

The fishery right of Zhoushan in the Context of Limited Access Management System

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Abstract

In 2017, north Zhejiang introduced a Total Allowable Catches (TAC) system for the gazami crab fishery. This was the first TAC pilot introduced in China's domestic waters. The system established a limit on the volume of gazami crab catches, and the fishery was distributed in accordance with certain restrictions (i.e. prohibited fishing areas for trawl nets). The gazami crab is a central coastal fishery in north Zhejiang and has an important influence on the local fishermen community. This paper aims to discuss the management of the fishery and assess the contributions and challenges of the rights-based approach to achieving sustainability. This paper introduces the countermeasures that prevent negative influences caused by the introduction of a quota system in the region.

1. INTRODUCTION

1.1 Description of the fishery

The gazami crab has a short life cycle, rapid generation transition, early individual maturity, strong fertility and rapid growth, all of which contribute to the economic importance of this species. In recent years, the fishing intensity of the gazami crab grew continuously, which led to a considerable decline in the fishery resource. In 2017, China launched its first TAC pilot on the gazami crab fish in north Zhejiang. This pilot was created in order to experiment with an alternative fishery management system in China—from input control management to input control combined with output control. The TAC pilot project was located at the east of the Zhoushan islands, 30 to 31 degrees north latitude and 122 to 30 degrees east longitude. It covered an area of about 2 300 km² or about 1.5 times the size of the Zhoushan continental area.

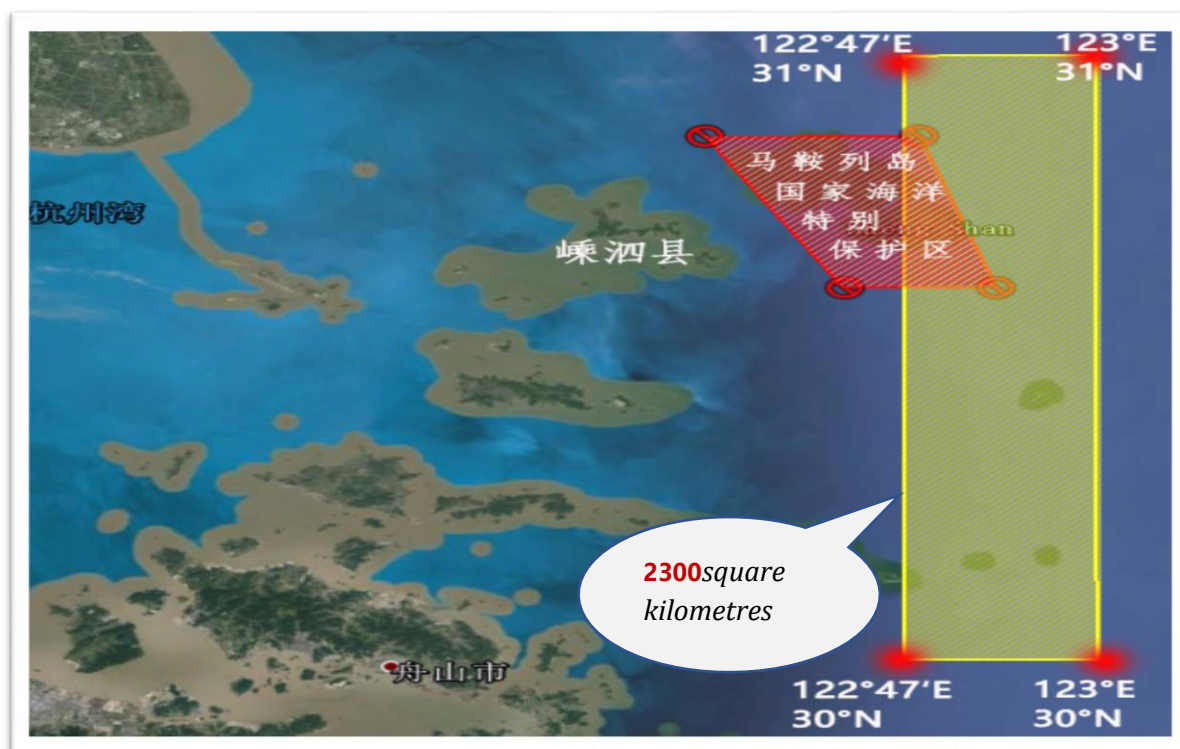


Figure 1. TAC pilot sea area in Zhoushan.

Source: Zhu Wenbin, Zhejiang marine fisheries research institute.

1.2 Economic contribution and social implications of the fishing activity

Zhejiang province is a major marine fishing province in the east sea region. It underwent major economic development in recent decades thanks to the doubling of the price of gazami crab products following the resumption of stream-net operations in the 1970s, and to the declining output of other fish resources. By the 1980s, the catch yield of gazami crab in Zhejiang province exceeded 50 000 tons. By the middle of the 1990s, due to the successful promotion of crab cages, the catch was over 60 000 tons. In 2012, it reached more than 80 000 tons, accounting for 40 percent of the fishing catch in the East China Sea. The catch yield of gazami crab is unprecedented, but the resource quantity of gazami crab is volatile.

2. MANAGEMENT OF THE FISHERY AND RIGHTS-BASED APPROACH

2.1 Management of the fishery

In 2017 and 2018, under the guidance of the Ministry of Agriculture and the Marine Fisheries Research Institute and fisheries organizations, quotas were determined and allocated within a threefold framework: “Sites transaction and quota management plan”, “Supervision and inspection plan for vessels in TAC pilot sea area” and “Resource survey and monitoring plan”. There were then six systems: Designated sites transaction; Fishing logbook; Vessel location notification; At-sea observers; Reward and Punishment.

2.2 Brief history of the former rights-based approaches used in the fishery

Some changes have occurred in the biological characteristics of the gazami crab, such as individual miniaturization, early sexual maturity and single age structure. For this reason, Zhejiang province has adopted a number of positive measures to protect the species. In 1983, it adopted the annual May to June ban period for gazami crab fishing, mainly to protect the gazami crab brood. In 1999, the province implemented limits on the production scale of the main fishing gear—the crab cage and the fixed gill net—and enforced regulations on the fishing period and protected area to manage the crab resources. In 2000, the east sea area banned the main crab cage boats from entering the area because there were too many of them. In 2001, the province adopted a ‘proliferate and release’ method in order to increase the gazami crab stock. During the 2017 Marine fishing moratorium, the fishing period was extended by a month for some fishing vessels including circular and single ship girder (girder pole shrimp), cage pot, gill net, purse seine etc.; the new fishing period is from 1 May, 12 pm to 1 August, 12 pm.

2.3 Rights-based approach: allocation and characteristics

The above traditional “command and control” approach to fisheries management fails to control the volume of catches, which can cause overexploitation and declining fish stocks. Solving the plight of the gazami crab resources and achieving sustainable development and the utilization of effective methods requires limiting fishing management. The gazami crab resource regeneration and supply level must be in a state of balance. In other words, catches must be lower than the regeneration of the species. The implementation of a total allowable catch (TAC) system thus has important strategic significance in this regard.

There are 102 fishing boats in the region, including 73 in Linhai and 29 in Sanmen. The formulation of the total catch quantity takes into account data on the number, yield and output value of fishing boats between 2011 and 2016; the breeding and release time, location and quantity of the gazami crab are also taken into account.

In 2017, the ministry of agriculture (MOA) decided to carry out TAC fishing management of gazami crab in waters north of Zhoushan. The establishment of the TAC is based on investigations conducted by scientific research institutions, following the principle that the growth of biological resources must exceed

the catch amount. The government departments allocate the quotas to the fisheries cooperatives, who can then allocate them to fishermen. The trade of quotas is conducted at sea through the vessel, and under the supervision of monitoring vessels. Finally, the output is reported, and the warning quota is achieved.

Figure 1 is a partial grid map of the area. It excludes the sea area of the national Marine special reserve in Shengsi. The area is grid managed, and each year the fishermen acquire catch waters by drawing lots. The north sea of Zhoushan uses an average distribution method in free distribution. This system reflects the principle of absolute fairness because the amount of quota is the same for each individual unit. While the cost of this allocation method is relatively low, it does not take into account the differences between the subjects in reality. In turn, this may lead to over-allocation or under-allocation of gazami crab resources. To some extent, this is a restriction to the promotion of TAC management of gazami crab.

3. CONTRIBUTION OF THE RIGHTS-BASED APPROACH TO ACHIEVING SUSTAINABILITY

3.1 Sustainable use of the resources

Local authorities have identified the hydrological environment characteristics of the pilot water area during the summer vacation, the composition and quantity distribution of gazami crab population along the coast of Zhejiang, and their relationship with the environment (Figure 2). The results show that environmental factors such as water depth, bottom dissolved oxygen and surface bottom salinity had a great influence on population distribution in spring. In autumn, environmental factors such as salinity, water depth and temperature at the bottom layer had a great influence on population distribution. The impact of the whole fishery on the biological and ecological environment was understood through the observer plan. According to the analysis results of the observer, a total of 42 species were found to be caught concurrently, with an average proportion of less than two percent.

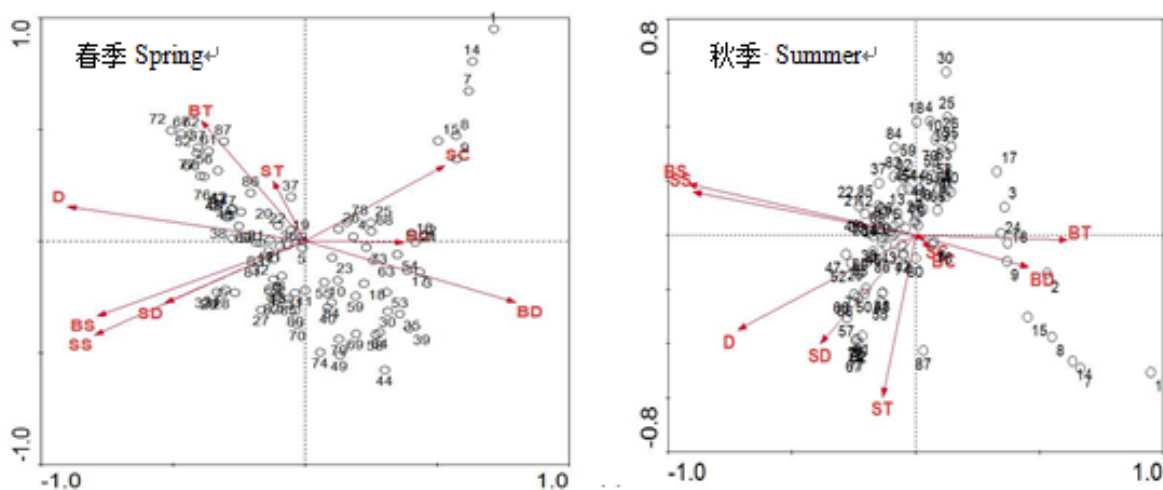


Figure 2. The relationship between population distribution and environment.

3.2 Economic viability of the fishery

The total catch in 2017 was 1 612 tons, which represents 50.39 percent of the TAC (3 200 tons). The official pilot period was from 16 September to 31 May. The actual fishing period is from 1 October to 15 January. The effective harvesting in the TAC pilot area averaged at 1 559 vessels per day, the number of gillnet pieces was 0.768 million in total, and the average CPUE was 2.1 kg/P. Overall, the first year of TAC was half-complete. Since the basic data set by the TAC is derived from fishermen's self-reports, it is reasonable

to believe that during the first year of the pilot scheme, fishermen reported high production for fear of insufficient quotas.

3.3 Social equality

The pilot boats came from the same community, the boats were relatively uniform in size, and the fishermen were familiar with each other and supervised each other. Self-discipline and management skills have proven important to reduce frictions and contradictions between the fishermen. Autonomous fishing organizations not only provide a way for fishermen to actively participate in fishery management, but also contribute to the implementation of the quota management system. The strict control of autonomous organizations will reduce the cost of quota management.

4. MAIN CHALLENGES AND WAY FORWARD

4.1 Challenges for the fishery

The relevant people's understanding of quota management is insufficient. According to the survey, many fishermen, fishery managers and stakeholders in Zhoushan, such as captains, have a lack of knowledge about the content and significance of quota fishing management policy because it has yet to have a profound impact on their work and life.

It is difficult to determine the total resources of *gazami crab*. The production complexity of the entire Zhoushan sea area is much higher than that of the northern sea area mentioned above. First, the area of the sea has increased roughly four-fold with a wider distribution of resources. Secondly, the variety of fishing gear of *gazami crab*, including gill netting (fixed gill netting and streamer netting), crab cage, single trawl and shrimp net, etc., increases the complexity of resource evaluation. Thirdly, there is a lack of comprehensive and long term fishing resource surveys. Fourthly, the proliferation and release of *gazami crab* will only be carried out in Zhoushan once a year.

The allocation of *gazami crab* is difficult. Determining an adequate way to allocate the catch quota is crucial to the implementation effect of quota management. However, the distribution of the northern waters of Zhoushan is barely compatible with quota allocations because of the different fishing intensities of the *gazami crab* in different waters. For instance, in the last ten years, the *gazami crab* catch in Daishan county has been four times as much as in the Punto district, 4.9 times higher than in the Shengsi county sea area, and 28.6 times higher than in the Dinghai county sea area. In addition, the fishermen use different fishing boat types as well as different *gazami crab* fishing tools, including the crab pot and gill net home but also shrimp nets, trawls single, double girder rod trawl etc., which make the scales of different operations difficult to grasp and the allocation of *gazami crab* quotas between areas very difficult.

Real-time monitoring of catch is very difficult. Firstly, the Zhoushan area includes many different types of fishing boats. The fishing gear for *gazami crab* fishing is diverse as well, including gill net (streamer net and fixed gill net), shrimp net, bottom trawl and other strong catch. Even installed camera equipment can be insufficient to evaluate the specific number of *gazami crabs* in marine productions. Secondly, the operation at sea takes a long time. Thirdly, in order to maximize their profits, some vessels carry quotas from several fishing vessels in addition to their own. It is, therefore difficult to define the traceability of the catch.

4.2 Improving fishery sustainability in the future

The first goal is to strengthen the influence of limited fishing management. There are some misunderstandings among the people involved in the fishery regarding the basic principles of the TAC

system; there are also some fishermen or fishery companies that could be considered more egoistic and are therefore less apt to accept the TAC management system. Managers should publicize and guide the fishermen and their stakeholders, strengthen communication and contact with the fishermen in the management process, and ensure that the fishermen express their concerns in order for them to feel like the TAC system is beneficial to them in the long run and does not deprive them of their wealth.

The distribution of quotas should be equivalent to the distribution of wealth. When one navigates the rivers in the north of Zhoushan, it becomes obvious that the region will not survive more complicated water conditions. Therefore, the countermeasures against the allocation of quotas are discussed as follows. Firstly, there are two ways to choose the subject of quota: one is the fisherman as the subject of allocation, and the other is the fishing boat as the subject of allocation. Second, the determination of the executors of allocation quotas can be implemented by introducing community management. Finally, for the selection of a quota allocation method, the following options are available: (1) the distribution can be based on the percentage of catch of gazami crab in the specific county of this sea area; (2) distribution according to operation mode and proportion of catch obtained by main fishing gear of gazami crab; (3) distribution in accordance with the flood season of gazami crab; (4) distribution according to fishing effort; (5) distribution is conducted freely and through auction; (6) when the fishermen want to withdraw from the fishing or the quota has surplus, the ITQ system can be implemented to transfer the quota under the supervision of the government. It is conducive to increasing the income and resources of fishermen to be fully utilized.

The total allowable catch is the core of the implementation of quota catch. In this implementation process, a reliable and effective supervision and monitoring system is needed to comprehensively monitor the issuance of quotas and the transaction process of catch to provide security for the total allowable catch. Zhoushan sea area has a large fishing capacity, numerous fishing ports, and vast shore trading regulations. These regulatory measures are not sufficient for the vast sea area in northern Zhoushan; they must be complemented by an effective monitoring system at the shore.

Finally, there could be improvements in terms of social stability. The limited gazami crab resources coupled with the excessive fishing capacity, the limited efforts to solve the excessive fishing, the need to guide the fishermen multi-functioned gathers, but also for subsequent compensation mechanisms to solve fishermen's livelihood problems will all require a number of countermeasures. First, to consummate the fishermen multi-functioned gathers subsidy measures. Second, through appropriate regulation of market prices to ensure fishermen's sales income. Third, to improve the social security system in fishing areas such as medical insurance, endowment insurance and unemployment insurance. Fourth, to establish a fishery compensation fund.