

Cooperation and Practices of Cod Fishermen toward Sustainable Fishery: A Case Study of Geoje City

Kim, Garam

Maritime Heritage Research Division, National Research
Institute of Maritime Cultural Heritage
sanbada123@korea.kr

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Abstract

Cod has been one of the fish that human beings have loved. It has not been long since it recovered from its situation of almost extinction in all oceans of the world. The historical process of its depletion and recovery raises key questions: Who owns the common pool resource? Who should manage the common pool resource? These have led to several strategies and countermeasures, some of which have been successful at stemming species decline.

In South Korea, cod has long recorded high production due to its high demand as a favorite fish species. However, the phenomenon of declining and depleting cod led to a situation where we had to take seriously the question of who and how to manage cod. Having repeatedly experienced the exhaustion and recovery of the resource, fishermen had to think seriously about the crisis of their profession and the sustainability of the fishery. To achieve it, fishermen organized the fishing community, made a set of rules, and began common activities to manage resources and use fishing grounds. The voluntary resource management activities and practices of the fishing community began to take effect as they interacted with local governments and the fisheries authorities. Fishermen are now carrying out cultural activities not only for their livelihood, but also for the sustainability of cod fishing.

In this paper, I will examine how the fishing community strategy and practice interacted with the system and achieved successful results through the case analysis of cod fishing in Geoje.

Keywords

cod fishery, common pool resource, autonomous management, sustainable fishery

Introduction

As the fishing ground has the characteristics of a common pool resource in that access to it and use of it is open. But this very openness stirs up competition, generating various problems. A typical problem arising from excessive competition of users is depletion of resources through over-fishing. There are numerous examples of the latter. In South Korea, croaker (*Larimichthys polyactis*), pollack (*Theragra chalcogramma*), cod (*Gadus macrocephalus*), and skate (*Raja pulchra* Liu) are such cases. Fish resources should be protected because they not only help maintain precious marine bio-environments, and provide fishermen with their livelihoods, but are needed to maintain unique fishing and food cultures.

There have long been various cases in which various actors try to prevent depletion of resources. The government and related authorities have tried to regulate over-fishing and illegal fishing through institutions. Fishing communities have promoted spontaneous and collective efforts to prevent over-fishing. However, there have been limits in such efforts depending on historical and social contexts.

In South Korea, fishery resource depletion by indiscrete over-fishing started from the Japanese Occupation era. Afterwards, with the development of advanced fishing technologies, such phenomena have been accelerated. In the early days, there was no specific legal apparatus, such as the Fisheries Act, so there were competitive fisheries. Then, when the Fisheries Act was adopted, the act focused mainly on fishing license and permission rights rather than resource management and/or maintaining a sustainable fishery. Competitive fishing continued and resources were being depleted.

Experiencing continuous depletion of resources, and an accompanying slump of the fishery, a reduction of fishermen's income, and a deepening of competitive fishing, national and local governments and fishing communities began to cooperate. They started to establish institutions for sustainable fishing and encouraged fishing communities to prepare monitoring and regulation. As a successful case of the cooperation between the central government, local government, and fishermen, we can think of the cod fishery.

This paper analyzes the cod fishery around the coast of Geoje city. First, it will deal with how cod fishermen experienced the crisis of their jobs caused by depletion of cod, what they learned from it, and how they acted to overcome the crisis. Then, it will examine how the Ministry of Agriculture and Fisheries, the local government, and fishermen cooperated to restore the resource.

Theoretical Discussion

The management of marine resources is related to the complex issue of preserving the marine biological system and cycle and the livelihood and related food culture of fishing communities, and development of fisheries. Therefore, we cannot dismiss the problem of resource management simply as the problem of fishermen or fishing boats.

To this end, theorists of common pool resources have begun to pay attention to various practices and ways to overcome resource depletion in various parts of the world (Wade, 1994; Agrawal, 2003). Case studies by scholars on common pool resources are largely based on ownership and management subjects of common pool sources, and differences in

attributes and characteristics of sources. Their analyses indicate that the management subject and method are determined according to whether the resource is private or shared, and the results may vary. Also, the management method can be changed according to the attribute of the resource. If we assume that fishermen are major subjects of management of resources, we provide them with all the powers to manage, distribute, and use the sources. But this generates the cost of regulating and monitoring in order to prevent over-fishing by fishers themselves. By contrast, if the external organization or the government is given the authority to manage and use the resources, it can ignore various practical problems occurring in daily lives of fishermen.

If managed in a uniform way by the compulsory intervention of the state, the problem could become even worse, so common pool resources theorists suggest the need for institutional consensus on the ownership and utilization of resources (Ostrom, 1990). That is, they suggest compromises of self-management of fishermen communities and government intervention rather than pure privatization or the government-led management. This argument takes into account the importance and impact of the system that operates on a higher scale while effectively managing shared resources through autonomous practice by the local community.

In fact, fishermen can't get out of the upper category of national system and management framework while forming groups and sharing fishing grounds autonomously. This is because fishermen operate in accordance with fishing zone and fishing gear restrictions, and the TAC (Total Allowable Catch) system. Therefore, based on the above arguments, it is likely that the fishermen's method of using fishing grounds and the system for sustainable fishing need to interact for management to be successful.

In such a context, some researchers have concluded that that fishermen's communities or fishing village communities could manage fishery development with governmental agencies. In fact, many case studies revealed that such a community is effective in management and preservation of fishing materials (Ostrom, 1990), and can be a successful and sustainable alternative (Berkes, 1989).

Many South Korean case studies on fishing village communities have revealed how such communities can manage, and use resources, and maintain sustainability within institutional frameworks. They are mainly anthropological and sociological research studies targeting fishing village communities which have been adapted to ecological environmental characteristics and technological development. Such research revealed changes in the occupation and living culture of communities, which adjust to internal and external changes and uses and manage the environment around the place of living (Jung and Kim, 1993, 1996; Park, 2001). In particular, An (2007), in her study on plain-diving fishing in Jeju Island, examines long-standing ideas, rituals, and traditional communal fishing, showing how the community avoided suffering the tragedy of resource stress on fishing grounds. Instead, she reveals how they shared common labor practices, controlled production and ultimately enabled sustained fishing amid the market economy of modern industrial society.

The South Korean research referred to above commonly pays attention to traditional resource-using methods and the life culture of such communities. It analyse how their knowledge about the ecological environment has accumulated over generations and how social culture for communal labor has been developed. In addition to revealing community adaptation to internal and external changes, such research is significant in terms of resource management because it shows method of continuous resource use.

In general, fishermen who settle and reside in a certain area inevitably create and share community norms and values because they collectively use the natural resources around them. Such community norms work to monitor over-fishing and illegal fishery, because there are definite limits in resources obtainable. As cod is available only in winter, and the production amount is limited, fishermen are very sensitive to over-fishing and illegal fishing. Community norms also create unique social and cultural mechanisms for maintaining collective values and social relationships among fishermen. Such characteristics are important for survival, and sustainability of community life.

Such important social and cultural mechanisms for the continuation of community life can be found in the unique distribution method of fishermen's society. Fisherman with a fishing boat require substantial manpower in the process of fishing, arranging fishing gear, and handling of caught fish. Fishermen can hire regular seamen or hire village people by paying daily wages. They pay monthly salaries to seamen and pay village residents with cash or commodities like caught fish. To older residents without regular incomes, such part-time work is economically helpful. The fish they receive from the part-time work can be eaten at home or processed to be sold at the market.

Despite the unique community-run methods concerning resources, such as those identified above, the risk of resource depletion still exists due to overfishing or illegal fishing. Individual overfishing can be monitored according to community internal norms, but collective overfishing or illegal fishing requires external intervention. In addition, when resource depletion occurs, there is a limit to the community's or fishermen's own response, which threatens not only fishermen's livelihoods but also the socio-economic system within the community.

Therefore, it is necessary to have proper external intervention which can guarantee the autonomy of the self-governing community and enhance efficiency in resource use and management. That is, the need for the establishment of a higher-level system for monitoring, sanctions and compensation is apparent. Such a national institution should consider self-government of fishing grounds of fishermen, and, at the same time, resource management. This is because the national institutions need to interact with the actual field because the people who practice the institutional and normative order are fishermen. Only then will fishermen be able to operate sustainable fishing while being protected from the unique and traditional way of using and managing resources.

Cod fishing in Geoje city is the case where such a process is applied. In a long history of cod fishing, there was a time when fishermen's occupations were imperiled because of the depletion of cod. But, the collective efforts of fishermen and the support of newly established institutions allowed the resource to increase again, which has led them to adopt various strategies to maintain a sustainable fishery.

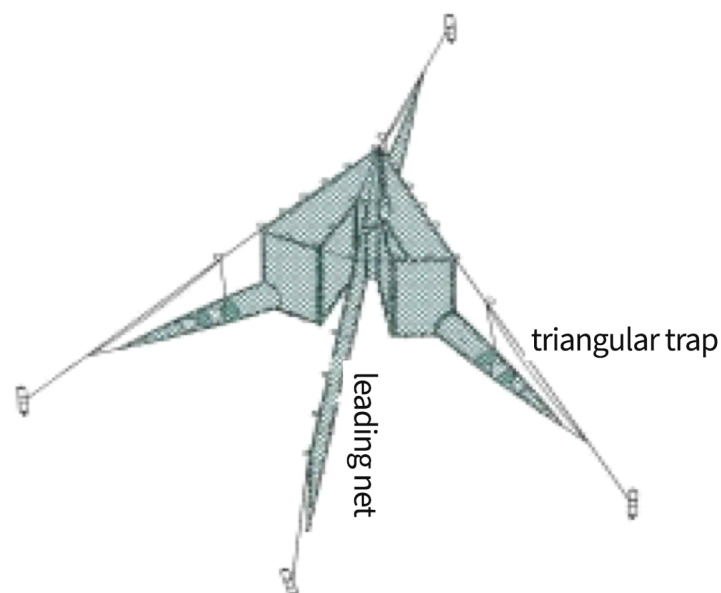
Resource management and cooperation of cod fishermen

Cod fishermen in Geoje city catch cod in Jinhae Bay to the east of the city and are proud of their work, which has a long history tracing back to the Joseon dynasty. It has taken a long time to establish mechanisms to sustain cod fishing, and there were twists and turns until they found the mechanism. They now hope that cod fishing will continue to future generations.



Fig 1. The location of Geoje City

At Jinhae Bay, cod fishermen use pound nets to catch cod from November to February. Currently, 81 pound nets are allowed in Geoje city area. Cod fishing is very profitable to the extent that by working during winter season, fishermen can live comfortably for the rest of the year. As a result of its high profitability, cod fishing has attracted various kinds of people including those who catch cod illegally – without permission. In addition, there were many fishermen from other cities around the Jinhae Bay who fished in Geoje waters.

Fig 2. Pound nets used in cod fishing¹

A pound net is composed of the central leading net and three triangular nets on both sides. The set of nets is large and can reach as long as 200m. Each fishing person is only permitted to own one set of nets. But there were some who install two, or even four sets. Facing an over-competitive situation with too many people entering the business, existing fishermen sometimes catch cod in the sea beyond the permitted fishing ground or try to increase their catch by secretly installing more nets.

In the process, cod fishers had conflicts with those catching other kinds of fish. What was more serious was that excessive competition did not generate increased income. The installment of many nets in a limited space would often cause damage like the tearing or loss of nets. It took time and money to procure new nets, reducing the number of working days.

Along with excessive competition, various environmental elements aggravated the depletion of cod, forcing cod fishers to give up their jobs. Many of them moved to other regions, or to Japan where they worked as day laborers. Other fishermen left the fishing zone and continuing illegal fishing, and the resulting problems did not disappear. Conflicts with fishermen in other regions as well as the decrease in cod and pollution of the sea have occurred frequently. Physical friction also occurred with those involved in the fisheries authorities who came to crack down on illegal fishing.

To solve related problems, fisheries authorities implemented policies on regulating fishing and proliferating the fish. To regulate fishing, the authorities designated allowed fishing grounds, fishing tools, and tonnage of fishing boats with the Fisheries Act. To proliferate the resource, The Geoje City government started the project of discharging artificially inseminated cod eggs. In 2003, the government started the project of discharging the cod fry. According to fishermen, cod yields began to increase in the late 2000s. Cod are either artificially inseminated, or the fry is supplied by cod fishermen.



Fig 3. Female and male cod used to produce artificially inseminated eggs

The effect of proliferation of the resource and regulation of fishing can be identified by statistics. In the 1990s, cod yields began to decrease, down to only 1 ton in 1994. But, the projects of simultaneously discharging artificially inseminated cod eggs and the cod fry made the yields increase. In the 2010s, the yields rapidly increased, and, then, decreased somewhat to stable amounts.

As the products increased owing to proliferation of the cod resource, fishermen competitively expanded fishing grounds. Competition and conflicts among fishermen take place regardless of the decrease or increase of cod yields. As cod fishing provides fishermen with high profits in a short period of time, fishermen with nets and boats have no choice but to fish competitively.

Table 1. Cod yield in Gyeongnam Province² (Unit: ton)

Classification	1989	1990	1991	1992	1993	1994	1995	1996	...
Yield	107	19	11	18	25	1	9	23	...
Classification	2010	2011	2012	2013	2014	2015	2016	2017	2018
Yield	941	884	1,604	1034	834	737	690	670	457

(National Statistics Indicators)

Despite the increase of the resource, illegal fishing caused by competition has continued. But it is difficult to monitor or sanction individual fishing practices and not easy to apply sanctions because close monitoring is difficult due to the nature of fishing at sea.

The history of laws and rules to prohibit over-fishing and manage the cod resource is as long as the history of cod fishing. The first cod fishing prohibition season was established in 1964, which prohibited cod fishing for two months from December to January. This persisted until 1986 when fisheries authorities adopted the policy of prohibiting and catching cod body length is 30cm or less in January. To secure cod used for the resource proliferation, the authorities allot 700 cods per fishing boat which only uses the pound net for 15 days. As the cod fishing period is short, fishermen have continuously petitioned the authorities to shorten the prohibition period. But authorities have not granted it.

Fisheries authorities have not reduced the fishing period while implementing their project to increase resources for the preservation of cod, the continuous fishing of cod, and the fishery economy. In the 2000s, the authorities have encouraged the fishing community to take voluntary action for the efficiency of fisheries resources management and the improvement of fishing environment, and fishing management. Specifically, the authorities run an incentive system, providing the fishing community with rewards for capturing species designated as harmful and for fishing communities that regularly clean the sea – providing them with portable radio transceivers or financial grants. The above regulations presuppose the existence of a fishing community capable of collective effort. This is because collective, unified, and continuous practice is easier to achieve than institutional effects than to lean on individual fishermen's efforts.

Cod fishers in Geoje have organized a fishing community to promote friendship and share information. The number of fishermen who joined the community was 81. Originally, the community was not meant to work for resource management or common use of the fishing ground but as fishing became slow, with the reduction of cod and the

strengthening of competition and conflicts among fishermen, and reduction of fishing days, members of the community sought a new direction. Beyond their efforts to comply with existing fishing regulations, they have begun to create new norms internally within the regulatory framework. To begin with, the cod fishing community adopted the geographic marker system for the products to prevent illegal fishing and selling of cod. It was a measure assuming that the members of the fishing community would work in the designated fishing ground. When they work in the fishing ground, fishermen are allowed to monitor each other in the course of fishing because the permitted fishing area is concentrated in one place. In addition, as they are interrelated by multiple social relations in a small geographic area, they cannot escape rumors on illegal fishing. Accordingly, in terms of regulation, it became possible to actually practice and apply formal systems that rely only on the autonomy of individual fishermen.

With the first measurement, people could be sure that the cod sold by fishermen who joined the community was at least caught within the designated fishing area. The cod produced in such a way had a sheet of paper detailing the place where it was caught and had the fisherman's name on its tail. The system was spontaneously adopted by the community to demonstrate that it was legally produced, and provide transparent distribution information, with more than 90% of members participating in the system.



Fig 4. Tack used as geographic marker³

Second, members of the community jointly clean the fishing ground before the fishing season starts. Cleaning means more than removing trash like deserted styrofoam and net. Cod fishermen who have caught cod every winter know the exact locations where they can harvest much cod. Thus, to pre-occupy the best spots to work, they often would leave the anchors they used under water. This practice has long been a problem as it encourages competition and also leads to losses in fishing nets. To solve this problem, the fishing community cleans the whole fishing ground, and removes wasted nets and anchors from under sea before the cod fishing starts in full scale. As anchors are the property of individual fisherman, the community sets the cleaning day, and lets fishermen recover their own anchors.

Third, the community fixes the date when fishing starts, and asks fishermen to go the fishing ground at the same time. Fishermen cast nets freely. As the nets used for cod fishing are big and heavy, they are fixed on a specific spot and used until the season ends. So, if the fishing date is not fixed, there will be competition among fishermen to pre-occupy good places, and expedient methods such as setting up anchors in advance will inevitably occur. Given that environmental pollution and over-fishing can always occur, such measures are to prevent them.

Fourth, if members of the fishing community report illegal fishing, the fishing community will pay a reward. The reward is set high at 3 million won (KRW). As cod fishing is very profitable, the community awards the reporter the high amount of money to encourage reporting and prevent illegal fishing. The fisherman violating the rule is prevented from participating in the cod festival organized by the community and is not allowed to get the printed tag containing the geographic marker for a certain period of time.

Fifth, the fishing community holds the cod festival to advertize cod. Cod is one of the fish favored by South Koreans. It is cooked in various ways, and used as one of the dishes put on the table to worship ancestors. In particular, cod yielded in Geoje is popular because it is large and fresh.⁴



Fig 5. Poster of the 13th Cod Festival in 2019 and cod characters

The cod fishing community designed the festival to promote sustainable cod fishing and to satisfy both producers and consumers. In order to implement it in earnest, the festival, programs and Daegu symbolic characters were planned and created in cooperation with Geoje City. The festival was expected to be helpful to improve the local economy and the image and identity of Geoje as well as to promote local tourism.

The festival has been very effective. During the festival, fishermen sell cod to visitors at 20-30% cheaper than usual price. The sheet of paper containing the information of the producer's name and the place it was caught is attached to the tail of it. Visitors from across the country can buy fresh cod cheaply. While the number of cod sold in the 2018 festival was only about 1,900 because of reduction of yields in that season, the sales shot up to about 7,300 in 2019. The number of visitors increased from about 27,000 in 2018 to about 32,000 in 2019. The restaurants near the festival site also earned about 130 million won (KRW).⁵

In addition, fishermen who are producers, experiencing the positive effect of the festival, began to trust the resource management of the fishing community and the local government. Fishermen say it is important to have an increased confidence and sense of belonging to the fishing community. Ultimately, the practices and effect of the resource management is realized through collective efforts of fishermen.

However, fishermen have not always actively agreed to or accepted the rules of the fishing community. In the early stages, when the community tried to prohibit some conventional, but illegal fishing methods, some fishermen resisted. As they have maintained social relations in the same area for a long time, they tended to implicitly overlook each other's fishing practices. It was not easy to protest illegal fishing methods used by their competitors if they were not directly harmed because of their blood relations and regionalism. In such a situation dominated by old tradition, it was difficult to resist to the new way of fishing promoted by the fishing community actively adopting the institution of the fisheries authorities. However, as steady efforts and compensation were made properly based on institutional support, fishermen began to actively participate, resulting in a steady increase in cod production, cod consumption, and local publicity at the same time.

Conclusion

The existing analyses of fishing management have either overlooked the community level or predominantly focused on the relationship between the government and individual producer. However, theorists on common pool resources argue that an understanding premised of the existence of the community should be applied to the process of establishing and modifying the relevant system. Ultimately, it is the human community near natural resources which uses and manages them. In this context, Jeantot (2000) emphasizes the role of fishing communities in fishery management. First of all, he asserts, we should start to rebuild the community before seeking to increase fisheries resources, because neither side can succeed without efforts to manage fisheries resources and foster communities. However, despite various institutional efforts for joint management of the government and community, there have been many cases of management failure. Those failures may be caused by the efforts to change institutions without understanding the importance of community.

Marine scientific methods and fishery management suggested to solve fishing crises have limits, because they are based on institutional assumptions that may be inconsistent with perceptions of fishermen on resources and their demands on resource management. Such responses just concern the adoption and application of government-led institutions, and participation rates of fishermen in such methods are low. They focus only on the 'self-interested individual', overlooking socio-cultural characteristics of a specific community. In summary, institutional responses without understandings of communities have led to resource depletion, marine pollution, a general crisis of the fishery as well as the crisis of cod fishing in South Korea. Accordingly, it is necessary to include fishermen as not only the objects of resource management and use regulation, but practical actors, based on understanding of fishing community.

Along with the necessity to deal with the fishing community as major actor of management, there is also the problem of understanding the community itself. Allison & Ellis (2001) point out that existing community analysis studies on fisheries management start from a consistent understanding of the community. That is, they assume that all the communities have the same social structure, common interests and shared norms. But there are not many such cases. For example, the cod fishermen this paper deals with reside in dispersed places. Only 27 live in the same village. Plus, some families

depend only on cod fishing, but others do not. Some fishermen are more conscious of blood relationships and regionalism than others, and some just pursue individual interests. In other words, members of the fishing community have various backgrounds in living places, ages, income levels, and social networks. Nevertheless, it could be said that it was the interaction between institutional support and the fishing community's action strategy that brought positive results to resource management and utilization.

The interaction was achieved by cooperation between related government authorities and community members. The related government authorities actively supported autonomous management of the fishing community and made efforts to make fishermen fully understand the institution and use institutional benefits. Also, the fishermen continued their voluntary efforts by consulting with related ministries, focusing on the leaders of the fishing community. As a result, a framework was established for sustainable fishing.

Today, we see reduction of numerous species, environmental pollution, and slowdown of related industries. Now, it is time to apply area-customized methods rather than a uniform method. Cod fishing in Geoje was not a unique case. But it was not easy for the fishing community and fisheries authorities to make institutional revisions by adjusting mutual differences in positions and finding common grounds. However, if the efforts to constantly share concerns for the future and create a venue for consultation are supported, that is, if the fishing community or system does not exist alone at each unit, but rather agrees and interacts with each other, sustainable patterns of resource use can develop.

Endnotes

1. Pound net is fishing net statically installed in a specific place. The net resembles a pocket. The cod enter triangular 'pocket-like' nets on both sides.
2. Gyeongsangnam-do is the upper administrative unit including Geoje city. This figure represents the total output of Gyeongsangnam-do, including Geoje.
3. The tack attached to the cod tail contains the fisher name, phone number, and the fishing boat name along with the characteristics of the cod.
4. Cod (*Gadus macrocephalus*) comes to Jinhae Bay to lay eggs from early December. The shallow sea area of Geoje and the southern sea is the major egg-laying area of cod in those times. As the cod is big and fatty before laying eggs, Geoje cod is more popular than those caught in other areas. Laying eggs in the Geoje area, cod continue its journey up to Gangwon province and Hamgyeong and Hwanghae provinces. There, cod seasons are from April to May.
5. "The 13th Geoje Cod Festival was abundant with high cod yields and many visitors." saegeoje internet news (www.saegeoje.com accessed 2020.4.17)

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