

# Missing Links in Ocean Governance: The Case of Fisheries

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## ABSTRACT

The state of the world at the beginning of 21 century is terribly bad from all points of views such as environment, food supply, resources, economy and security essential for human survival. Our civilization based on technological development and mass consumption has been using up all resources on land and looking for alternative resources at sea. The UNCLOS and succeeding agreements provided a new framework for fisheries development in late twenty century and took various approaches such as the precautionary approach, the preservationist approach, protection of biodiversity and ecosystem integrity, and privatization of property rights to fisheries management, resulting in frustration. This paper focuses on missing links in the current management strategies from the ocean governance point of view based on the Japanese experience and discusses better management strategies. These include change in our attitudes from land-based idea to sea-based idea and from antagonism to co-prosperity among fishermen and environmentalists and/or developers, and the importance of worldwide sub-regional as well as nationwide community-based fisheries co-management in ocean governance among all interest groups in sea utilization.

**Keywords:** Fisheries, ocean development, environment, community-based management, sub-regional management, co-management, ocean governance

## 1. INTRODUCTION

Ocean governance concerns the management of ocean with multiple users. Its users ranges widely from private to governments, from industry to navy, and from sea-based actors to land-based actors. Due to the common property nature of ocean and the wide range of users, governments have tended to have an important role in ocean governance. However, its trans-boundary nature of resources and incomplete diplomatic relations among all countries, some aspects of jobs are beyond governments' capability.

Shipping and fisheries are two major industries based on ocean and have lasted since the history of human being and will continue to be active in the future. Although shipping's contribution to the society is transportation and simple, fisheries' contributions to the society are multi-faced, including food, environment, and national securities in addition to economic viability. Thus, this paper focuses on fisheries management as the most important sector in ocean governance.

The state of the world at the beginning of the 21<sup>st</sup> century is terribly bad from all points of views such as environment, food supply, resources, economy and national security essential for human survival. Our civilization based on technological development and mass consumption has been using up all resources on land and looking for alternative resources at sea. Even only from the food security point of view, we are in danger as shown in Tables 1-5. Eight million people are said to be starving in the world at present and the current market economy has failed to allocate food properly.

Table 1. Food self-sufficiency rate by county (%)

Table 2. Estimates of world population and food production

Table 3. Per capita grain consumption (kg/person/year)

Table 4. Maximum population on earth fed by current level of food production

Table 5. World capture fisheries production

The UNCLOS III and succeeding agreements provided a new framework for fisheries development in late twenty century and took various approaches such as the precautionary approach, the preservationist approach, protection of bio-diversity and ecosystem integrity, and privatization of property rights in fisheries, to fisheries management, resulting in frustration.

## 2. CURRENT FISHERIES MANAGEMENT APPROACHES

As conventional fisheries management tools, popular ones include fishing effort restrictions as input control such as restrictions in fishing gear and method, mesh and line size, number of vessels, size of vessels, and horse power; zoning; area and time closure; and size limit of catch. Under the open access system, the effectiveness of these tools have been less than under limited entry schemes in which participants are clearly defined. These tools are still important as far as these are applied in appropriate ways. Recent approaches paid most attentions in fisheries management include zoning, mono-species approach, precautionary principle, preservationist approach, protection of bio-diversity and ecosystem integrity, privatization of property rights in fisheries, monitoring, controlling, and surveillance.

### 1) Zoning

Zoning has been practiced in many parts of the world. In Japan, common fishery rights areas cover most of coastal waters stretching from the baseline to a few kilometers. These rights are granted to local fisheries cooperative associations (FCAs) as a community-based co-management partner. The continued existence of this system is largely attributable to the fishermen's conflict avoidance, compliance behavior, and cultural values (LIM et al., 1995).

Territorial seas of 12 miles, contiguous zone, EEZs, and high seas are certainly zoning developed under the UNCLOS III which left the management of trans-boundary issues of fisheries to international and/or regional cooperation. However, these are administrative jurisdictions without considering the ecology of marine species and there is no integrated comprehensive management yet at seas. EEZs provided ample opportunities for coastal nations, but all coastal countries except for China face with serious over-investment and resource depletion. On the other hand, excluded distant-water fishing vessels from EEZs concentrated fishing at high seas in the 1980s. Accordingly, signs of over-fishing, new fisheries development, and increasing interest of coastal states on high sea fisheries and by-catch were observed and resulted in various international regulations such as Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean (NPAFC) of 1992, Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas of 1993, Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea of 1994, and the Fish Stock Agreement (UNIA) of 1995, restricting high seas fishing based on the coastal interest.

### 2) Mono-species approach

Mono-species approach is common among industrial fisheries targeting primary species. These fisheries operate at sea more than a day and tend to discard low value species or to practice high grading. The output control such as total allowable catch (TAC) system was regarded as the most efficient tool for resource conservation and the TAC was adopted in UNCLOS III. However, the success of the system has been very limited mainly because of incompleteness of the system. Except for limited coastal species or relatively small number of participants and landing places, it is difficult to get reliable statistics to evaluate the resource situation because of high research cost and real time information gathering cost.

On the other hand, coastal fisheries in Asia largely depend on multi-species fisheries. Markets accept all fish landed. It is difficult to practice TAC for each species in Asian countries, though UNCLOS III obligates coastal states to adopt the TAC system. Japan and Korea tried to examine the TAC system for certain species. However, those TACs were set high so that catches have not met the TACs. Thus, there is no serious enforcement problem at moment.

### 3) Precautionary principle

For fisheries on the high seas, the precautionary principle has been made applicable in the 1995 Fish Stocks Agreement, requiring the signatory states to halt fishing either when scientific evidence indicates the danger of a depletion of stocks or when scientific data indicates the possibility of serious damage to the habitat. With regard to fishing limits that would be established in the international regional regulatory regimes under the agreement, signatory states are obligated to honor scientifically determined "reference

points" that will trigger actions to protect the stocks under exploitation. According to SCHEIBER (2001),

"It is especially important that the Agreement provides that, whenever such protective measures are required - either because of over-fishing or natural causes- the measures must be dedicated not only management but also to conservation of stocks and of habitat alike. When new fish populations are discovered and fishing is approved, it must be only on the basis of cautious conservation and management measures, with only gradual development of fisheries authorized. In all these respects, the 1995 Agreement embodied a precautionary approach. Moreover, ... all new entrants into a fishery under such a regime will be required to conform to the regulations in effect. This could mean that a zero quota will be given to a new entrant, whether a signatory or not- a situation that formerly obtained only in the EEZs- ..."

Questions on this principle are how to apply for this principle to meet either the demand for managing fisheries resources with population dynamics or the demand for food security, full utilization of the sea and multi-species fisheries, including food diversity and sustainable fisheries for human survival in the 21<sup>st</sup> century.

#### 4) Preservationist approach

The preservationist approach includes some distinct variants: marine mammal protection. In whaling, the question of whether a particular species is at the scientific "endangerment" level or rather ought to be preserved on other juridical and ethical grounds is a hotly debated topic. Japan has been involved in cetacean research since 1987 and provided scientific data to International Whaling Commission (IWC). The recent research indicates that cetaceans in the world consume each year 280 to 500 million mt of seafood, equivalent to 3 to 5 times of the total marine commercial fisheries catch (TAMURA and OHSUMI, 1999). Japan warns when a single species is protected and ignoring its role in the ecosystem, the balance in the ecosystem is disrupted (ANONYMOUS, undated; ANONYMOUS, 2001; YONEZAWA, 2001; and MORISHITA and GOODMAN, 2001). Although dominated in IWC, the preservationist approach faces the increasing challenge.

Protection of a large ecosystem is another variant, relating to areas such as the Antarctic, where the "marine sanctuary" approach is applied. Preservation is also central to regulatory programs governing smaller ecosystems such as the Monterey Bay area on the California Coast and the Great Barrier Reef zone in northeastern Australia. These programs involve total bans on certain types of activity as parts of a larger effort to achieve sustainability by preventing irreversible ecosystem damage (SCHEIBER, 2001). From productivity point of view, wilderness can afford only small number of people. How does this approach meet the demand for food for the populated earth of 6 billion.

#### 4. Protection of bio-diversity and ecosystem integrity

Overlapping with the debate of the precautionary principle and preservationist approach are recent trends in articulating principles for maintaining the health of ecosystems through comprehensive management (FLUHARTY, 2002). The explicit objectives of sustaining bio-diversity are developed thoroughly in the U.N. Bio-diversity Convention in 1992, but the bio-diversity imperative is in potential conflict with other concepts of "sustainable development" and "full utilization of resources" as the Rio debates made clear (SCHEIBER, 2001). There is no universally accepted solution as in the Brundtland Commission Report on the need for a balance of development and sustainability (ANONYMOUS, 1987) Thus, the second best solution is internationally to respect cultural as well as natural characteristics of local conditions, taking advantage of characteristics and functions of fisheries.

#### 5) Privatization of property rights

The idea of privatizing fishery rights has a long history. In Japan, those have been practiced since the feudal time. However, these rights are temporary use rights, not private property rights in absolute sense. In other parts of the world like Indonesia, Yap, and Fiji, traditional fisheries management based on these rights still remains. Based on open access policy, western countries tended to neglect these rights for a long time. The Total Allowable Catch (TAC) system in the international fisheries was rooted from the

Whale Oil Production Agreement in 1931 due to prevent over supply of whale oil. After World War II, International Waling Commission (IWC) was established in 1948 and a TAC system was implemented in such a way of the Olympic method based on the blue whale unit equivalent. The system adopted the TAC system by country in 1962, and entered in to the moratorium in 1982. Many following international fisheries agreements adopted some sorts of TAC systems.

In the 1970s, debates on fisheries management in EEZs was heated in the United States (MATSUDA, 1982). These included management strategies such as a system of disincentives/incentives, moratorium on entry coupled with the simple licensing, a system of stock certificate, the Alaskan limited entry system, a royalty system and the "grandfather system", and single ownership. All include variants of output controls and important issues were whether individual quota (IQ) or individual transferable quota (ITQ) should be taken and whether the social costs of privatization are acceptable or not.

The last 20 years' experience of the privatization policy in the world is not so optimistic except for a few cases such as practices in New Zealand and Australia where fisheries are rather simple and very confined cases such as the scallop fishery in Japan.

#### 6) Monitoring, control and surveillance (MCS)

Open access is common practice in western countries so that anyone can join in any fisheries if he thinks it will be profitable. An application of the total allowable catch (TAC) system looks simple and practical. However, it associates with many problems pertaining to high grading and discard, resource assessment, false report and real time statistical information system, diversity of landings in place, time and use including subsistence use, and interaction with other species. In October 2000, EU organized International Conference on Fishery Monitoring, Control and Surveillance in Brussels and highlighted the MCS. This indicates that the fisheries industry in western countries is the subject to control, because "fishermen took two, but he reports only one" (YAMAMOTO, 2001).

On the other hand, so many fishermen work at so many places in Japan. The feudal order collapsed with the Meiji Restoration in 1868 and the new Meiji government declared that all sea areas belonged to the new central government in 1874. But this led to severe disputes within the fisheries sector, resulted in the withdrawal of the declaration in 1875. Based on the thorough study of traditional fisheries customs, the Meiji Fisheries Law, characterized by the modernization of customary rules and regulations and by the establishment of legal fishery rights, was enacted. And it was in part succeeded to the current Fisheries Law based on revised limited entry scheme together with democratization policy (MATSUDA, 1991). The Japanese government has been aware of the high cost of MCS by the government and chosen the community-based co-management scheme utilizing local autonomy based on a fisheries cooperative association (FCA) system including the MCS function as a more reasonable way. Thus, fishermen are not subject to MCS by the government, rather subject to MCS by themselves. Besides, Japanese fishermen are not only promoting environmental health in the society but also closely associated with coastguard and police by helping them not only to prevent smuggling and other illegal activities at sea, but also to reduce MCS cost.

### 3. CHARACTERISTICS OF FISHERIES

Fisheries target commercial living species, living freely in a natural commons with special characteristics of: insensibility in hydrosphere; renewable resources with species interactions; common property in nature; wide exposure to environmental pollution and destruction; high natural dependency and catch/price uncertainty; perishability of catch/products and market limitation; and poor scientific knowledge. These fisheries species and habitats characterize fisheries.

#### 1) Insensibility of target species and habitats in hydrosphere

Fisheries species live in hydrosphere so that those are difficult to sense. There are many obstacles to sense them. Those include waters themselves as living environment with high water pressure, very low dissolved oxygen, and high mineral contents. Therefore, fisheries objects are difficult to see, hear, touch, smell, and taste, unlike other objects pertaining to land-based industries. Even using high-tech machines

like robots or sensor, their use is very limited at sea. As a result, fisheries science is still a frontier science like space science.

2) Target species and habitats as renewable resources with species interactions

Fisheries species and habitats are renewable resources, which mean that those will be utilized forever except for natural intervention, if those are managed wisely. Fisheries are one of the oldest industries in human history, still remain vital, and will continue to be important in the future. Despite the conventional use of fish, most marine organisms are not utilized yet (MATSUDA, 2001). The fisheries sector plays a significant role in food security with additional contributions to incomes and wealth (ANONYMOUS, 1995). This is particularly important if we consider the rapid population growth with limitation of supply of food from agriculture (NAGASAKI, 1999). As healthy food, drugs, raw materials, and ornamental use, there is a great potential in fisheries.

3) Common property nature of target species and habitats

The term "common property", used in the Roman Law, the Anglo-Saxon Common Law, the German Land Law, refers to a distribution of property rights in resources in which a number of owners are co-equal in their rights of usage. Their rights are not lost through non-use, but co-equal owners are necessarily equal with respect to the quantities of the resource used by each over a period of time. Common property is not everybody's property; potential resource users who are not members of a group of co-equal owners are excluded (CIRIACY-WANTRUP and BISHOP, 1975). In this sense, fisheries species and fishing grounds are certainly common property resources. As far as the resource use is much less than the amount of the resource, users are relatively free to use it. However, such user's freedom will be reduced as the more users are involved and/or more efficient gears are used. Under over-fishing conditions, fishermen have to consider responsible fisheries (ANONYMOUS, 1995a)

4) Wide exposure to environmental pollution and destruction

As far as people live, work, and produce something, how to handle wastes are an unavoidable important issue. When population was small and people don't consume much, the nature took care of those human wastes. However, wastes from the currently over-populated and industrialized world with mass consumption of plastics and other man-made products are beyond the nature's carrying capacity. By the law of gravity, excess pollutants run into river, lakes and seas. As a result, the seas are suffering from marine pollution such as eutrophication, red tide, blue tide, low dissolved oxygen; loss of spawning and nursing grounds due to development; oil spills; contamination by inorganic/organic chemicals; pollution due to other litters and wastes from human activities. It is said that about 80% of marine pollution are attributable to land-based activities. Marine-based pollution includes ship-based one and aquaculture.

Fisheries species and fishing grounds are certainly affected by these water and land pollution. In 1999, 134 million metric tons (mt) of chemical fertilizers were used in world agriculture and more than 75,000 of compound chemicals were produced for agricultural drugs and other industrial use (BROWN et al, 2000). Fates of excess chemicals from agriculture are rivers, lakes and seas. Although only fisheries species and birds recover increasing nutrients at sea and prevent eutrophication, their contribution to such recovery is said to be less than 10%. Unless we promote fisheries, marine environment is going to be worse. The excess policy for marine mammal protection against responsible fisheries such as whaling advocated by Japan is not a relevant policy from the environmental point of view. The fisheries industry could be a strategic sector coping with environmental problems from points of not only nutrient recovery, but also environmental monitoring function since one of the major jobs of fisheries is to supply safe foods for the people (MATSUDA, 2002).

5) High natural dependency and catch/price uncertainty

Fisheries are well known as an industry with high natural dependency and catch/price uncertainty. This is because lives of target species of capture fisheries are an integral part of ever-changing nature and prices of harvests are determined by demand and supply. These prices could be different at different place, time, and product form. Although capture fisheries could take advantage of externalities because

the nature takes care of cost of production except for harvesting cost, they have to live with nature which is uncontrollable. This uncertainty makes fisheries a high risk and high return business. As a result, the capture fisheries sector is difficult to get credit and has to base on own capital. This is the reason why the qualification of a fisherman requires savings equivalent to at least 3 years' disposable incomes so that he can continue sustainable fisheries. Thanks to this philosophy led by Hokkaido Fisheries Cooperative Associations (FCAs), current scallop fishermen in Hokkaido, who used to live in remote hamlets and be workers away from home in winter 40 years ago, have savings of over 100 million yen (US\$750,000) per fishing household, and per-capita annual income of 20-50 million yen(US\$150-380,000). They conduct resource management type fisheries and contribute to responsible fisheries including resource enhancement. Those FCAs have their own research vessels, do resource assessment by themselves, and predict the resource situation up to 5 years in advance.

#### 6) Perishability of catch/products and market limitation

Perishability of catch/products of fisheries commodities has long been known. Fisheries commodities have been marketed for a long time. Fresh fish were marketed locally while processed goods such as dried, smoked, fermented, salted, seasoned seafood, were marketed in distant areas traditionally much before canned and frozen goods became available. How to overcome this perishable characteristics of fisheries products has been the major issue in fish marketing, because fish spoil easily so that fresh fish must be sold as quickly as possible, thus the market is very limited. With a big catch, it is difficult sell fish fresh, so that fish processing developed for the purposes of not decreasing values of catch initially and of value added later.

In 1999, Japan imported 3.4 million mt of fish equivalent to 1.7 trillion yen (US\$13 billion) in value from over 140 countries. This value is next to oil import which is said to be the lifeline of Japan. These fish imports include fresh fish, the number of lots are many, and each lot is smaller than agricultural commodities. The Narita International Airport is also called as the Narita Fishing Port. Adoption of the Hazard Analysis and Critical Control Point (HACCP) system and product labeling, including the descriptions of the place of origin, in Japan is relatively new. Nevertheless, there have not been many incidents like cholera because of thorough inspection by traders' themselves.

#### 7) Poor scientific knowledge

In many fisheries, catch data is the only source of scientific data, though scientific surveys for resource assessment for particular species have done in limited ways. If catch data is reliable, resource situations could be estimated. However, the reliability of data provided by fishermen has been questioned especially after the implementation of EEZs. Under the TAC system, resources are tended to be underestimated and the assessment of such resources requires independent resource surveys at least a couple of times a year. However, resource surveys are quite expensive so that most countries just neglect them.

In the past, fisheries management is based on mono-species approach, not multi-species approach. An application of mono-species approach to fisheries is very limited because it is too simple and neglect interactions with other components of the ecosystem. Unless we could develop more comprehensive management strategies, there is not bright future in fisheries. Further, in order to value the fisheries, it just from a monetary based short-term interest is not enough. Sustainable fisheries management should be rational not only from short-term prospect (0-5 years) but also from medium (6-30 years) and longer-term (more than 30 years affecting next generations) prospects. Furthermore, all industrial fisheries were short-lived and over-speculated because most of fisheries management scheme was based on seasonal basis so that it was difficult to make an rational investment decision for new fishing vessels for next 25 years. These characteristics feature the fisheries. Although there have been a lots of changes in fisheries in the past, these characteristics of fisheries have been unchanged.

## 4. MISSING LINKS IN OCEAN GOVERNANCE: MISMANAGEMENT OF FISHERIES

Missing links in our ocean governance is rooted to ignorance on fisheries, fisheries overlooked by general public such as hard, dirty, fishy, dangerous jobs, and the mismanagement of fisheries with wrong assumptions for the fisheries management neglecting characteristics and functions of fisheries because of

poor knowledge on fisheries among managers and the public. These include too much emphasis on top-down approaches, poor accountability of fishermen, and market economy; and neglect of importance of resource enhancement and co-management in fisheries with local autonomy. Scientific base and ecological integrity on fisheries is very limited, except for very local cases. There are some lessons from the Japanese experience. These include cooperation among fishermen and the society, social functions of fisheries, and the design principle of community-based co-management.

It has been increasingly important to develop healthy and sustainable fisheries, by coexisting with the nature of the ocean. Cooperation between fisheries and environmentalists is the key for the development of the world fisheries in the present century. This is because fisheries are the only industry, based on ideas from the sea and nature, effectively contributing to solutions for global persistent problems of food and environmental security, rural poverty and national security if we manage it wisely.

#### 1) The Minamata Disease Incident

In the human history, fishermen have been victims of land-based economic activities since all pollutants eventually go to rivers, lakes, and seas. The MINAMATA disease incident (1932-68) in Japan dramatizes such a case. Inorganic mercury was used at Chisso, the company dominated the economy of Minamata city, as a catalyst in producing acetoaldehyde and about 600 tons of them were directly discharged from the factory to the sea for more than 35 years. Fishermen at first recognized the abnormal discharge and protested against the company, but such a claim was neglected at very early stage. Since then, fishermen repeatedly protested against the company in vein. Even the local, prefectural, and national governments did not help fishermen. In doing so, fish were contaminated by such a mercury and converted it to organic methyl mercury. These fish were taken by fishermen and sold to the public. Accordingly, abnormal situations occur among fishermen's family at first and later consumers who took a lots of fish from Minamata Bay and surrounding sea. Patients with a wide range of disabilities for daily life appeared increasingly. Those patients were estimated as 200,000.

As a result, it brought to courts after 1968 when the company stopped the production of acetoaldehyde. Many courts dealt with the matter, resulting in the defeat of the company and governments but too late. Many patients passed away before the national government apologized to some patients in 1995. The Company and governments could compensate only less than 20,000 people and whole damages have never studied well. Although the governments regard the Minamata Incident was over, no one believe it. With such bitter experiences, Minamata city rose up to the leading city of environmental activities in Japan with ISO 14000 where fishermen, patients, citizen, and governments are working together.

#### 2) Social functions of fisheries

It is important for the society to recognize critical roles of fisheries such as a bridge between sea and land, a tool for sustainable development, a tool for rural development, a tool for nutrient recovery and environmental monitoring, and a tool for national securities including food and environmental securities.

Fisheries also contribute to economic opportunities for rural development, business, employment, foreign exchange earnings and savings; research and development opportunities; and national securities. Research and development opportunities for understandings of hydrosphere and ecology surrounding target species are important to know how to reduce uncertainty, how to wisely manage fisheries resources, how to improve fishermen's welfare, how to improve food diversity, how to wisely use fisheries for rural development and national security, how to integrated knowledge in other disciplines into fisheries, and how to coordinate marine affairs. National securities include food, employment, environmental, and rural development securities including prevention of illegal actions such as pirates, smuggling, and illegal fishing.

Without taking into account food diversity such as fish from the ocean, there will be no other solution for the world food problem because of the limitation of land, environmental problems and economic viability preventing efficient food allocation. However, in the most part of the world conventional fisheries have resulted in over-fishing, resources depletion and environmental degradation. Nevertheless, there still remain some resources not touched by human being. Therefore, we must learn from the past and develop

rules for the wise use of fisheries resources so as to meet the local requirement of the area concerned.

There is no industry to recover excess nutrients at sea except for fisheries, salt making and guano collection, though it is said that only about 7% of nitrogen and phosphate has been recovered by current fisheries. Further, target species of fisheries are often victims of man-made environmental pollution. Accordingly, fisheries could be the most effective environmental monitor and seafood safety will only be guaranteed by responsible human activities, including industries, fisheries, fish processing, fish marketing, and fish consumption. Thus, the world environmental problem will never be solved if we neglect fisheries.

The ways of conventional fisheries management, which are still kept in many developing countries have resulted in rural poverty, and national insecurity such pirates, smuggling and illegal fishing should be changed to new approaches suitable to local conditions. Taking advantage of comparative advantages such as externalities of fisheries and local characteristics, wise use of fisheries resources will result in prosperity and national security. The past experiences must be critically reviewed and learned.

Fisheries in Asia have a long history, and many people depend on fisheries. According to FAO compiled statistics, by 2000 in terms of quantity the total production including seaweeds from all Asian countries was 62 percent of the world total. If we take aquaculture alone, it accounts 91 percent of the world total. In value terms by 1999 the export of fishery commodities from the whole Asian countries was 35 percent of the world total, while the import was 40 percent. Fundamentally Asian people are fish eating people. Fisheries in the Western countries are mainly composed of an industrial fishery, while those in Asian countries are primarily based on a small-scale fishery. Nevertheless, these characteristics have been hardly considered at international forums.

Current fisheries have many ways to improve their activities from environmental points of view while current environmental activists also have many ways to improve their activities from fisheries points of view. They can work together for the future.

### 3) Community-based fisheries co-management

The design principle of fisheries co-management exists in Japan. (MATSUDA, Y, 1991; LIM, P.C., Y. MATSUDA, and Y. SHIGEMI, 1995). The Japanese Fisheries Cooperative Association (FCA) system covering all fishing communities in Japan is a community-based fisheries co-management system. The system was established by the Fisheries Cooperative Association Law of 1948 and the Fisheries Law of 1949. The laws granted FCA as a non-profit organization both administrative and economic functions. The administrative function is to manage Common Fishery Rights and licenses granted by prefecture governors or Minister while the economic functions include various business activities such as credit and insurance; supply of oil, ice, net, gear and equipment, and daily items; fish auction, and rentals of cold storages and warehouses.

The FCAs have been networked at prefectural as well as national levels with the government supports. Each FCA formulates a fisheries management plan for common fisheries right areas for capture fisheries each 10 years and for demarcated fisheries right areas for aquaculture each 5 years, respectively. Conflicts among different plans are coordinated by a Fisheries Coordination Committee at prefectural level or United Sea Fisheries Coordination Committee for transboundary issues covering more than a prefecture. Except for Minister's designated industrial fisheries, most of fisheries rights and licenses are granted by the prefecture governor concerned.

Under the FCA system, fishermen's access to credit becomes easy, their risk has been reduced, and a sense of resource management including resource enhancement has been fostered. But many of current FCAs face with serious problems of low income and savings, resource depletion, and little successors. This is attributable to mismanagement of the FCA system resulting in destruction of fisheries environment by industrial development, over-protection of fishermen and over-lending to fishermen with easy inspection to each function, and monetary solution of compensation on fisheries, not to the design principle of the FCA system. This is because there are many FCAs in remote Hokkaido under the same system are very vital.



## 5. FISHERIES MANAGEMENT IN THE 21<sup>ST</sup> CENTURY

There was no industry in this world living longer than fisheries in the past and will be no industry in the future if we manage it properly. Many other industries such as oil and reclamation industries have been said to be more economically viable than fisheries, but all of them came and left and shorter lived than fisheries. If we understand these and consider for the future, we can have better vision than before. Fisheries are certainly one of the key industries among many industries in the world.

Over-fishing is a mono-species fishery's problem, not a multi-species fisheries problem. If we shift our policy from mono-species approach to multi-species approach, we need not worry about over-fishing and no government intervention is certainly an attractive alternative in fisheries management. Administrative cost is zero, but multi-species fisheries continue on a sustainable base because bio-mass will increase due to eutrophication at sea, though species composition will change all the time.

If we spend money on fisheries management, the objective of the management should be much higher than in the past. Although FAO is rather pessimistic on the future of capture fisheries with the limit of around 100 million mt (FAO, 2000), Japan advocates the possibility of sustainable capture fisheries production of 500 million mt based on multi-species approach, including utilization of whales. China's capture fisheries production from East China Sea has been increased from 5 million mt in 1989 to 15 million mt in 1998 and this is attributable to man-made marine forest based on kelp and other seaweed culture from Tairen to Fukken Province for 1,300 kilometers. The seaweed production during the same period increased from 1.6 million mt to 6.3 million mt.

In the past, fish were regarded as free gifts from nature. But the time has come to the age of responsible fisheries in such a way of contributing at least 1% of landing values to resource enhancement, fisheries management and research. The time also has come to choose the best management option from top-down, bottom-up, community-based management, co-management, community-based and/or sub-regional co-management in a real term, according to local conditions, place, time and local initiatives, since there is no universal solution.

Local autonomy & cooperative networking are essential components of sustainable fisheries management and roles of government include to help establishing local autonomy, networking all sub-regions, and checking the function of those autonomies.

A balance between development and environment is necessary for our human survival. After World War II, the same words have been used frequently, but little people paid attention on environmental aspect. The counter reaction is the environmental movement last two decades. Now we are in the middle and try to behave more in a rational way. A balance between bio-diversity and "development or full utilization or economy" is important. Facing with food and environmental problems, we must change from the society based on mass-consumption and mono-culture to the society based on appropriate consumption encouraging to reduce unnecessary consumption, and reuse and recycle consumed goods, and to respect cultural and food diversities as well as bio-diversities. Fisheries must live with nature and are not an enemy of environmentalists, rather one of the best friends of environmentalists. They must work together for our future generations. Let's take examples in the Asia-Pacific region surrounded by APEC countries.

### 1) Sub-regional fisheries management

There are many international fisheries management bodies in the region. These include Asia-Pacific Fisheries Commission (APFIC), Forum Fisheries Agency (FFA), Inter-American Tropical Tuna Commission (IATTC), International Pacific Halibut Commission (IPHC), International Waling Commission (IWC), North Pacific Anadromous Fish Commission (NPAFC), Pacific Commission (PC), South Pacific Forum (SPF), Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea, Japan-Republic of China Joint Fisheries Commission, and Japan-Republic of Korea Joint Fisheries Commission. Some are sub-regional and some are not. Most of them are based on either governmental or mono-species approaches and face many problems. For example, IWC established to make possible the orderly development of the whaling industry in 1956 is not functioning. On the other hand, the South Pacific islands countries have experimented their regional

fisheries management scheme characterized by "enforcement without force" since the 1980s and are seeking to develop a better management scheme in the Pacific.

The new approach relevant for the 21<sup>st</sup> century is a sub-regional approach for offshore and high sea fisheries, but based on responsible private initiatives with government support. The role of government is an initial legal setup of local autonomy of such sub-regional fisheries management bodies, cooperation regarding trans-boundary issues over coastal jurisdiction and periodic checks of networking, transparency of the management and all functions of the autonomy to prevent corruptions. The management should be based on multi-species and ecologically based management for sustainable fisheries development including research and resource enhancement responsibility, not a simple stock management in the past.

Asia Pacific region is quite large so that it could be divided by 6 sub-regions: Bering Sea, the Sea of Okhotsk, Japan Sea, East China Sea, South China Sea, Pacific Ocean. The Pacific Ocean could be divided by two or three sub-sub-regions such as North Pacific, South Pacific, and Central Pacific. Nevertheless, each sub-region must compose an ecosystem at sea. At present, regional fisheries management bodies include FAO type like IAPFIC, developed country type like IATTC, and developing country type like FFA. Characteristics of the FAO type are open membership to member countries of FAO and scientific committees to collect catch statistics, analyze data and advice the management bodies for MSY. The developed country type is characterized by limited membership to small number of countries whose interests on a specific target species are very high. In addition, there is a case of having its own research laboratory to conduct resource management study.

On the other hand, the developing country type excludes distant-water fishing nations as a member. Although all of them are governmental organizations, they face on many management problems (ANONYMOUS, 1992). Those of the FAO type include a lack of funds and properly constituted and staffed secretariats, conflict between scientists and contracting parties, conflict of interests among contracting parties, fishing operations by outsiders, inability to make binding recommendations and decisions concerning management, a lack of enforcement capability, and invocation of the veto right by contracting party. The developed country type also has problems of confrontation with other interests, fishermen's moral and flag state responsibility. Although, the FFA's management is highly rated as "enforcement without force (MOORE, 1987)", it faces with a limitation under the UNCLOS III framework (SAITO, 1993) and research capability on highly migratory species management (JOSEPH, 1990).

Attempts to establish regional fisheries management schemes in South China Sea, East China Sea, Japan Sea, Okhotsk Sea and Bering Sea have existed. But all of them are governmental ones, not non-governmental ones. This is critical when those regions include territorial problems such as Spratly Islands in South China Sea; Senkaku Island in East China Sea; Takeshima in Japan Sea; Habomai, Shikotan, Kunashiri and Etorofu Islands in Okhotsk Sea. Further, different interpretation on continental shelf, and other political problems such as the China-Taiwan relationship and severance of diplomatic relations are another problems. These make governmental approach unworkable. This is particularly true in the Asia-Pacific region.

Further, past fisheries management approaches, emphasizing mono-species management from conservation point of view by setting TAC for maximum sustainable yeild (MSY) as the objective, have neglected the economic viability of fisheries. Most of TAC is set for one fishing season while an investment for fishing vessels is for over 20 years. How can fishermen economically survive under these circumstances? Fisheries management strategies must be changed if we wish to improve the current fisheries. Learning from the experiences in the 20<sup>th</sup> century, we must develop more effective approach toward sustainable fisheries management in the 21<sup>st</sup> century. My recommendations are as follows:

- Ecosystem-based 6 sub-regions: Bering Sea, the Sea of Okhotsk, Japan Sea, East China Sea, South China Sea, Pacific Ocean consist of 6 sub-regions. The Pacific Ocean could be divided by two or three sub-sub-regions such as North Pacific, South Pacific, and Central Pacific. Andaman Sea, Sulu Sea Celebes Sea, and Arafura Sea could be included in the South China Sea sub-region.
- Non-governmental fisheries management bodies: Members of the sub-regional fisheries management bodies in the Asia-Pacific region should be non-governmental, consisting of

memberships of fisheries representatives of surrounding countries of the sub-region whose interest should be sustainable fisheries development not only for the current generation but also for our future generations in the sub-region, with the sense of responsibility.

- Sub-regional vessel registration: The national representative is responsible for its national registry within EEZ and at high seas. Without exception, through the national representative all vessels fishing in a sub-region must be registered in the sub-regional registry which automatically registered in the APEC regional registry.
- Fare cost and benefits sharing: Beneficiaries from fisheries have to pay for the social cost such as resource enhancement, fisheries management including MCS and research cost for the sustainable fisheries for current and future generations.
- Economic viability: Right or license based fisheries are important (ANONYMOUS, 2000). The term of such right or license should be long enough to secure economic viability, say 10-20 years.
- Local autonomy: The sub-regional fisheries management bodies have to have local autonomy such as the Japanese Fisheries Cooperative Associations (FCAs) with administrative and economic functions together (MATSUDA, 1991; LIM et al, 1995; MATSUDA, 1998)
- Government support: Government supports are essential to establish such sub-regional fisheries management bodies with local autonomy under a co-management scheme with the respective government. Resources and fishing grounds will remain as renewable common properties and there are great potentials for expansion in both quantity and quality in the future.
- Multi-species and ecologically sound sustainable fisheries management: Further research and statistical collection are needed to manage sustainable fisheries. Cost of relevant research should be paid by beneficiaries, not by governments. Too much dependence on government sides on research and administration has curtailed incentives of fishermen to manage and develop sustainable fisheries.
- Step-by-step process: It takes one generation, 30 years, to change so that we must take a step-by-step process for next 30 years.

## 2) Networking

Networking is particularly important in fisheries management because fish migrate beyond each jurisdiction, ranges of fishermen's activities are vast, and enforcement by the authority is difficult. The most effective way to manage fisheries resources is to be managed by responsible local autonomy and principal roles of governments are to help establishing local autonomy, networking all sub-regions, and checking the function of those autonomies. This is a variant of co-management approaches. Further, both horizontal and vertical integration are essential within county, sub-region, and the ocean regarding EEZ and high sea fisheries management in order to manage fisheries effectively.

## 3) Role of governments

The role of governments is an initial legal setup of local autonomy of the above mentioned community-based and/or sub-regional fisheries co-management bodies, cooperation regarding trans-boundary issues over coastal jurisdiction and periodic checks of networking, transparency of the management and all functions of the autonomy to prevent any corruption. The management should be based on multi-species and ecologically based management for sustainable fisheries development including research and resource enhancement responsibility, not a simple stock management in the past.

## 6. CONCLUSION

Fisheries are a difficult subject and should not be neglected by the society due to the ignorance. Their contributions to the society are tremendous. The objective of fisheries management is not just a simple allocation of scarce resources but more than that to succeed richer resources for future generations. Attention must be given to community-based fisheries co-management in inshore fisheries and sub-regional fisheries co-management in offshore and high seas fisheries as effective fisheries management schemes with local autonomy and fishermen's initiatives described in this paper. It is meaningless to continue to fight between Fisheries and Environmental Activists since both seriously consider the environmental issues on the earth and must live with nature. Obvious are evils of non-recycle society with destruction of ecosystem, and the importance of co-existence with nature. Fishermen's environmental monitoring functions must be respected by environmental activists. The 'co-existence with nature' is the

common interests between fisheries and environmental activists. If both emphasize the 'co-existence with nature,' both are friends, will respect each other, and could work together for the solution to big problems of the earth such as mass-consumption, mass-destruction, and environmental pollution based dominantly on land-based activities. Then, both will respect marine science, conduct appropriate research, minimize conflicts among them with zoning schemes, practice the 'responsible fisheries' enhancing marine resource bases such as seaweed beds, marine forests, tidal flats, coral reefs, and mangrove areas. Fighting with fishermen, environmental activists will never gain environmental security.

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**Table 1. Food self-sufficiency rate by country (%)**

USA	France	Germany	England	Italy	Japan
125	140	90	75	78	40

Source: Food Marketing Economy No. 430 (2000): 12-13.

**Table 2. Estimates of world population and food production**

Year	2000	2025	2050	2100
Population (1,000)	5,500,000	8,500,000	-	12,000,000
Food production (Million mt)	Grain: 1,884 Meat: 179 Fish: 100 (1991)	No increase (?)	No increase (?)	No increase (?)

Source: Nagasaki, F., Meat Culture and Fish Culture, NOBUNKYO, 1999:50-56.

**Table 3. Per Capita Grain Consumption (kg/person/year)**

Average Asian	135-180kg
Average Indian	200kg
Average Developing Country's People	200kg
Average Japanese	500kg
Average Developed Country's People	Over 500kg
Average American	1,000kg
Average People	340kg

Source: Nagasaki, F., Meat Culture and Fish Culture, NOBUNKYO, 1999: 52-56.

**Table 4. Maximum population on earth fed by current level of food production**

Current level	5,500,000,000
Assuming American style by all	3,400,000,000
Assuming Japanese style by all	8,700,000,000
Assuming Indian style by all	13,400,000,000

Source: Nagasaki, F., Meat Culture and Fish Culture, NOBUNKYO, 1999: 53-54.

**Table 5. World Capture Fisheries Production**

(Million mt)																
Year	1970	1972	1974	1976	1978	1980	1982	1984	1986	1988	1990	1992	1994	1996	1998	1999
Production	59.3	55.1	58.9	61.9	62.5	63.6	67.3	72.8	79.8	83.6	80.3	80.4	86	87.3	80.1	85.8

Source: FAO Fisheries Statistics