal whaling has a long tradition as in other western coastal areas facing Japan Sea. This is because large cetaceans migrate northward for feeding during spring and summer season along the Tsushima warm current and return to the south for wintering and breeding. Coastal areas of Japan Sea virtually frequented migrating whales, and very often

stranding was found ashore.

Some of coastal villages of Nagato had developed thrusting technique for whale at least since early 17th century. Whaling was a group activity in which 60 to 80 crews took part in with 7 to 8 whaling boats. After late 17th century (since 1673), a new technique for whaling was introduced; *amitori-shiki hogei* (whaling by using net). Being entrapped by a large net, whale was then killed. This remarkable technique has made the whale hunt more efficient than before. It has persisted as late as the beginning of the last century (1907) when modern Norwegian whaling technique was introduced.

In the Nagato area, villagers actively harvested migrating whales by thrusting techniques. In each village there was *kujira-gumi* or whalers cooperatives. Once whale is found swimming, a number of boats surround the sighted whale by a large net spread in a semi-circle and detachable harpoons were used for the killing. As the whale was an important source of income as well as the tax to the feudal fief, in-coming whales that chase after food fish were a great event for whaling villagers. The fief provided silver and rice for the whalers cooperative and supported their whaling activities. In return, the fief obtained the tribute of meat as well as cash obtained by the sale of whale meat. Failure of hunt made whalers frustrated, and they often obstructed the out-going whale entering the neighboring village by driving whale offshore or by means of putting bunches of bamboo floating as obstacles. For migrating whales, there were frequent disputes between neighboring communities over the ownerships and the obstruction.

In 1889, the agreement was made among coastal villages of Nagato concerning the ownership and fair whaling activity. Once harpooned but let injured whale escape to the neighboring village, the final owner of the whale goes to the harpooners groups. Stranded whale belonged to its coastal village unless harpoon head was thrust in the dead body of the whale.

7. Long-Distance Migrators of the Mekong River (Lao PDR)

Along the Great Mekong River in Lao PDR, many fishing communities have depended river fish for their subsistence. In the southernmost part of Lao PDR

territory, there are more than 60 fishing communities fish conservation zone system (FCZs) were commenced since 1994 in Khon Fall area of southern Laos [Baird and Flaherty 1999].

In this area, 68 FCZs were implemented among 63 Villages, in which each FCZ ranged between 0.25 to 18ha (mean=3.52). After five years implementation, significant increases in the stocks of at least 51 species were detected. However, for many species known to be long distance migrators, increase were not reported. Yet, some long distance migrators such as *Mekongina erythrospila* and *Labiobarbus leptocheilus* were reported to increase by a few villages. Long distance migrators which were not reported to increase, include such as *Henicorhychus* spp., *Paralaubuca typus, Tenualosa thibaudeaui and Scaphognathops bandanensis.*

This example clearly shows that for the management goal, community-based resource management system (CBRM) is not always working for the long distance migrators. As the Mekong river runs through territories of Vietnam, Cambodia, Laos, Thailand, and China, international dialogue must be an indispensable but difficult process for the ultimate goal of migratory fish management.

Ⅳ. CONCLUSION: A Future for Sustainable Management for Migratory Marine Species

From seven examples raised above, it became quite apparent that migratory marine species were claimed quite in different ways; if the migratory species are in the common waters (or open access area), the first who sighted have the priority as a rule. If the species approaching to coast or being stranded within the community's territory, the owner is either to those who first found, or to the village head, king or village members as a whole (whaling case). Fish pass and migrating route is often owned or claimed by particular social groups (Malaita's case) or held by fishers who have the exclusive use rights (yellowtail's case in Toyama Bay).

Even if migratory species are in the open access waters within the village,

FCA's territory or country's territorial waters, spawning sites are often claimed for the conservation, but it may sometimes bring about serious disputes over the management and entry rights. This is apparent from cases from Ishigaki, Malacca and Laos. It suggests that deviated ownership pattern for migratory species between the exclusive property rights and open access is fundamentally associated with the institutional premise to the space ownership. In other words, whether migratory fish is owned or un-owned is decided where fish is. Exceptionally, some kinds of fish is *a priori* claimed by king or clan wherever it may be harvested [Titcomb 1975; Carrier 1981].

Customary practice for fish trapping to migratory mackerels in eastern Indonesia shows that a village head and trap owners could preferentially harvest fish in good fishing grounds while the common people fish less in peripheries without effective fishing gears. Definitely, this rule is the cultural appropriation to the open access fish resources at the pre-harvest stage.

Overall, it is ascertained that migratory marine species are not for the open access, but are subject to particular ownership in terms of space. As fish move, human's concern is directed to the spot, route or space where fish pass. Nevertheless, migrating marine resources are not designated only for the local possession nor determined by space-oriented conception, but these may potentially be the commons shared between neighboring communities, among many communities within the region, or even among the global citizens.

Therefore, we may conclude that migratory fish is, although it is essentially postulated as the commons, to be claimed and owned as local and regional commons. Sometimes, it can be claimed as global commons. This is quite a unique point that migratory marine species has the important potentials in discussing the relationships between local, regional and global commons.

Marine animals that swim across local fishing territory and further beyond the national jurisdiction are likely to evoke essential question to us. Although international management scheme for migratory resources is an ultimate goal, it remains unknown if there is a single and the best solution satisfying all the stakeholders' opinions belonging to different areas and diverse cultures. Dynamic aspects of ownerships to migratory marine species should be scrutinized for the

sustainability beyond cultural appropriation to migratory marine species.

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<초록>

회유성 해양자원의 생태학적인 관리의 모색: 아시아 · 태평양으로부터의 시점

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회유성 해양자원의 관리에 대하여 새로운 접근법을 제안하였다. 그러기 위해서 일본(3개 사례), 말래카해협, 인도네시아, 라오스(메콩강), 솔로먼 제도의 7개 사례를 제시하였다. 물고기와 고래에 관하여 일주기와 계절적인 회유현상, 그리고 그것에 대응되는 어로활동을 다루었다. 회유성자원은 공유자원(코먼즈)으로서의 성격을 가지고 있으나, 사례에서 보면 어장으로의 입어규제가 적응된 결과, 자원이 특정 씨족과 지역공동체에 의해 소유되는 것임이 밝혀졌다. 회유성자원에 대한 권리를 둘러싼 분쟁의 해결과정은 자원을 지역의 공유자원으로 여기는 견해의 존재를 뒷받침하고 있다. 회유성자원은 다른 한편으로는 공공의 공유자원과 전세계의 공유자원으로서의 잠재적인 의미를 가진다. 따라서 회유성자원의 국제적인 관리를 위해서는 다원적이고 지역에 뿌리를 둔 접근법이 필요하다.

주제어: 회유성 해양자원, 물고기와 고래 일주기와 계절적 회유, 공유자원