

Commons in the rehabilitation process from *Tsunami* damage: from case study in *Sanriku* fishing communities, Japan

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Abstract

Coastal areas in Japan are traditionally managed by the nearby fishing communities as local commons. The Tsunami caused by the huge earthquake in 3.11, 2011 gave severe damage to fishing communities in the *Sanriku* coastal area in Japan. The study investigates the role which coastal commons plays in the process of rehabilitation, focusing on the gathering of abalone, the one of the most important harvests from coastal commons in *Sanriku* area. By the tsunami, most of fishing boats have been broken/ lost, and with insufficient number of boats, communities tried to conduct abalone gathering for the help for economic rehabilitation. The study examined the types of abalone gathering in 2011, and found four types. There were collective efforts on two aspects, one is with regards to management of insufficient boats, and the other is regarding distribution of profit.

Detailed case study described the decision making process of collective gathering by introducing two different types of fishing communities. One is a fishing community that depends most of livelihood on fisheries, and the other is the community where fisheries is regarded as secondary income source.

There have been the collective efforts to sustain community members' living appearing in different appearance: income generation and basic living condition in the community. In *Sanriku* area, natural resources gathered at the coastal commons have economic importance. The commons in the fishing community functioned as the motivation for rehabilitation, and the collective action encouraged people to go ahead for the rehabilitation.

Keywords: Sanriku, the Great East Japan Earthquake, fishing community, collective action, natural resource,

1. Introduction

Sanriku coastal area is located on the complicated *rias* coastline which covers from northern border of Iwate prefecture to Mangoku-ura in Miyagi prefecture. *Sanriku* area belongs to Tohoku region. *Sanriku* is bestowed with rich marine products.

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Particularly, seashells (like abalone and urchin) and various seaweeds (wakame, kelp, agar weed etc.) grow at the coastal commons.

Sanriku area suffered from severe damage by “3.11” the Great East Japan Earthquake. 18,550 people died /missing (5,824 for Iwate, and 10,838 for Miyagi). 1.5 million houses were broken (20 thousand for Iwate, and 240 thousand for Miyagi). 25 thousand fishing boats (about 90%) were broken/lost (13 thousand for Iwate, and 12 thousand for Miyagi) (National Police Agency, 2011 online, Toho area research institute 2011 online). As for economic damage on industries, 69% is fishery related in Iwate, and 35% in Miyagi. All the fishing communities got damage by tsunami, and 96% of fishery management bodies in Iwate, and 99% in Miyagi got damage. As these figures show, the damage on fishing communities in *Sanriku* area was so severe.

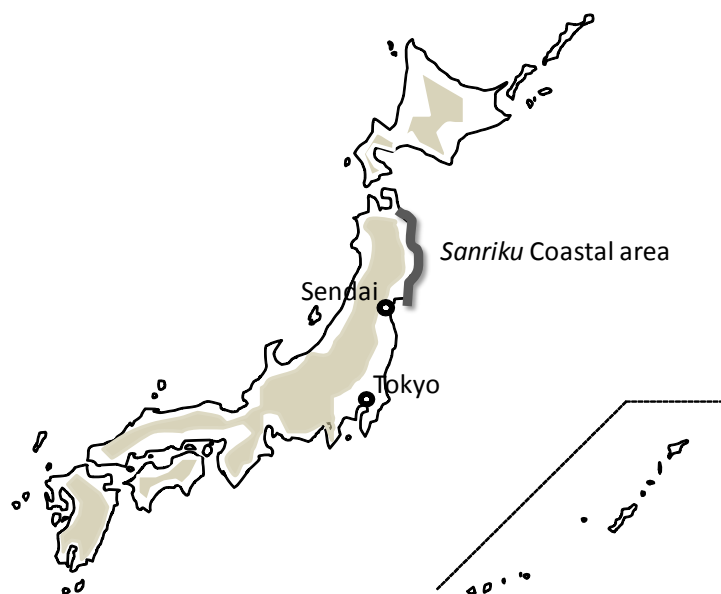


Figure 1. *Sanriku* area

(Source: map by author)

Current paper focuses on abalone gathering which was the first harvest after earthquake for many fishing communities. Abalones inhabit in the reefs on the seashore, and communally managed by local fishers. they can be sold at high price, and placed as important source for temporary income. In *Sanriku* area, fish/seaweed/shell culture is major income source now, but the facilities and seeds were all broken and lost, and it took time to recover. After the earthquake, gathering of natural resources that can be done with boats and simple gears were focused as income source for recovery. Although gathering requires less facilities, it cannot be done without boats. As mentioned above, almost all the boats were

broken / lost, and the collective action was needed to go gathering. Current paper analyzes how the collective actions were taken by fishing communities.

At first, the actions of each fishery cooperative/ fishing community of whole *Sanriku* area is analyzed by classifying in patterns. Then analyze in detail based on the interviews with two fishery cooperative/ fishing communities. One is a fishing community that depends most of livelihood on fisheries and the community where fisheries is regarded as secondary income source, and in both communities, shellfish gathering functioned for the rehabilitation of the community in different ways. By focusing on the decision making process after tsunami and the characteristics of each community which led the decision making process , the role of coastal commons for the community is discussed.

2. *Sanriku* fishery before “3.11” earthquake

Status of fishery in 2010 at *Sanriku* area before the earthquake is shown in figure 2, and 3s. As figure 2 shows, Iwate and Miyagi are one of major region of fishery. Figure 3 shows the percentage of fishery management bodies that addressed that natural resource gathering at the coastal commons are main income source (upper bar), the percentage of the fishing management bodies that addressed that abalone gathering is the main income source among those whose main income source is gathering (middle bar), and percentage of fishery management bodies that addressed that abalone gathering is the main income source among all the fishery management bodies (lower bar). For fishery management bodies in Iwate and Miyagi, gathering is placed as important position, and especially for fishery management bodies in Iwate, more than 10 percent fishery management bodies addressed that abalone gathering is the most important income source.

Fishing community and fisher’s cooperative do not necessarily coincide. There are 233 fishing communities in Iwate, and 194 in Miyagi in 2003. Fishing cooperatives are 24 in Iwate and only one in Miyagi. With regards to management of natural resource gathering, cooperatives take initiative in Iwate, and branches under cooperative or each fishing community manage in Miyagi.

Abalone can be sold about 60 US\$ per one kg. One abalone weighs 100 to 150g, and one abalone can be sold 6 to 10 US\$. If one gathers 30kg (this figure is average harvest of M-d1, later explained), (s)he can get about two thousand US \$, and if (s)he gathers 150 kg (average harvest of I-B2, ditto), he/she can get nearly one million US \$. Abalone is such a profitable product, and abalone gathering is done individually and competitively. Abalones are gathered by hooking from the boats, or by diving by region. To conserve the resources, the size of harvestable abalone is

strictly fixed, and the period of gathering is also strictly decided by the cooperatives/communities. At the harvest day, all the fishers go to reefs. Many cooperatives/communities release abalone seeds. Harvested abalones are mostly sold to outside processors (often through cooperative) and they are processed as dried abalone for exports to China and so forth as expensive delicacy.

3. Abalone gathering in 2011

In 2011, 5 cooperatives among 24 in Iwate, and 6 cooperative communities among 15 communities in Miyagi did not gather abalone. Information on abalone gathering was collected from 28 cooperatives/communities.

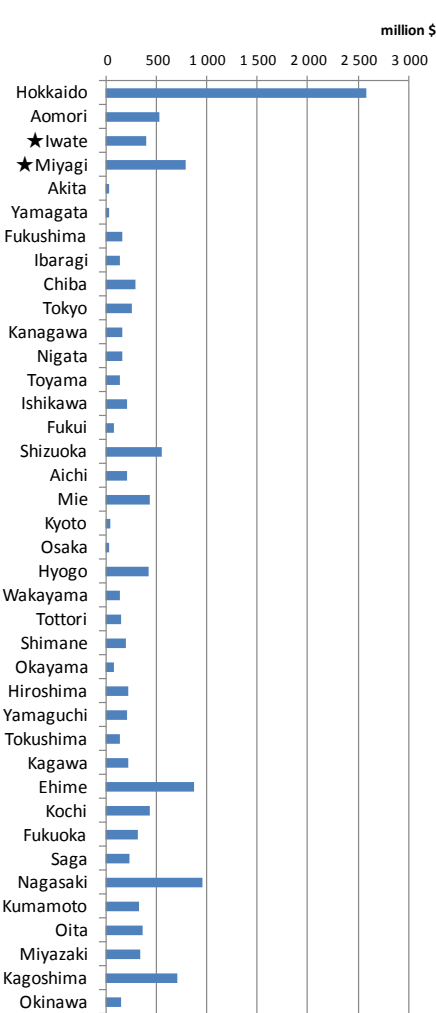


Figure 2: Prefecture wise annual haul (2010)

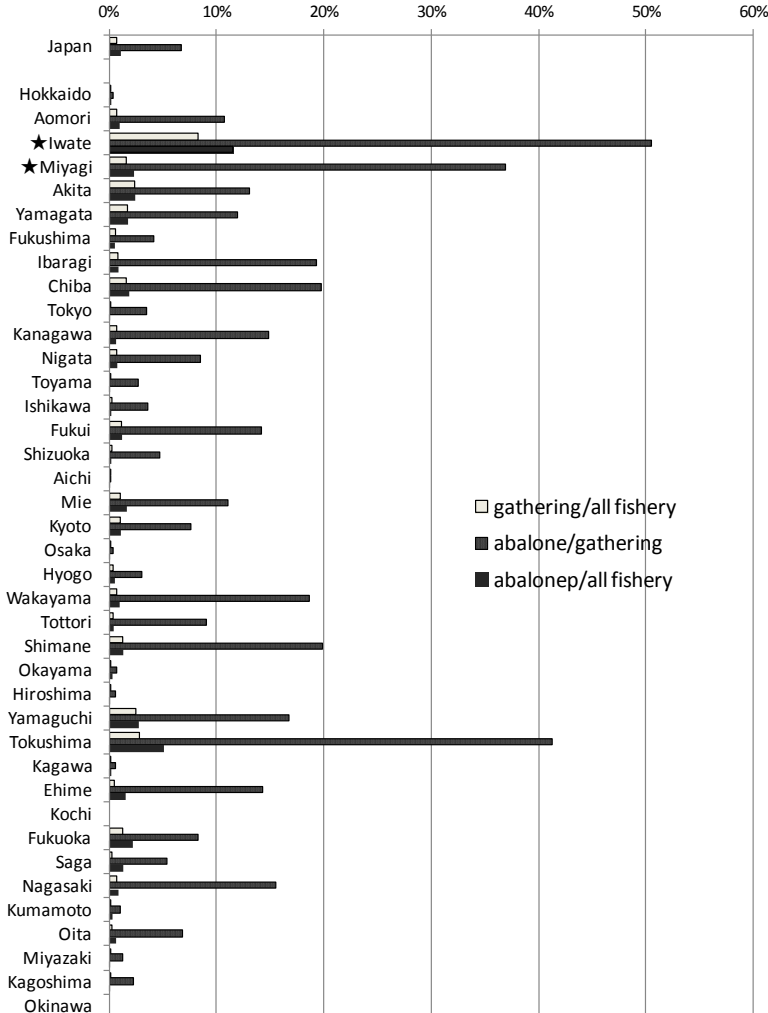


Figure 3: Importance of natural resource gathering and abalone gathering (2010) (source: compiled from fishery census)

Table 1. Abalone Harvest in 2011 and other related indicators

fishing cooperative/ community*	2008 (Census)			2011 (after"3.11")		
	aged rate** (>60yrs)	dependency on gathering	Independent marketing source	damage on the living***	abalone harvest	abalone gathering****
I-A	64%	59%	14%	3	○	II
I -B1	46%	42%	5%	1+	○	III
I-B2	34%	30%	13%	2	○	III
1-B3	51%	52%	10%	2	○	I
I -C	54%	17%	18%	1+	○	I
I -D	58%	36%	20%	1+	○	II
I -E1	60%	18%	19%	2	○	III
I -E2	56%	23%	14%	2	×	—
I -E3	43%	37%	10%	2	○	II
I -F1	46%	12%	24%	2	○	II
I -F2	49%	7%	52%	1+	○	III
I -F3	57%	19%	35%	1+	×	—
I -F4	40%	2%	33%	4	×	—
I -G	61%	38%	29%	1+	×	—
M-a	52%	19%	35%	1+	×	—
M-b	40%	0%	32%	1+	×	—
M-c1	52%	3%	79%	3	○	III
M-c2	61%	62%	114%	1+	○	III
M-d1	67%			4	○	III
M-d2	67%			1+	○	I
M-d3	67%	48%	33%	1+	○	I
M-d4	67%			3	○	I
M-d5	67%			1+	○	I
M-e1	39%			2	○	I
M-e2	39%	11%	51%	2	○	III
M-e3	77%	69%	62%	4	×	—
M-e4	23%	0%	72%	1+	×	—
M-e5	88%	0%	94%	1	○	I

*) I:Iwate, M:Miyagi, A,a: local government,1,2: cooperative/comunity

**) among fishery cooperative members

***) 1+ :heavily damaged (more than 2/3 houses were broken), 1 :heavily damaged (more than 1/2), 2:damaged(more than 1/3), 3:partly damaged(less than 1/3), 4:no/slight damage (almost all the houses were safe). Source from Archaid,2012 and Abe 2012.

****)-:no harvest, I :harvest by those who could do, II :collective use of boats III:collective use of boats/collective gathering with even share among cooperative members (from interviews and (Source :secondary information from online newspapers and magazines)

Among 28 cooperatives/communities, there were four types of action for abalone gathering in 2011 (table 1). 1) did not do abalone harvesting (eight(8) cooperatives/communities), 2) those who have boats and can do did (eight(8)), 3) boats were collectively used, and the harvest was individually sold (4).4) boats were

collectively used, and the harvest was also collectively distributed(eight(8)).

All the cooperatives/communities suffered from severe damage of boats, and harbors sunk under the sea level. The main reasons why those cooperatives/communities that did not harvest were 1) shortage of boats, 2)destroy of harbor. In addition, some cooperatives/communities worried about the damage on abalone resource conservation by tsunami. Fear for the influence of radioactive matter, and processors' damage were also addressed.

There were cooperatives/communities that overcame the shortage of boats by sharing one boat with 2 to 3 fishers. Among them, two types of harvest distribution was observed as mentioned above. One is that those who went gathered got the harvest individually, and the other is the harvest is pooled, and distributed to all the cooperative/branch members. With regards to former type, there was one cooperative where the harvest was pooled and distributed considering the past five years of harvesting result of each fisher (I-F1). Since the harvest of abalone deeply depends on each fisher's skill, and the reasonable way of harvest distribution was sought. Among the cooperative/communities that distributed to all the members, one fishing community asked professional diver to gather abalone since they could not manage boats or repair harbor (M-c2).

By comparing other relevant indicators, factors that enabled the collective action will be analyzed. Several hypothesis were set as follows 1) the damage on living differed community to community, and those who got less damage on the living could do collective action, 2) Areas where good abalone harvest is expected did collectively, 3)the cooperatives/communities where young members are actively working could do, 4)those cooperatives/communities where the importance of fishery as income source is high and the interest on fishery among people is also high could do, 5)those cooperatives/communities that are quite independent (indicator is the percentage of those who did not depend on fishery cooperative's joint marketing) could do.

As for hypothesis1)M-c1, M-d1, and I-B1 (cooperative building was safe, and could function as control center) support, but I-B1, I-F2, M-c2 do not support. As for hypothesis 2), I-B1,2, and M-c1,M-d1 support, but I-F2, Mc-1, Me-2 do not support. With regard to hypothesis 3), I-E1, M-c2, and Md-1 do not support, and so do with hypothesis 4) since these factors correlate each other. As for hypothesis 5), the tendency that those cooperatives/communities where fishers seek for own marketing did collective action (I-B2 shows low percentage, but it is because of that cooperative itself has contracted with consumers' cooperative for years), but I-B1 do not support. M-d1 also depend on prefectural marketing route, but it may be because of the aging of community members. There are exceptions on each

hypothesis, and various factors may affect in complex way.

There were reasons why abalone gathering were canceled in 2011, and it cannot easily attribute to the lack of collective power. But under such as devastating situation, it is remarkable that fishing communities could decide to do collective gathering of abalone which was important income source.

4. Collective actions by two cooperative / community

In this section, two types of cooperatives/communities are highlighted, and the decision process for collective action for abalone gathering is described in detail. One is I-B2 cooperative where fishery is important income source, and there are many young fulltime fishers. The other is M-d1 community where community member is aged, and fishery is placed as the temporary or additional income source mainly after retirement. Figure 4 and 5 show the population distribution by age groups, and family types in 2010. I-B2 has young generation members, and fewer households with single member (the rate of three generation households is 42%). On the contrary, M-d1 is quite aged, and the rate of households with single member and households with (aged)husband and wives are high (the rate of three generation households is 15%).

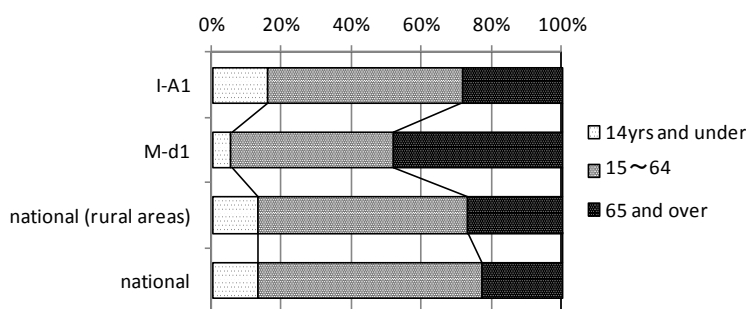


Figure 4. Age group distribution of two communities
(source: compiled by author from national census in 2010)

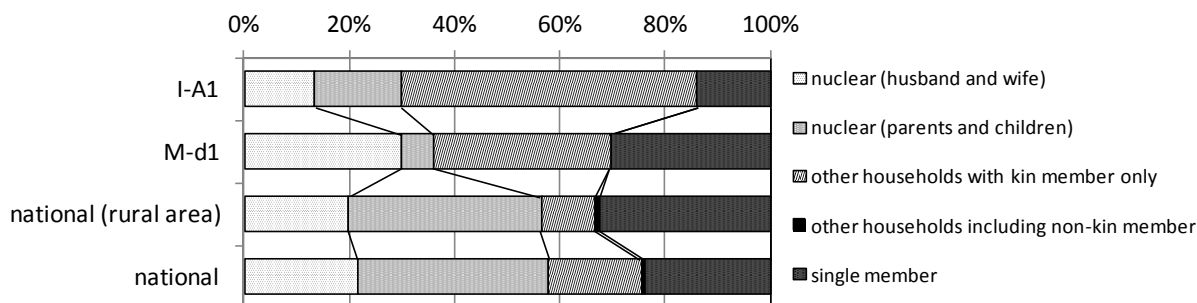


Figure 5. family composition of two communities
(source: compiled by author from national census in 2010)

(1) Collective actions by I-B2

I-B2 is located in extremely remote area with steep coastal lines, and coastal fishery was the most important and almost sole industry for the local people. So the cooperative was functioning as the support for local people's lives, and it conducted various trials. For example, monthly salary was introduced into fishery for stabilizing livelihood from 1960 for the first time in Japan. The cooperative supports local community, too, and has been subsidizing for junior high school since 1954.

Regarding fishery products, main products were almost unchanged as sea weeds, sea urchin. Thus the concern on resource management was keen, and there was need for finding advantageous market. There were efforts to add values such as self processing by procuring from local fishers since 1964. It is uncommon in Japan that the cooperatives take risk and buy out the products from local fishers. In addition, there have been efforts to find original markets, and I-B2 developed own market such as consumers' cooperatives, and department stores in urban cities. With such activities, I-B2 succeeded in branding of its products. I-B2 expenses various activities.

Concerning resource management, I-B2 expends both for regulation and stock enhancement. Regarding abalone, abalone seeds are produced and bred to some size by cooperatives so that the survival rate will be satisfactory in I-B2. At the time of harvesting, patrolling and watching is done everyday in I-B2.

After 3.11 earthquake

Among 406 cooperative member households, 100 lost their houses, and 50 villagers died. On 3.11, fishers were busy with preparation of seaweed harvesting. All the fishing gears were taken by tsunami. Among 814 boats, only 14 were safe (those were far out at sea). The building of cooperative is located on the hilly place, and thus it was safe from tsunami. The economic loss of cooperative amounted to eight (8) million US\$, the largest in Iwate prefecture.

Two days after the earthquake (3.13), the cooperative set up head office for rehabilitation. One week after (3.19-20), condition of boats was checked, and started repair by cooperative's expense. Harbors were damaged, and it was impossible for fishers to go fishing by one's own (needed help), and there was no objection for collective action. One month later (4.9), all the cooperative members gathered, and it was decided to gather necessary boats and fishing gears with the expense of cooperative. Harvest season of natural seaweed is May, and fishers made every efforts to get boats visiting fishing communities free from tsunami so that they can go seaweed gathering. 60 boats were collected and natural seaweed

could be harvested. The harvest and boiling was conducted community base (there are four community groups) and the profit (the cooperative bought the products) was also pooled to each community group, and distributed to the community members through each group.

Abalone gathering

I-B2 is famous for good quality and affluent resource of abalone. By November, about 160 boats could be provided. Before the start of abalone gathering, the cooperative asked divers to check the existence of abalone. The diver reported that the abalone number was less than usual in southern part, but asked each fishers to check by themselves. Abalone could be gathered more than expected. As the same with natural seaweed harvesting, boats were distributed to four fishing communities, and the profit was distributed among community members. The head of cooperative says that there must have been complaints for such equal distribution in minds, but all the fishers obeyed the cooperative decision.

I-B2 is located in remote area, and there was no alternative than to rely on the harvest from the sea. Thus, the cooperative build up the collective production and marketing system. The cooperative also supported local community through school. What the cooperative aimed at was to make every member to be able to sustain their livelihood in the community.

(2) Collective action by M-d1

M-d1 is located on the edge of peninsula. With rough waves and no place to escape, M-di could not construct good harbor. Instead, plenty of reeves bestowed rich harvest of natural seaweeds and sea shells. The rough wave prevented the increase in size of boats, and made difficult to set nets. Collective fishing was tried once, but it did not continue because of poor sale. Fish/seaweed/shell culture did not expand because of rough wave. In this way, in M-d1, individual gathering and small scale fishing was main income source. Thus fishers went out for distant fishing from larger harbors in neighboring beaches, and women went out for peddling their products.

As mentioned above, in M-d1, collective fishing like village based fixed nets, or fish/seaweed/shell culture was not successful. Economic activities were individually performed. Instead, there were various collective activities for maintenance of village life. The land has slopes, and when one wanted to build new house, the base should be raised to get even space by piling rocks from the sea reef. Rocks were broken by powder, and broken rocks were carried. The work is announced in the village, and villagers gather to help it.

M-d1 has mountains at the back of the hamlet, but the biomass was not so plenty. So That every community member can get necessary fuel wood for one year's use, fuel collection was collectively done at the mountains in winter season. Trees were fell and cut to appropriate length, then piled, tied into bundles. Distribution to each household was discussed by regional group leaders. Piles are arranged evenly considering tree species, and regional group leaders drew lots.

The use of reefs was also decided by the community. Until 2010, to be entitled as the community member, one had to be the fishery cooperative member, too. The community and fishery was strongly connected. Among various natural seaweeds and shells, abalone was special. At the harvest season(Nov.to Dec.), those who went distant fishing also tried to return to participate abalone gathering.

Located on the edge of the peninsula, and by frequent dense fog, navigating ships used to be wrecked at M-d1. Hearing the news of ship wreck, villagers would gather and rescue. As the prayer for the safety and gratitude of the harvest, rituals and festivals used to be placed at the center of the village events, and the bathing and traditional dances is dedicated to the gods. In this way, various collective activities and devices were elaborated, and strengthen the unity among villagers.

After 3.11 earth quake

In the peninsula, most of the beaches suffered from severe damage by tsunami. There were 1591 households in the peninsula, but it decreased to 519 after the tsunami. Among 755 boats, 720(95%) were lost or broken.In M-d1, there were few damage on buildings, and fortunately no one died. But harbor was broken, boats are lost, and culture facilities were broken. The living space was almost safe, but production base was heavily broken.

Repair of harbor

Villagers discussed what to do with broken harbor. Only waiting for the support from the outside, it would take time, and would be too late for the abalone gathering. Then with the initiative of next generation leaders around 60years old, they decided to tentatively repair the harbor by themselves so that boats can be moored. They made large concrete bricks and put them on the quay. For the frames to make bricks, planks of broken cooperative building were used. The expense was managed from the community budget that has been stocked from the management fee for natural resource gathering. While debris clearing made villagers to feel downhearted, repairing harbor made them feel happy.

Collective gathering

At the villagers' general meeting on June 5, 2011, collective action was approved. The sea urchin gathering in the summer season was done by asking professional diver since there were only few boats. Among harvested sea urchins, 10 metric ton was sold by the community (paying 3% of the sale to the cooperative), and with the profit, communal graveyard that was damaged by earthquake could be repaired. Some portion was sold to community members, which pleased those who could not obtain local sea urchin since they do not go gathering.

As for abalone gathering, it was known that 25 boats could be provided before the season, and 86 villagers who wanted to go gathering boats used boats collectively. Women also could participate as rowers. Those who went gathering got allowances from the residents association. In addition, they could get wounded abalones that cannot be sold.

At the end of December, professional diver was called and gathered abalone to sell to the villagers to enjoy new years' delicacy. Until the earthquake, all the abalone was sold to the cooperative right after the harvest, and only those who went gathering could get wounded abalone for own consumption. In addition, some amount of money was distributed to all the village members as solarium.

When one become aged and cannot go gathering, he/she cannot get the harvest from the sea even though living in front of it. The collective action enabled such villagers to get the portion of harvest. With the progress of aging, one of next generation leaders says that such collective action will be needed more, and it also be effective for resource conservation.

5. Conclusion

The coastal commons in *Sanriku* area supply various natural resources, which were the major income source. These days, fish/seaweed/shell culture has replaced the center of income for fishers, but at such a emergent time like 3.11 earth quake, natural resources that can be harvested with simple gears did function as quick income source.

In particular, the most expensive natural resource, the abalones were gathered collectively in many cooperatives. Collective gathering lessens the pleasure of abalone gathering since the fishers' skill is directly connected to the profit, but community members agreed. After the earthquake, harvesting of natural resources gave not only temporary income, but also the pleasure of harvesting and the hope of rehabilitation. Seasonal harvesting period accelerated the speed of rehabilitation since fishing community hastened the recovery of boats

and harbors so as not to miss the season.

The detailed process of I-B2, and M-d1, showed the collective efforts to sustain community members' living with different appearance: on the income generation or on the basic living condition in the community. In both areas, the will existed in the community to make every member can sustain community life.

Collective action also brought about unexpected effects. As the case in M-d1 shows, the collective gathering made the harvest to distribute among members. Local abalone and/or urchin could not be eaten otherwise going gathering. Such experience at the emergency gave impressive lessons learnt to the community. As mentioned before, some of the leaders felt collective gathering make villagers happier on the whole and good for resource conservation, and it was reported that I-F2 decided to continue collective action even after enough number of boats were provided (Iwate nippo, 2012, online).

The commons in the fishing community functioned as the motivation for rehabilitation, and people to go ahead for the rehabilitation, and the collective action encouraged them. Such management system has been established through generations' experience. In *Sanriku* area, natural resources gathered at the coastal commons have economic importance. The commons in the fishing community functioned as the motivation for rehabilitation, and the collective action encouraged people to go ahead for the rehabilitation.

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