Community Based Coastal Fishery Management : Lesson Learned from Seto Inland Sea - Hyogo Prefecture, Japan

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1. INTRODUCTION

Tropical fisheries are often multi-species and multi-gear. Community-based fishery management has been recommended as an effective instrument for fishery management in tropical zone while it has long been successfully practiced in Japan. This study objective is to identify the keys of success in Japanese coastal fishery management. Lesson learned from coastal community-based fishery management in Japan will be beneficial for adopting effective coastal community-based fishery management in Thailand. Seto Inland Sea has been selected, as the study site, due to it's being important in term of coastal fisheries. The focus is on Hyogo Prefecture which is one of the 12 Prefectures around Seto Inland Sea. Data are collected from existing literatures and interviewing key persons in the area. Two fishing cooperatives in Seto Inland Sea side of Hyogo Prefecture, Akashiura and Ikuha, are selected representative for the coastal fishery management at the village level. Akashiura is located on the west of Kobe, about 20 minutes by train from Kobe. Ikuha is located on the northwest part of Awaji Island, about 40 minutes by car from Kobe.

2. FISHERIES IN SETO INLAND SEA

Coastal fisheries in Seto Inland Sea have been developed ahead of other regions in Japan. The total sea area is 21,827 sq km. In this Sea there are 727 islands. The largest one is Awaji Island.

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Along Seto Inland Sea Coastline located 12 Prefectures i.e. Wakayama, Osaka, Hyogo, Okayama, Hiroshima, and Yamaguchi (Honshu) ; Fukuoka and Oita (Kyushu) ; and Ehime, Kagawa, Tokushima, and Kochi (Shikoku). Sea areas are divided into 9, i.e. Osaka Bay, Harima Sea, Bisan Seto Sea, Bingo Geiyo Sea, Hiuchi Sea, Aki Sea, Iyo Sea, Suo Sea and Kii Channel. Seto Inland Sea has been important fishing ground for coastal fisheries in Japan, as well as being important spawning, nursery, and sanctuary for fishery resources of Japan. Fishing grounds in Seto Inland Sea are considered rich of fishery resources, both in term of varieties and abundance.

Fisheries in Seto Inland Sea can be divided by fishing gear into 9 groups, i.e. boat seine, small trawl, purse seine, gill net, angling, set net, lift net, shellfish collecting, and others. Two most important fishing gears in term of their catch volumes are boat seine (40% of total catch in 2001) and small trawl (28% of total catches in 2001). The total fish catches in 2001 was 240,813 t. Catches had been stable during 1997 and 1998, increased in 1999 and decreased again in 2000 and 2001. Catches in 2001 was the lowest during the last nine years. Decreases in catches from small trawl and purse seine were clearly observed, while catches from boat seine tended to increase. Nevertheless by value of production, catches from Seto Inland Sea decreased by only 1 % during 1999-2000. By fish types, sardine (iwashi) catches are the highest. 28% of total catches in 2001 was sardine. However sardine catches have been fluctuated recently. Sardine catches decreased during 1996-1998 and increased during 1999-2000 but decreased again in 2001, though the volume was still higher than 1996-1998. Second most catch in 2001 was sand lance (ikanago) (15%) which catch volume was significantly increased in 2001. Mackerel (aji) and shrimp catches were 5% each while flatfish (karei) catch was 4% followed by cutlass fish (tachiuo), shellfish, and sea bream (tai) of 3% each. Other catches were 34%. During 1995-2000, catches by species fluctuated. While sardine tended to increase from 1998 ; mackerel, flatfish, cutlass, sea bream, shrimp and mollusk were relatively more stable ; sand lance reached the peak in 1998 and tended to decrease since then but recovered again in 2001. Important catches include sardine, mackerel, flatfish, cutlass, sea bream, sand lance, shrimp and shellfish. Beside fish production, there is aquaculture production. Total aquaculture production from Seto Inland Sea was 370,493 t in 2001. 50% of this production was laver (nori), followed by oyster (39%). Important fish cultures were yel-

lowtail (6%) and red sea bream (3%) while there was also sea mustard (wakame) culture (1%). Other aquaculture was only 15%.

Number of fishing vessels in Seto Inland Sea was 20,979 in 2000 being 19% of total in Japan. 84% of the fishing vessels in Seto Inland Sea were small scale being less than 5 GT. Only 8% were 5-10 GT. These are considered mainly small-scale fisheries. In term of marine aquaculture, there were 5,243 marine aquaculture establishments in Seto Inland Sea, or about 20% of total in Japan. Share of Seto Inland Sea is around one-fifth of the total fisheries in Japan while main characters of fisheries in Seto Inland Sea are coastal small scale fisheries.[1]

In term of income, marine fishery household in Seto Inland Sea earned a gross fishery income of 3,958.6 thousand Yen, of which after deducting fishing expenses there would be a net fishing income of 1,942.3 thousand Yen per household per year. In addition to this fishing income, there were non-fishery business income of 187.2 thousand Yen and non-business income of 3,020.9 thousand Yen. Not all family members are engaged in fisheries. There are family members working outside fishery sector and earned almost as high income. On average accounting for all sources of income, one fishery household could earn about five million Yen annually.

In term of net fishery income, fishery household with 3-5 GT fishing vessel could earn most (2,753 thousand Yen per year). This net fishing income was almost as high as non-business income (e.g. salary). Accounting for non-fishery income, this fishery household could earn more than five million Yen per year. (Table 1)

During 1995-2000, marine fishery household in Seto Inland Sea earned an annual income of 5,018-5,905.7 thousand Yen. The peak was in 1996; thereafter their incomes were quite stable. Nevertheless the share of non-fishery income had been increasing. In 2000 it accounted for 62% of the total income of marine fishery household. Fisheries had been a profitable occupation. Fisherman could almost get double revenue from their investment in fisheries. The fishery net revenue was about the same as the cost of fishing. Nevertheless, the number of fishery establishments had been limited and there had been restriction on increasing individual fishing effort. There had been a limited entry for fisheries. This can explain the stable fishery income through the years. Through the social and economic development, job opportunities other than fisheries have been increasing. A number of fishery household members could find the

non-fishery income sources. Usually young family members, with higher education, could earn non-fishery non-business as well as business income. (Table 2)

Table 1 Incomes and Expenses of Fishery Household - Seto Inland Sea by Type of Fishing Vessels, 2000

(1,000 Yen/hh/yr)

Item	Average	< 1 GT	1—3 GT	3—5 GT	5—10 GT	Small Trawl
Expenses	2,016.3	1,018.8	1,113.4	2,814.6	4,144.0	2,833.5
Wage	92.2	14.9	0.8	150.1	363.6	28.0
Vessel	228.6	61.5	164.0	295.6	539.9	287.7
Office	6.0	12.0	0.7	6.5	12.2	4.1
Gear	210.1	137.7	98.0	319.1	310.4	537.3
Oil	405.2	154.9	149.2	668.7	748.8	176.8
Bait	33.7	56.2	34.1	25.4	23.2	44.3
Seed	1.0	4.0	—	—	3.4	—
Material	49.0	72.2	33.9	46.8	71.7	128.0
Vehicle	37.6	37.9	22.5	38.0	98.7	34.2
Rent	39.1	18.6	36.2	45.3	66.5	60.4
Fee	210.1	94.6	138.0	315.2	255.3	251.5
Interest	21.8	10.0	10.0	25.6	78.7	5.1
Others	892.0	438.9	564.0	1,193.5	1,826.9	1,527.6
Gross fishery income	3,958.6	2,139.4	2,423.4	5,567.6	6,576.3	4,400.1
Net fishery income	1,942.3	1,120.6	1,310.0	2,753.0	2,432.3	1,566.6
Non-fishery business income	187.2	127.5	280.1	103.4	332.2	96.6
Non-business income	3,020.9	4,306.4	2,558.7	2,897.4	2,742.6	2,405.4

Source : Calculated from the data of Seto Inland Sea Fishery Coordination Office of Fishery Agency

Table 2 Costs and Revenues of Marine Fishery Household around Seto Inland Sea 1995-2000

(1,000 Yen/hh/yr)

Item	1995	1996	1997	1998	1999	2000
Cost	2,003.8	2,081.8	1,951.1	1,947.3	2,034.9	2,016.3
Vessel	510.1	503.1	464.0	447.9	499.2	469.3
Gear	419.5	430.8	411.2	402.9	392.1	438.7
Oil	369.4	372.8	386.3	390.2	385.1	405.2
Fee	216.1	231.7	229.4	216.4	214.1	210.1
Wage	78.1	100.9	84.3	109.1	121.0	92.2
Others	410.6	442.5	375.9	380.8	423.4	400.8
Gross revenue	4,463.4	4,536.6	4,402.9	4,214.5	4,046.8	3,958.6
Fishery net revenue	2,459.6	2,454.8	2,451.8	2,267.2	2,011.9	1,942.3
Non-fishery revenue	3,013.0	3,450.9	2,957.2	2,845.7	3,006.1	3,208.1
Total revenue	5,472.6	5,905.7	5,409.0	5,112.9	5,018.0	5,150.4

Source : Seto Inland Sea Fishery Coordination Office of Fishery Agency

For aquaculture, net revenue from laver culture was 3,360.8 thousand Yen in 2000

while the household could also earn 2,192.2 thousand Yen from non-fishery revenue. Laver culture household could make a little higher income (5,553 thousand Yen) than marine fishery household. Cost and revenues of laver culture household are given in Table 3.

Table 3 Costs and Revenues of Laver Culture Household-Seto Inland Sea 1995-2000

(1,000 Yen/hh/yr)

Item	1995	1996	1997	1998	1999	2000
Cost	7,472.6	6,728.8	7,926.5	8,101.6	8,598.7	9,218.0
Material	1,121.0	1,032.5	1,501.4	1,481.4	1,530.8	1,678.8
Wage	1,224.8	934.9	1,394.9	1,205.4	1,452.4	1,452.8
Oil	840.0	851.7	794.0	961.7	1,017.4	1,086.7
Fee	646.9	799.5	757.8	839.4	925.3	1,238.9
Others	3,639.9	3,110.2	3,478.4	3,613.7	3,672.8	3,760.8
Gross revenue	9782.8	9,263.8	11,179.7	11,406.7	12,223.1	12,578.8
Fishery net revenue	2,310.2	2,535.0	3,253.2	3,305.1	3,624.4	3,360.8
Non-fishery revenue	2,278.4	2,860.1	2,623.0	2,944.5	1,880.1	2,192.2
Total revenue	4,588.6	5,395.1	5,876.2	6,249.6	5,504.5	5,553.0

Source : Seto Inland Sea Fishery Coordination Office of Fishery Agency

Aquaculture household in Seto Inland Sea had a better income as compared to marine fishery household. The average gross income of Japanese household was 6,731.3 thousand Yen in 2000. For marine fishery household in Seto Inland Sea gross fishery income was 3,958.6 and there was non-fishery income of 2,029.5 thousand Yen, leading to a total gross income of 5,988.1 thousand Yen, a little below the average Japanese household. Nevertheless while average Japanese household expense was 3,805.6, it was lower for Seto Inland Sea fishery household (3,747.7 thousand Yen). Seto Inland Sea fishery households, on the average, were close to the average income group. Marine fishery households with 3-10 GT vessel and aquaculture households could be better than the average.[2]

In 2000, the total number of fisherman in Seto Inland Sea was 39,080, a decrease of about 3% from previous year. 38% were 40-64 years old while 31% were 65 years old or older. Most of them (85%) were self-employed. Number of fishermen in-every age class, except the self-employed of 65 or older and the total 65 or older, had been decreasing, especially for the age class of 15-24 which most were the young generation who sought job-opportunity in non-fishery sector. (Table 4)

Table 4 Number of Fishermen in Seto Inland Sea by Sex and Age, 1999-2000 (Person)

Item	Total	Male	15—24	25—39	40—64	65 and over	Female
Total							
1999	40,190	32,160	710	3,990	15,770	11,690	8,030
2000	39,080	31,250	600	3,770	14,750	12,130	7,830
% Change	(2.76)	(2.83)	(15.49)	(5.51)	(6.47)	3.76	(2.49)
Self-employed							
1999	34,020	26,320	400	2,530	12,750	10,640	7,700
2000	33,250	25,680	370	2,310	11,870	11,130	7,570
% Change	(2.26)	(2.43)	(7.50)	(8.70)	(6.90)	4.61	(1.69)
Employee							
1999	6,170	5,840	310	1,460	3,020	1,050	330
2000	5,830	5,570	230	1,460	2,870	1,010	260
% Change	(5.51)	(4.62)	(25.81)	—	(4.97)	(3.81)	(21.21)

Source : Seto Inland Sea Fishery Coordination Office of Fishery Agency

3. FISHERIES IN HYOGO PREFECTURE — SETO INLAND SEA

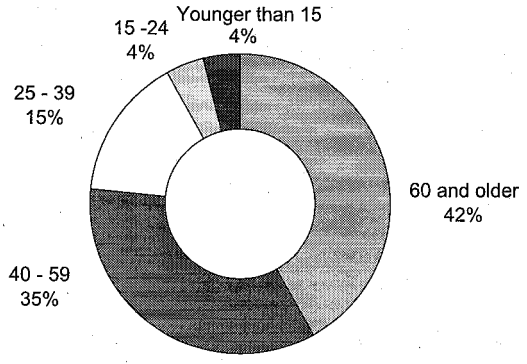
Sea Area of Hyogo Prefecture consists of Seto Inland Sea (Osaka Bay and Harima Sea) in the south and Sea of Japan in the north. In this study the focus is only the Seto Inland Sea. Hyogo Prefecture is divided into six districts i.e. Kobe-Hanshin, Higashi Harima, Nishi-Harima, Awaji, Tajima and Tanba. Relevant to this study are the first three districts which are located on Seto Inland Sea Coastlines plus Awaji which is the largest island in Seto Inland Sea. The other two districts are located on the Sea of Japan side. In term of fishery production, Hyogo share was over 2% of total fishery production in Japan in 1999. In term of marine fishery establishment, Hyogo Prefecture shared 3% of the total in Japan or 19% of the total in Seto Inland Sea. Of the total fishery establishments in Hyogo in 1999, 87% were individual fishery establishments, Fishery companies accounted only for 1% while the joint management establishments accounted for 12%. By size of organization, 84% used powered fishing vessel. There was not any non-powered fishing vessel in Hyogo. Those without fishing vessel accounted for only 2%. Set net and beach seine were 2% while aquaculture establishments were about 12% and the rest were designated fishing.

Most of the powered fishing vessels in Hyogo Prefecture were small vessels of less than 5 GT. In 2001 from the total 9,258 vessels, 88% were less than 5 GT. For those on Seto Inland Sea side, the number of fishing vessels was 7,751 of which 88 % were less than 5 GT. In Hyogo Prefecture, fisheries in Seto Inland Sea had more

important role than those in Sea of Japan. The main fishing vessels were of small scale, being less than 5 GT. Main fishing gears in Hyogo Prefecture－Seto Inland Sea are boat seine, small trawl, purse seine, gill net, and angling. Total marine catches were 61,696 metric ton in 2001. This was lower than aquaculture production (79,148 metric ton). Of the total production 140,844 metric ton, 44% were from capture while 56% were from culture. Main culture species were laver, oyster and sea mustard. Laver production was 86% of aquaculture production in 2001. Except the decrease in 1997, marine production from Hyogo Prefecture－Seto Inland Sea side had been relatively stable. Laver production had been the top in term of volume of production, followed by catches from boat seine and small trawl. In term of production value, marine capture production value and culture production values were about the same, with a little higher value for marine capture. In 1999 total production value from Hyogo Prefecture－Seto Inland Sea side was 45,950 million Yen. Laver still had the highest share of 44% in total marine production value in 2001 followed by boat seine (20%) and small trawl (18%). By type of fish among the total catches of 140,844 ton in 2001, 38% were fish, 56% were aquaculture production, and the rest 6% were shellfish. Highest production was still laver. Among fish, sand lance accounted for 56% of total fish catches, followed by white bait (18%). Other fish catches were fluke, scad, red sea bream, cutlass, flatfish, and Spanish mackerel. For shellfish, octopus shared 41%. Laver production was the highest among all.[3]

In term of population, in 2001 there were 6,490 fishermen in Hyogo Prefecture－

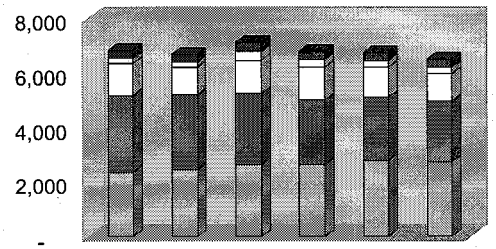
Figure 1 Age Structure of Fisherman Population in Hyogo Prefecture 2001 (Total=6,490 persons)



Source : Hyogo Prefecture-Seto Inland Sea Coordination Committee Office

Seto Inland seaside. Number of fishermen had been decreasing through the years. About one-third were 60 years old and older and the other one third were 40-59 years old. In 2001 42% of the fishermen were 60 and older and 35% were 40-59 years old. Only 15% were of 25-39 years old while 4% each were 15-24 years old and those younger than 15. (Figure 1 and Figure 2) Numbers of immigrants into fishing communities are limited. (Table 5)

Figure 2 Age Structure of Fisherman Population in Hyogo Prefecture 1996-2001 (persons)



	1996	1997	1998	1999	2000	2001
Younger than 15	280	280	314	290	280	260
15 -24	210	220	308	280	230	260
25 - 39	1,150	980	1,211	1,180	1,110	990
40 - 59	2,820	2,760	2,623	2,380	2,330	2,250
60 and older	2,370	2,450	2,640	2,650	2,770	2,730

Source : Hyogo Prefecture-Seto Inland Sea Coordination Committee Office

Table 5 Immigration into Fishing Communities in Hyogo Prefecture 1996-2001 (persons)

Area/Year	1996	1997	1998	1999	2000	2001
Tajima Sea 1/	7	13	8	20	17	15
Osaka Bay 2/	2	5	5	0	0	21
Harima Sea 2/	13	17	27	22	18	19
Awaji 2/	17	19	13	20	12	16
Total	39	54	53	62	47	71

Source : Hyogo Prefecture-Seto Inland Sea Coordination Committee Office
Note : 1/ On Sea of Japan side.
2/ On Seto Inland Sea side.

4. COASTAL FISHERY MANAGEMENT IN JAPAN[4]

Coastal fisheries play an important role in Japanese fishing industry. They have been important sources of protein for domestic consumption. Fish is daily dish in Japanese meal. Japanese has preference for fresh fish, thus their consumption relies mainly on

domestic production, especially from coastal fisheries. It is necessary to maintain the high quality catches from coastal fisheries. Being aware of the importance of coastal fisheries, attention has been on the development of sustainable coastal fisheries. Coastal fishery management in Japan thus has a long history.

In the early 17Th century during the Tokugawa Period (1601-1867), Shogun Tokugawa Ieyasu established military headquarters in Edo (now is Tokyo). In order to secure food supply for his troop, he established a series of officially recognized fishing villages around Tokyo Bay. Each fishing village was granted exclusive fishing right over the fishery resources in the waters adjacent to their villages.[5] This exclusive right was targeted more on sedentary species near shore, while further from the exclusive zone fishery resources were still shared by several communities. In return they had to supply a portion of catches to the Shogun's castle.[6] During 1743-1867, this fishing right regime can be considered as Ura Law.[7] During this period the governance in Japan had been divided into various areas under the governance of the Lords of those areas. The Lords granted exclusive fishing right to coastal fishing communities and collected tax in return.[8]

Shogun regime was overthrown in 1867. Meiji era began. During this period (1868-1944), Japan sent missions in various fields, including fisheries, to Europe. Attempts were on adoption of new constitution. For fisheries, the missions were sent twice but turned out not to be successful due to different system of fishery management between Japan and Europe. It was not until 1901 that Meiji Fisheries Law was enacted. Meiji Fisheries Law took into account the principles adopted in Tokugawa Period. By this law exclusive fishing rights for inshore sedentary species in adjacent coastal waters were granted to the fishing villages while fishermen from different fishing communities could still share the fishing far from shore. The fishing right under Meiji Fisheries Law could be granted only to fisherman's society. Individual fisherman could not get the right unless he had a satisfied record of fishing in the past. The fishing right was granted to fisherman's society upon their request. This led the fishermen in establishing their organizations to obtain the right. These fisherman's societies were later on developed to be fishery cooperative associations.

During the Meiji era, in 1910 trawl fishery was developed in Japan and led to conflicts with coastal fisheries. Licensing system was firstly adopted in an attempt to con-

trol the number and fishing effort of trawlers. In latter half of 1920s most of fishing vessels were mechanized, thus increasing fishing effort. These increases finally led to over utilization of coastal resources and conflicts among the fishermen.

Before the end of Meiji era fishing right had been extended further from shore while there were more large scale fisheries coming in this fishing sector. The power somehow turned to be under control of relatively large scale fishermen and under control of specific group of fishermen. There was a need for redistribution of the fishing right.

Before Word War II the Fishery Bureau in the Ministry of Agriculture, and Commercial Affairs was in charge of Fisheries. Under this Fishery Agency there were 4 divisions taking control of coastal fisheries, overseas fisheries, fishery commodities (mainly for export), and fishing vessel insurance. Included in Division of Coastal Fisheries were sub-divisions of Fishing Right, Fishery Cooperative, Infrastructure, Sea Ranching (with emphasis on fingerling release to enhance salmon stock in natural waters), and aquaculture. Overseas fisheries during that time focused on Bering Sea Area capturing salmon, king crab and cod for export. Canned salmon was mainly exported to the United Kingdom while canned crab was exported to the United States of America. Relatively small volume of salted and dried cod was exported to China. By that time fishery export was the second important export from Japan, being next to silk. Before World War II, fishing right was granted by the Minister. They were right on fishing gears as well as on captured species.

In 1935, Mr. Kanichi Nomura, the Chief of Coastal Fisheries Division, in attempt to reduce the conflict in fisheries, proposed the Program on Fishery Coordination. Under this scheme Fishery Coordination Committee was established, with participation of the fishermen. The objective was to achieve fishery management plan for optimum resource utilization, with harmony among stakeholders. Nevertheless the Word War II delayed implementation of this program.

After World War II, Meiji Fisheries Law was abolished in 1945. Japan was under control of Alliance Force for seven years. Under the governance of the Alliance Force Japan finally became democratic country. Fishery management was also reorganized to be democratic and decentralized. The Meiji Fisheries Law 1901 was redrafted, taking into account the establishment of Fishery Coordination Committee as proposed by Mr.

Nomura since 1935. Finally Fisheries Law 1949 was enacted. In addition to the establishment of Fishery Coordination Committee, there was fishery reform. Central government decided to buy back all fishing right by issuing bonds in an attempt to renew the right with an objective to make fishery resources available for harmonious optimal utilization.

Currently, fisheries in Japan can be classified by type of management into three main categories : fishing right fishery, licensing/authorized fishery, and free fishery.

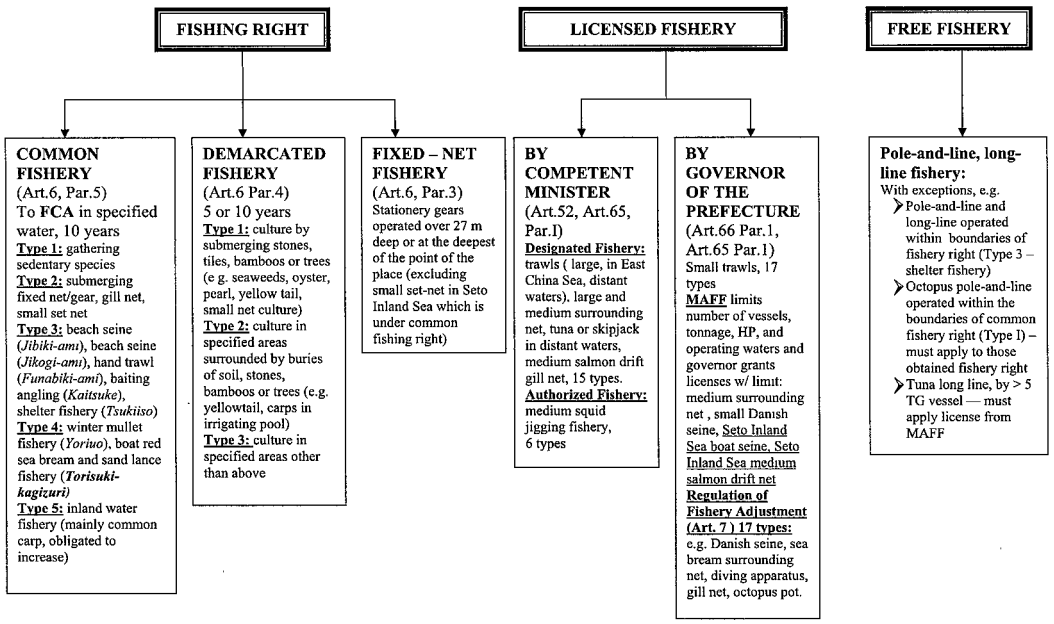
The fishing right is classified into three groups : common fishery, demarcated fishery, and fixed-net fishery. Common fishery is operated by common use of specified waters and will be granted only to Fishermen's Cooperative Associations (FCA). The right will be distributed among members of the cooperatives. The period of grant is 10 years and can be renewal upon the application and performance of the grantee. Covered in this common fishery are 5 types of fisheries including gathering sedentary species ; submerging fixed net/gear, gill net, and small set net ; beach seine, hand trawl, baiting angling and shelter fishery ; winter mullet fishery, boat red sea bream and sand lance fishery ; and inland water fishery. Demarcated fishery is mainly aquaculture in specified areas. There are 3 types of demarcated fishery : culture by submerging stones, tiles, bamboos or trees ; culture in specified areas surrounded by buries of soil, stones, bamboos or trees ; and other culture in specified areas. Period of grant is 5 or 10 years. Fixed−net fishery is operated by fixed gears over 27 m deep or at the deepest point of the area.

Licensing fishery can be divided into two groups : those granted by competent Minister and those granted by Prefecture Governor. Included in the group granted by the Minister are designated fishery and authorized fishery which are mainly mobile gears in offshore fisheries and have to be uniformly regulated by the Minister in order to lessen the conflict and maintain sustainable fishery resources. Under the Fisheries Law and Fisheries Resources Conservation Law, Fisheries Coordination Committees was established. 17 types of fisheries shall be granted to the fishermen by the Governor whom shall take into consideration the recommendation from his Sea Area Fisheries Coordination Committee/s. Main fishing gears in this group are small trawls and other coastal mobile gears. Nevertheless there is a limitation by the Ministry of Agriculture, Forestry and Fisheries on the number of fishing vessels, tonnage and horsepower. The

grant in Prefecture's waters cannot exceed the limit.

Free fishery includes those not being covered in the first two categories. They are pole-and-line fisheries, and long-line fisheries. Nevertheless this will not cover fishing in the boundary of common fishery fishing right of shelter fishery, octopus pole-and-line in the area of gathering sedentary species common fishery fishing right, and tuna long-line of over 5 GT has to apply for license from the Minister. (Figure 3)

Figure 3 Type of Fishery Management in Japan



For Seto Inland Sea, fishing right is the most important.

Under the Fisheries Law 1949, Fisheries Coordination[9] Committees were established.

At national level there is the "Fisheries Agency Bureau" in which administrative commission is the "Central Fishery Coordination Council". The Council takes role in drafting overall fishery management plan, harmoniously ; carefully takes into consideration the request from relevant stakeholders. The Fishery Agency Bureau functions as the secretariat in arranging central planning for fishery management in Japan. Nevertheless this Bureau does not make the top down decision but carefully gathers information from various stakeholders, takes into account the requests from the fishermen, level by level from fishing communities up to prefectures and regions, and gathers necessary in-

formation required in making fishery management plan. The decision is bottom up right from the fishermen in various fishing communities. Fisheries Agency Bureau is autonomous, not belonging in the Ministry of Agriculture, Forestry and Fisheries but works together to serve as secretariat supplying the required information and most important to coordinate for the harmonious optimum utilization of aquatic resources in Japan. The drafting of fishery management plan is "bottom up" not top down.

At regional level there are "Regional Fisheries Coordination Committees". At present there are 3 Regional Fisheries Coordination Committees and 5 Subcommittees as follows.

1. The Regional Fisheries Coordination Committee for the Japan Sea and West of Kyushu
2. Subcommittee for West of Kyushu
3. Subcommittee for West Japan Sea
4. Subcommittee for North Japan Sea
5. The Seto Inland Regional Fisheries Coordination Committee
6. The Pacific Ocean Regional Fisheries Coordination Committee
7. Subcommittee for North Pacific Ocean
8. Subcommittee for South Pacific Ocean

The objectives of the above committees are to provide consultation and coordination for appropriate resource management, including those in the region and those migrate in regions beyond the area of the Prefecture. The emphasis is on the coastal and offshore fisheries. The three committees cover whole fishing grounds of Japan, being divided into Japan Sea and west of Kyushu in the west and north of Japan ; Seto Inland Sea and Pacific Ocean on the east and south. Subcommittees are set up to increase the efficiency of the Committees in consideration on resource utilization and distribution. Nevertheless the roles of these committees are focused on consultation and coordination, not making the decision in fishery management. Harmonization among stakeholders is the top priority.

Regional Fisheries Coordination Committees give consultation and coordinate on resources management for coastal and offshore fisheries, take careful consideration on preparation of resources recovery plan, and give advice on implementation of the appropriate management measures.

Committee members consist of elected representatives from Prefecture Coordination Committees acting for the coastal fishermen, central government appointed representatives for offshore fishermen, and central government appointed fisheries experts.

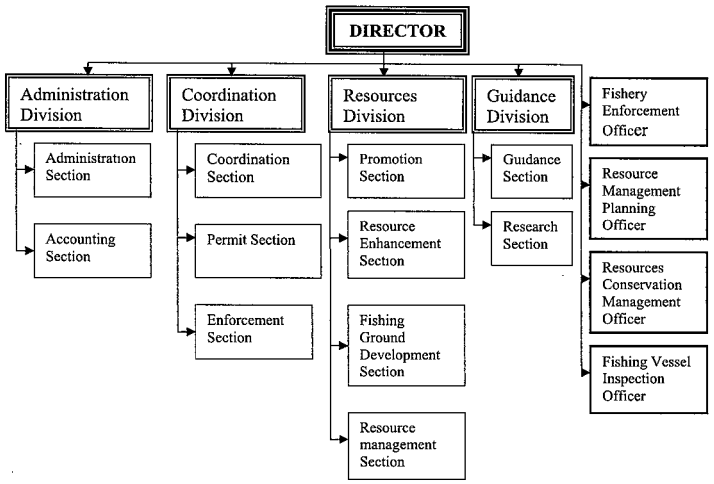
For "Seto Inland Sea Fisheries Coordination Committee", there is "Office of Seto Inland Sea Fisheries Coordination" serves as secretariat to the Committee. The Office is under the Fishery Agency Bureau, located in Hyogo Prefecture at Kobe District Office. There are 17 committee members in Seto Inland Sea Fisheries Coordination Committee, of which 11 members are elected by mutual vote from Prefecture Sea Area Fisheries Coordination Committees[10] and 6 are the experts appointed by Ministry of Agriculture, Forestry and Fisheries. The function of the Committee is to investigate problems of fishery coordination in Seto Inland Sea, consider the problem and the solution, and give instruction on the coordination. The target is to obtain harmonious fisheries for optimum aquatic resource utilization in Seto Inland Sea. The function of this Committee does not relate to fishery licensing.

Seto Inland Sea Fisheries Coordination Committee was established in 1950 by the Fisheries Law 1949. By Fishery Agency Law, the Office of Seto Inland Sea Fisheries Coordination was under Fishery Agency Bureau. It was attached to Kobe City to undertake the coordination and monitor fisheries in Seto Inland Sea for harmonious optimal utilization of aquatic resources in this sea. The jurisdiction of sea area was determined according to Article 109 of the Fisheries Law. In 1966 according to the reorganization in the Ministry of Agriculture, Forestry and Fisheries, Fishery Enforcement Division was added to the Office. In 1973, the Fishery Guidance Division was added. In 1977, Fishing Ground Development Section was established under Resource Division. Thereafter more officers had been added as follows: Resource Management Planning Officer (1995), Fishing Vessel Inspection Officer (1997) and Resource Conservation Management Officer (2001). The present organization chart is given in Figure 4. There are 4 Divisions under the Office of Director i.e., Coordination Division, Resources Division, Guidance Division, and Administration Division. There are also 4 Officers under this Director, i.e. Fishery Enforcement Officer, Resource Management Planning Officer, Resources Conservation Management Officer, and Fishing Vessel Inspection Officer.[11]

The Coordination Division has 3 sections i.e. Coordination, Permit and Enforcement.

Coastal Prefectures around Seto Inland Sea developed their own rule and regulation in fisheries and their fishing grounds can be jointly exploited. It is necessary for the Office to give the information, guidance and coordinate for harmonious fisheries in Seto Inland Sea[12]. The Office is also responsible for issuing fishery licenses as granted by the Minister of Agriculture, Forestry and Fisheries. For the enforcement, the Office has two fishing patrol boats and one aircraft. Another function of the Coordination Division is to inspect and give approval on the fishing vessel. This task is in collaboration with the Fishing Vessel Inspection Office.

Figure 4 Organization of the Office of Seto Inland Sea Fisheries Coordination



Source: Office of Seto Inland Sea Fisheries Coordination

Resources Division has 4 sections, i.e. Promotion, Resource Enhancement, Fishing ground Development, and Resource Management. Main functions are improvement in fishery management capability, enhancing stock abundance, promotion on aquaculture, and development on fishery recovery plan. The focus is on fishery development on the basis of appropriate resource management. In strengthening fishery management capability, the activities include sustainable fishery development, strengthening capability of young fishermen in their cooperative administration, increasing value the catches via value added process, and offering consultation for effective fishery community business. Seed production for releasing into natural waters is conducted for stock enhancement. For aquaculture promotion the Resource Division undertakes research on marine aquac-

ulture and gives consultation on aquaculture technology and management for sustainable development. For fishery recovery, the systems of "Total Allowable Catches" and "Total Allowable Effort" have been adopted. Recently Resource Recovery Plan for Spanish mackerel has been adopted.[13]

Guidance Division has 2 sections, i.e. Guidance and Research. The focus has been on the problems of red tide and shellfish poisoning. Attempts are also on maintaing fishery environment. Another important function is to collect and report the data on Seto Inland Sea Fisheries.

Administration Division has 2 sections,i.e. Administration and Accounting. The total number of workers is about 25. As observable the role of Seto Inland Sea Fisheries Coordination Office is mainly on the coordination, consultation, and enhancing resource abundance in Seto Inland Sea aiming at better living aquatic resource management and harmonious management plan. The Office offers instructions on fisheries and fishery regulation for the fishermen. Recently the Office organized conferences on Resource Recovery Plan for Seto Inland Sea in collaboration with the fishing communities.

At prefecture level[14], there are "Sea Area Fisheries Coordination Committees". One prefecture may have more than one Sea Area Fisheries Coordination Committees. In Hyogo Prefecture there are two Sea Area Fisheries Coordination Committees; "Seto Inland Sea Area Fisheries Coordination Committee" and "Tajima Sea Area Fisheries Coordination Committee". The Office of Seto Inland Sea Area Fisheries Coordination, under the Fisheries Section−Fisheries Administration−Hyogo Prefecture Office serves as secretariat to the Committees.

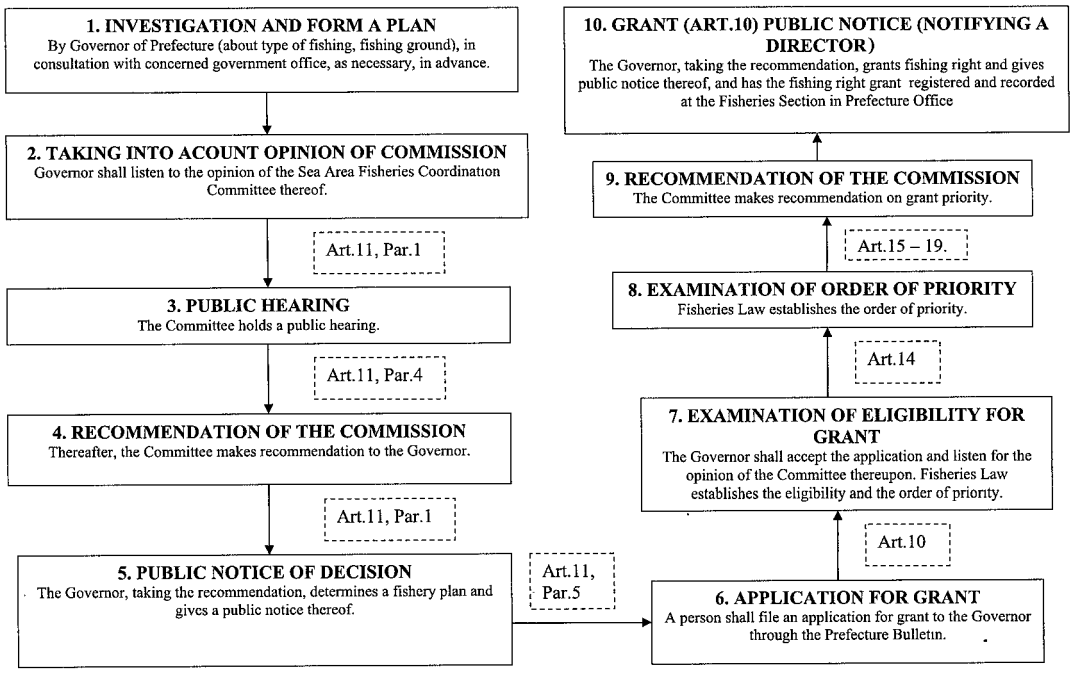
In Seto Inland Sea Area Fisheries Coordination Committee, there are 15 committee members. Hyogo Prefecture Governor appoints 6 fishermen and their employees according to the Fisheries Law and the Public Office Election Law elects 9. Of the appointed 6, 4 are the experts (learned and experienced) and 2 are from those having public interest in the Sea Area. This Committee gives instruction on fisheries coordination and decision on common fishing right, including the fishery license issuance which is granted by the Prefecture Governor.[15]

Beside there are local offices (under Ministry of Agriculture, Forestry and Fisheries) in the other districts including Himeji and Tajima.

The Prefecture Governor grants fishing right for coastal fisheries. To grant fishing

right, the Governor will adopt fishery management plan, determining the types of fisheries and the fishing grounds. The Governor shall consult with relevant government offices for the required information. Consultation from Sea Area Fisheries Coordination Committee will be taken into his consideration. After drafting the plan, the Committee will organize public hearing before giving further recommendation to the Governor. The Governor, after receiving the recommendation, shall reconsider and finalize the fishery management plan and issue public notice of decision. Then a person (usually fishery cooperatives or individual fishermen) can apply for the grant, filing the application to the Governor through the Prefecture Bulletin. The Governor shall accept the application and listen to the recommendation from the Sea Area Fisheries Coordination Committee. Before making the recommendation to the Governor, eligibility for the applied grant and order of priority will be examined. Fisheries Law establishes the criteria for eligibility and the order of priority. Then the Sea Area Coordination Committee shall make recommendation on grant priority to the Governor. The Governor, taking the recommendation, shall grant fishing right. Public notices on the grant will be given. The fishing right grant will be registered and recorded at the Fisheries Section in Pre-

Figure 5 System of Granting Fishing Right at Prefecture Level



fecture Office. (Figure 5)

At the community level, there are "Fishery Cooperatives". As of March 31, 2001 there are 3,662 Fishery Cooperatives all over Japan. In Hyogo Prefecture, there are 102 fishery cooperatives or about 3% of total in Japan. Only 4 are Federation Cooperatives, others are units belonged to the fishery communities. 87 units (85%) are fishery cooperatives in general while only 6 concern only on production and 5 concerning only processing.[16] In Seto Inland Sea side of Hyogo Prefecture there are 61 fishery cooperatives. Two fishery cooperatives are selected for this study. They are Akashiura Fishery Cooperative and Ikuha Fishery Cooperative.[17]

5. THE TWO SELECTED FISHERY COOPERATIVES

5.1 AKASHIURA FISHERY COOPERATIVE[18]

In Akashi there are 7 Fishery Cooperatives with about 1,100 members. Akashiura is one of them and was established before World War II, in the form of "Fisherman Cooperation" not "Cooperative" and developed to become fishery cooperative. Numbers of members in Akashiura Fishery Cooperative have been decreasing through the years from 435 members in 1990 to 358 members in 2002. The members of Akashiura Cooperative are full time fishermen. Part-time fishermen are not allowed to be member. Akashi has been developed rapidly and become more urbanized, thus offering more job opportunities for the coastal dwellers. The younger generation in fishing family has an access to better education and prefers leaving fishing which is considered a hard work for non-fishery occupations. Gross revenue per fishermen, annually is around 10 million Yen while net revenue is about 6 million Yen.

Akashiura Fishery Cooperative has been administered by 14 executive committee members of which 2 are permanent members, 9 are part time and are elected from the fishermen, and the other 2 are accountant and clerk. Unlike other fishery cooperatives, Mr. Komatsu the President of Fishery Cooperatives has been in the position for a long time and started working as cooperative officer rather than being the fisherman. Total number of workers in Akashiura Fishery Cooperative is 23.

Amount of fishery sales in Akashiura have been decreasing after the earthquake in 1995, to be about 3.1 billion Yen due to deteriorated environmental condition as well as decrease in demand for fish during the economic depression. However this is still

higher that the average (0.9 billion Yen/cooperative). The maximum revenue in 1991-1992 during the bubble economy was 4 billion. The decrease in revenue can be explained by 2 reasons.

1. The worsening economic condition. Price of high quality fish decreased. During the boom, Japanese restaurants purchased a lot of high quality fish due to high demand of their customers. During the bust, the demand, mainly from restaurant customers, most of which were businessmen with budget for their customer entertainment and business party, was lower. Fish price decreased a lot.
2. Fish abundance has also been decreased due to the construction of Akashi Bridge, land reclamation, and the extension of Kansai international airport.

Upon the construction of Kansai International Airport, the government paid a 15 million Yen per fisherman for compensation of decrease in fishery income, as estimated from the damage caused by the construction of the bridge and the airport. There had been a long discussion on the payment. According to Mr. Komatsu, the fishermen rather required the government to keep the fishing grounds.

Akashiura Fishery Cooperative performs four main functions: input procurement, marketing, insurance and extension. Akashiura Fishery Cooperative is well-known of being successful in marketing development for member catches. Catches are landed at Akashiura landing port where they are sold by auction at the market there. The Cooperative charged 3% auction fee from the member. Recently, supermarkets and department stores entered the local market. They tried to purchase live/fresh fish directly from Akashiura Fishery Cooperative not from middlemen. The Cooperative has started to sell products (both fresh and processed) directly to consumers. Contact has been established with consumer cooperatives (e.g. Kobe Consumer Cooperative) and hotels.

Fish auctions at the Cooperative Market are twice daily, on the 0:30 for the wholesale market and 11:30 for the restaurants (dinner) and supply to all large fish central markets including Tokyo (to be sold at 04:00) and further west. Freshness is very important. During summer time, with high temperature water, perishability of mackerel can be observed.

Akashiura Fishery Cooperative changed marketing strategies in 1978. Before 1978, fishermen sold their catches to the market, independently. On June 1, 1978 the "Cen-

tral Wholesale Market" was established in Akashi. This market is 8 km far from Akashiura Port. Middlemen went to buy from this central wholesale market since they could easily get the desired commodities. The distance of 8 km also had adverse impact on freshness of the catches from Akashiura, thus lowered the price.

Then Akashiura Fishery Cooperative decided to construct their own market－place for auctioneer. Fishermen had to consign Akashiura Fishery Cooperative to sell their catches and follow the market regulation as established upon agreement of the members. Cooperative market is "Internal Marketing". There are penalties and regulation for the member in violation or selling to the outsiders.

Large scale middlemen did not come to Akashiura Cooperative Market. Prices of the Cooperative Market, thus, were considered low due to lower demand from the buyers. Then the Cooperative tried to invite other middlemen to increase number of traders ; nevertheless the prices were still low.

In 1982, Akashiura Fishery Cooperative tried the "External Market". Workers in the Cooperative became the buyers, purchasing the catches, being the traders. The middlemen put on the complaints, but Mr. Komatsu talked them out and tried to develop further activities. Initially, share of external market was about 10%. The price formation and their ability were limited. Gradually the share increased. In 1987-8, this share was about 50%. In auction, Akashiura Fishery Cooperative enforced fishermen to show catch quality to auction participants. The objective was to maintain the quality. The members are required to follow the market regulations. Due to scale of operation and constraint on marketing capability, processing has been found in most of the fishery cooperative. Beside fresh sale, Akashiura Fishery Cooperative has developed processing for value-added fishery products, to suit consumers' demand and increase income to their members. Seto Inland Sea Coordination Committee supported on the processing of sand lance (ikanago) and octopus (tako) through the plant construction and price support program.

At present, Akashiura Fishery Cooperative has started to develop new commodities processed sand lance. The Cooperative sought collaboration with Kobe Consumer Cooperative. Prefecture Fishery Cooperative also assisted for construction of processing factory and facilities. There was also support price program. The collaboration with Kobe Consumer Cooperative and the Prefecture were successful. Akashiura Fishery Coopera-

tive has made effort to increase quality of sand lance. The high quality one could get a better price. Before this processing development, about 10 ton of sand lance was used for fishmeal. After the processing, this quantity reduced to 2 ton. Catch quality has been improved, being more processed for human consumption. About 25% of the products were directly sold by the Cooperative. Recently price negotiation is more difficult, especially with the Kobe Consumer Cooperative as the Consumer Cooperative is getting more commercialized and tried to make more profit.

Akashiura Fishery Cooperative has 6 fishery groups divided by type of fishing gears.[19] They are small trawl, purse seine, gill net, trolling line, long line, and octopus pot. Number of fishermen is limited and they share the fishing right granted from the Prefecture. A system of limited entry has been developed in Seto Inland Sea fishing communities. As the fishing right in this area is mainly common fishery right assigned to fishery cooperatives, to obtain the right fishermen have to be member of the fishing cooperatives. Fishery management plan is designed bottom up from the fishermen who are members of fishery groups in each fishery cooperative. In Akashiura Cooperatives the fishery groups participate in drawing fishery management plan in the area, including sharing the right and develop their rules and regulation on fisheries. For Akashiura Fishery Cooperative, as marketing has played an important role in their fishery development and increasing income of the members, rule and regulation on marketing are also adopted. Fishery Cooperatives usually set up extra rules and regulation in addition to those required by the Prefecture. Examples are the regulation on minimum catch size.[20]

Each fishery group takes role in enforcing their members to follow the rules and regulations as together established in the Cooperative. The Cooperative submits the application for fishing right to the Prefecture Governor. In practice once the right has been granted, sharing right relies on the history record. Violation of rules and regulation socially discredits, the member. Social sanction is considered severe penalty for the fishermen. The right can be voided for the violator. Compliance then is high among these fishing communities.

Members follow rules and regulations. If they break rules, they will be dispelled from the community. Fishing is dangerous and assistance among fishermen is important. In the suffering circumstance, assistance from the neighbors is needed. Fishermen, thus

have strong consciousness for compliance.

In Akashiura Fishery Cooperative for the 358 members, there are 362 fishing vessels. Most of them are small trawls of 3-5 GT (43%). Next large group is long line (35 %), most of which are 3-5 GT (28%). Others are trolling line (15%), boat seine (5%) and boat seine (2%). Fishery groups coordinate in sharing the fishing areas. Main fishing grounds for Akashiura fishermen are Harima Sea and Osaka Bay. In Osaka Bay, there is fisherman agreement-"Osaka Bay Fisheries Coordination Agreement", an agreement among fishermen, not the government. This agreement was established among the fishermen from various fishery cooperatives who had been utilizing this fishing ground. There are agreements on period of fishing, amount of catches, and fishing gears ; including some prohibition for the conservation purpose. Presidents of the relevant Cooperatives had an important role in settle the agreements. In case of sand lance, fishing ground is very large. In adopting new rule, there concerns other fishery cooperatives. Fishery group cannot make rule independently. The President of Akashiura Fishery Cooperative takes role in negotiation and coordinates with other fishery cooperatives.

Between Akashiura and Awaji Island there is a shallow water area called Sika-no-Se where has been spawning and nursery ground for aquatic livings and at the same time is an important fishing area. The area is utilized by 8 fishery cooperatives which had settled an agreement in sustainable fishing conserving the spawning ground. The collaboration among 8 fishery cooperatives in management of Sika-no-Se has been a successful case for collaboration among the fishermen in fishery resources conservation.

During May to September, there will be fishing holiday, 2 days/week. During October—April, since there is no seaweed production, fishing is daily, no holiday.

When the community starts a new rule, there can be conflict. President of the Cooperatives takes role in compromising among the fishery group leaders. Role of mediator has to be strong and influential for successful fishery management.

For aquaculture, Akashiura Fishery Cooperative has been granted demarcated fishery fishing right for seaweed culture. Coastal zone about 1 km from shore has been used for seaweed culture. Amount of seaweed sales from Akashiura is the largest in Hyogo. Nevertheless, amount of production has been decreasing after the construction of sewage disposal treatment plant up the river near these seaweed culture areas. The nutri-

tion for seaweed in the water has been decreasing, thus lower seaweed production.

The fishermen have utilized these fishing areas and aquaculture areas since Tokugawa era. Fisheries coordination in Seto Inland Sea right after the Fisheries Law was developed later than in the northern region. This delay might have been caused by the complicated fisheries in the area. Nevertheless after the Fisheries Coordination Scheme took off, collaboration among the fishermen, through fishery cooperatives, led to successful fishery management in this area.

Total annual production of Akashiura Fishery Cooperative as reported in March 2003 was 1,686,745 ton accounting for 1,608 million Yen.

The common fishery fishing right granted to the Cooperatives by the Prefecture establishes the property right over the fishery resources. In Akashiura, the fishermen believe in fish for the people and collaborate in maintaining the abundance of their resources. In Akashiura Fishery Cooperative, the role of fishery group leaders is not so important ; unlike the other fishery cooperatives such as Ikuha. In other fishery cooperatives, president comes from election among fishery group leaders. Fishery group leader contribution on the community development is important for being elected.

5.2 IKUHA FISHERY COOPERATIVE[21]

Ikuha is located on the northwest of Awaji Island. Communication to Ikuha is convenient, especially after the construction of Akashi-Kaikyo Bridge connecting Honshu via east of Akashi to the north tip of Awaji Island. There are also ferries from Akashi coast to the east side of Awaji. Recently the Island has been developed as one of important tourism spot in Hyogo Prefecture.

On Awaji Island there are coastal fishing communities scattering along the coastline of the Island. At present there are 26 fishery cooperatives in Awaji. Ikuha is one of them. Ikuha Fishery Cooperative has 200 members. These 200 members are full time fisherman.[22] The members elected 8 members for the executive committee to run the Cooperative. The term of this executive committee is 2 years. Each member paid 80,000 Yen fee on being member of this Cooperative and is charged 4% on their landings. In Seto Inland Sea the fisherman must belong to corresponding fishery cooperative. It is required that they must land their harvest at their cooperative landing point. Each fishery cooperative provides landing port where catches are sold. The Co-

operatives provide landing area in protection from storm. Ice, fuel and other necessary fishing equipment can be bought from the Cooperative. There are also storage room and processing plants where applicable. Production values range between 2-2.7 billion Yen a year. Main fishing gear in Ikuha is the boat seine of 3-5 GT.

Unlike Akashiura where the Cooperative is keen of marketing, Ikuha Fishery Cooperative focus is on the coordination among the fishermen, The members of this cooperative, and the other fishery cooperatives coordinate through the Presidents of respective Cooperatives.

There is no clear fishery group in Ikuha Fishery Cooperative as most of the fishermen use same fishing gear, the boat seine. Beside boat seine there is laver culture. However the fishing right granted for boat seine in Ikuha was 150, less than the number of members. Practically there can be more than one fishery household jointly own the fishing vessel. Boat seines can require two fishing vessels for their operation. In addition there can be speed vessel working like carrier receiving the catches from sea and rapidly landed the catches to get a better price (for freshness).[23] Thus per one fishing right there will be 5-6 persons working together. Some are the members themselves and some are hired workers. The fishing right cannot be inherited and is not transferable. Distribution of fishing right is usually based on record of fishing. Thus, there is a pattern of limited entry for fishing in Ikuha.

Similar to fishermen in Akashiura, Ikuha main fishing ground is Harima Sea and Osaka Bay, with more emphasis in northern area of Harima Sea. This fishing ground has a long history of fisheries. There are fishermen from different prefectures around the area including Okayama, Kagawa and Hyogo. There used to be conflicts among fishermen in this fishing ground. Overfishing was one of the problems which finally led to fishery resource depletion. After the establishment of fishery cooperatives, the fishermen got together establishing their consortium called "Koyogikai". They made agreement on fishery management for sustainable fishing, dividing the area for fishing and limit entry to control fishing effort. Through this consortium the northern area of Harima Sea has been divided into 3 areas. Presidents of Fishery Cooperatives involving in this area represent their fishermen in the consortium. Among these Presidents, 3 representatives will be elected to represent the 3 areas and there will be 1 top President of Koyogikai who is in charge of communication with the Prefecture Governors upon

the conditions of granting fishing right and coordination among these fishermen. The top President will be in position for 2 years. The consortium organizes one conference annually, providing the opportunity for the fishermen and relevant agencies to exchange the idea for better fishery management.

Ikuha is also one of the 8 fishery cooperatives in collaboration for the fishery management in the famous Sika-no-Se. Out of the 8 cooperatives, 4 are from Awaji Fishery Cooperatives.

On Awaji Island, the fishermen decided to divide the areas into three parts from the north to the south where in total there are 26 fishery cooperatives. Coordination Committee has been established consisting of the Presidents from these 26 Cooperatives who act as representatives of their fishermen members. From the 26, 3 will be elected as executive committee with 1 top President.

In this way the fishery management planning will be bottom up from the fishermen to their respective Fishery Cooperative Presidents; then to executive members of the Coordination Committee and the top President, who is in charge of communication with the Prefecture Governor, the Sea Area Fisheries Coordination Committee, and the Seto Inland Sea Fisheries Coordination Committee.

6. LESSON LEARNED FROM SETO INLAND SEA COASTAL FISHERY MANAGEMENT

In Seto Inland Sea, coastal fisheries has been important both in being source of high quality fish protein for domestic consumption as well as being important source of income for the coastal dwellers. Japan has recognized the importance of coastal fisheries and put effort in maintaining sustainable development in coastal fisheries through effective community based fishery management. Key factors of success in Japanese Coastal Fisheries Management can be classified into three main categories, i.e. physical conditions, institutional framework, and socio-economic conditions.[24] Among the three the most influential one is the institutional framework.

6.1 INSTITUTIONAL FRAMEWORK

LAW AND REGULATION Community based fishing right in Japan has begun since 17th century. However in the earlier time it was top down as being granted

from the Lord to coastal fishing communities. It was not until after the World War Ⅱ, after the enactment of Fisheries Law 1949 that the management system was reformed to be bottom up management plan. The "Fisheries Coordination Scheme" brought about after the Fisheries Law is an important factor of success for fishery management in Japan. The focus on "harmony" in fisheries for "optimum" utilization of fishery resources has a significant contribution on the success. To be harmonious, it is important to take into consideration the needs of various stakeholders in fishery resources. Central agency is needed in coordination and adjustment to satisfy these needs which may conflict. By the Fisheries Law, Fisheries Coordination Committees has been established, at every level (national, regional, and prefecture) to solve the problem. At the community level, fishery cooperatives are established to reflect the need of the fishermen. In adopting the fishery management plan fishermen can participate through their fishing groups and fishery cooperatives. Presidents of the Cooperatives work together among them and communicate their need to the Prefecture, Regional, and National Committees in which fisherman representatives can get involve in every step.

Beside Fisheries Law there are two other Laws supporting the coastal fishery management in Japan: Cooperative Laws 1948 and Fisheries Resources Conservation Law 1951. Cooperative Laws supports the establishment and strengthen cooperative as a community organization. Fisheries Resources Conservation Law is aimed at recovering the degraded fishery resource which was problem before the adoption of Fisheries Coordination Scheme. Without these two, in lack of capable community organization and the suffering from fishery depletion, it would have been difficult to successfully adopt community based fishery management.

FISHING RIGHT SYSTEM In Seto Inland Sea, coastal fisheries have the priority. The common fishery fishing right granted by Prefecture Governor to Fishery Cooperatives, the demarcated fishery fishing right which can be applied by the Fishery Cooperatives, and the licensed fishery as granted by Prefecture Governor are main tools of fishery management. The system of fishery right secured the access to fishing by these fishermen. It granted the right over fishery resource, a form of property right, exclusive to the grantee. Thus, such ownership allows careful resource utilization among these fishermen, a guarantee on return over the effort on fishery management for sustainable fishing. Together with the system of limited entry which has been adopted the

fishermen can be sure about the share of his return. This provides them the incentive for actively participation in fishery management planning.

FISHERY COOPERATIVE The establishment of fishery cooperative and fisherman participation in setting up rules and regulation from the bottom up allows active participation from the fishermen. Beginning from this first level, their needs are reflected through their fishery groups and thus the fishery cooperative executive committee. The Presidents of each Fishery Cooperative take role in coordination and being mediator, transfer the needs to the higher level as well as coordinate with other fishery cooperatives. Examples are the collaboration between fishery cooperatives which members are fishing in north Harima Sea, Sika-no-Se, Osaka Bay, and fishery cooperatives along the coastline of Awaji Island.

From this level there will be communication with Prefecture level where there is/are Sea Area Coordination Committee(s) providing consultation and guidance to the Governor. Included in this Sea Area Coordination Committee are fisherman representatives, experts, and those with public interest in the issues. At the Regional level there are Regional Coordination Committees which Seto Inland Sea Fisheries Coordination Committee is one of them. Conference and extension for common understanding in Fishery Management Plan, as well as conference on brainstorming among stakeholders are regularly organized. These organizations aim at achieving harmony among fishermen as well as other stakeholders. As the management plan has been drafted upon the consent of the fishermen and bottom up, while the government provided the "coordination" function, conflict in fishery resource utilization can be reduced and compliance among fishermen has been increased. This "bottom up" scheme while increases the level of compliance, reduces cost of monitoring and enforcement for coastal fishery management in Japan.

Fishery Cooperatives also take role in input procurement, infrastructure provision (such as port, auction market, office), insurance, and in some cases processing and marketing. These functions support uplifting living condition, and income of their members. Capability of the President is a key factor in Cooperative administration and successful fishery management. Strengthening cooperative management as well as business capability among young fishermen is included in the work plan of the Bureau of Fishery Agency as well as the Prefecture Fishery Office.

6.2 PHYSICAL CONDITION

SEMI-CLOSED SEA AREA Seto Inland Sea is semi-closed sea area. Specific rules and regulation are adopted in this area aiming at sustainability of this fishing ground. Overall boundaries are geographically clear as mentioned in the earlier section. Thus the Sea is exclusive for the fishermen in Seto Inland Sea. Within the area, fishery co-operatives settle agreement on division of fishing ground. There has been system of boundary line and sea mark using light pole and land mark which give clear common understanding among the fishermen in Seto Inland Sea. There used to be conflicts but collaboration among fishery cooperatives reduces the conflict. "Coordination" is important in solving the conflict in fishery resource utilization.

FISHING GEAR Most of fishing vessels in Seto Inland Sea, especially in Hyogo Prefecture are small fishing vessel of 3−5 GT. In Fishery Cooperatives where there are diversified fishing gears (for example in Akashiura), fishery groups are divided by type of gears. The group meeting takes into account the problem and needs of specific fishing gear group and the fishery group leaders coordinate in finding the solution and ways in satisfied needs of fishermen. In spite of diversified fishing gear, there is a solution through coordination among the fishermen.

FISHERY RESOURCES Most of the catches are sedentary species, thus less difficult for management. In case of multi-species, since there is a requirement of certain landing place keeping record is possible. Nevertheless in Japan, though the system of total allowable catch (TAC)[25] has been adopted together with total allowable effort (TAE)[26], in practice the actual catches have always been below the TAC. In term of TAE, fishermen have adopted the scheme, and limited entry has existed along with the establishment of fishery cooperative. The system of right distribution, which in based on past record of fishing, does not allow new entry unless the former fishermen have retired.

Under the administration of Fishery Cooperatives, which is community based fishery management; effective management on multi-species multi-gear tropical fisheries has been possible.

6.3 SOCIO-ECONOMIC CONDITION

COMMUNITY CULTURE Within the fishery community, the traditional culture has

important role. Fishery households in coastal fishery community have a close relation. They collaborate and help each other out in time of trouble. Fishing is a risky business and depends much on the weather condition which is difficult to be controlled. Social sanction then is considered a severe penalty. This tradition led to high level of compliance among these coastal fishermen. Fishermen in coastal fishing community around Seto Inland Sea are relatively homogeneous. Their backgrounds, including religious, traditions and customs, social background, and living conditions are similar. There is no distinguished variation among these coastal fishermen. Homogeneity cultural background can be observed in each community.

MARKET Fishery Cooperative established in Japan reduced the influence of fish trader in coastal fisheries. Fishermen are not credit-tied with the traders. They can fish as they want, with the objective of sustainable and responsible fishing. Some cooperatives have been capable in adopting marketing function. At least, the market is provided at the landing place where all catches from the members are sold. Market system as provided, is important in getting reasonable price for catches.

Consumer preference on high quality fish is another contribution in support for catch quality, thus better price and fishermen income. Processing also provides value added to the members' catches. This will be difficult for individual fishermen but provided certain conditions (economy of scale, technology, and capable marketing) it can be possible through the Cooperative.

INCOME Coastal fisheries in Seto Inland Sea are profitable. Fishermen can earn net revenue. Beside their family members also earn income from non-fishery sources. Marine fishery households earn income about the average level of Japanese households, and are able to earn surplus for saving. Fisheries, though is a hard work, can yield a good return. Limited entry system makes difficult new entry, thus the fishing effort is relatively stable. With successful fishery management, coastal fishery resources can be more abundant. Fishing income can increase.

It has been noticed that the stock enhancement and aquaculture have been promoted. Stock enhancement is expected to increase natural fish abundance. Aquaculture is an alternative source of production, which has proved to yield good income.

With successful community based fishery management, coastal fisherman living condition has been improved, both in term of income and quality of life.

7. THE OUTCOME

The outcome can be measured in term of efficiency, equity and sustainability[27] of coastal fishery management in Seto Inland Sea.

In term of efficiency, cost and benefit of community fishery management scheme can be evaluated. Community based fishery management in Japan reduces monitoring and enforcement cost. Fishermen comply rule and regulation settled by them, bottom up not top down. Participation from fishermen in adopting fishery management plan is the key factor. There can be transaction costs involve in adopting the Fisheries Coordination Scheme. Nevertheless this can be paid of by the long run benefit from the greater resource abundance and the optimum utilization of the available fishery resources.

In term of equity, fishermen can equally participate in community fishery management through being member of corresponding fishery cooperative. They have the common goal of optimum utilization fishery resource. The fishing right granted to fishery cooperative is fairly distributed among the members, transparently. System of election at each step supports this factor of equity.

Community based fishery management for coastal fisheries in Seto Inland Sea—Hyogo Prefecture can be sustainable. Fishermen collaborate in maintaining the ecological system (example is the management in Sika-no-Se Area) and sustainable fishery development. This is mainly due to the granted fishing right, equity in right sharing system, and effective coordination among stakeholders.

Endnotes

1 The data in this section are mainly from Seto Inland Sea Fishery Coordination Office of Fishery Agency.

2 Japan Statistical Yearbook 2003.

3 Data are from Seto Inland Sea Coordination Office, Hyogo Prefecture.

4 Most of the information in this part are from the interview with Prof. Dr. Tadashi Yamamoto, Honorary President of Japan International Fisheries Research Society.

5 Usually the fishermen estimated the zone by lining about 3 km from their shoreline, or at a distance that one could swim to.

6 Kevin Short (1992) and Morisawa, Short and Yamamoto (1992).

7 "Ura" is a Japanese word for coastal (mainly fishing) community.

8 In Akashi, similar system was also adopted by the Lord of Akashi. Akashiura was one of the fishing communities where fishing right was granted by the Lord.

9 In Japanese the word "adjustment" has similar meaning to "coordination". Sometime, each other replaces these two words.

10 There are 11 Prefectures around Seto Inland Sea, excluding Kochi Prefecture facing Pacific South Area.

11 Information in this part is mainly from the interview with Ms. Takesita and her colleagues at the Office of Seto Inland Sea Fisheries Coordination.

12 Recently conferences among fishery operators are frequently organized, e.g. for the Kii Channel, Osaka Bay, Hiroshima, Kagawa, and Suo Sea.

13 Committee instructions for Spanish mackerel recovery are : closed fishing for gill net and angling during 5/25-6/30, closed fishing for angling in Kii Channel during 5/15-6/20, closed fishing for gill net and angling in Harima Sea during 9/1-11/30 while allowable catch from purse seine is limited to 40 ton, closed fishing for gill net and angling in Bisan Seto during 9/1-11/30, closed fishing for gill net in Aki Sea during 9/1-9/30, closed fishing for gill net in Suo Sea during 5/1-5/31, closed fishing for gillnet in Iyo Sea during 5/1-5/31, and mesh size control (of greater than 10.6 cm.) in Seto Inland Sea.

14 Information from this part is mostly from the interview with Mr. Masao Yamamura and Mr. Yoshiki Tokura at Seto Inland Sea Area Fisheries Coordination Committee, Hyogo Prefecture.

15 For Tajima Sea Area Fisheries Coordination Committee, there are 10 members ; 6 are elected and 4 are appointed of which 3 are experts and 1 is from those with public interest in Tajima Sea Area.

16 Japan Statistical Handbook, 2003.

17 Prof.Dr. Yamao Masahiro of Hiroshima University recommended four fishery cooperatives i.e. Akashiura, Ikuha, Hayashizaki, and Bouze. Due to time and resource constraint only two fishery cooperatives i.e. Akashiura and Ikuha are selected for this study.

18 Most of the information in this part are from interview with Mr. Tsukasa Komatsu, President of Akashiura Fishery Cooperative.

19 Including aquaculture there are 7 fishery groups.

20 Set up by the community e.g. flounder 28 cm, swordfish 25cm-20cm, others 18cm-13cm, 15 cm, octopus 200 gm, crab 15 cm, abalone 10 cm, clam 2.5cm-3cm, shellfish 5 cm., shrimp 12 cm.

21 The information in this part is from interview with Mr. Maruichi Noriyuki, President of Ikuha Fishery Cooperative.

22 It is required that the member who can apply for fishing right must be full time fisherman and live in the community at least 90 days a year.

23 In Ikuha the auction at the landing point starts at 07:00 where the prices are usually highest and tends to decrease afterward. There are about 20 buyers at the auction place. Traders are from Awaji as well as outsiders. Buyer from Ikuha is only 1 out of that 20. The catches are delivered to supermarkets, department stores, central fish markets (in Kobe, Nagoya, Tokyo and Osaka), and individual buyers.

24 Details in Ruangrai Tokrisna et.al. (1997)

25 Control volume of catch by species.

26 Control effort in term of fishing days and number of fishing vessels, for example.

27 International Centre for Living Aquatic Resources Management and Institute of Fisheries Management and Coastal Community Development (1998).

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