

THE UNIVERSITY OF CHICAGO

“Blue Revolution”:  
The Adoption and Abandonment of Two Fisheries  
Technologies in Ningde, Fujian, 1953-1961

By

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## Chapter 1 Introduction

Socialist China revolutionized agricultural economic institutions by reorganizing household-based production units into large-scale collectives. This institutional change—in contrast to the nationalization of industry and the replacement of the market with central planning and administration—transformed not only ownership and how production units functioned, but also how laborers worked and related to each other. The socialist regime organized rural populations into collectives in accordance with its understanding of Marxism, which called for the massive regimentation of labor relations and the casting of labor processes. To reorganize labor processes and relations, the state reskilled many rural populations. There were many new laborers—many of them females—mobilized by the state to work in agriculture. Thus, they had to learn farming skills from scratch. Additionally, the state trained many rural laborers to build roads, canals, and dikes for collective agriculture. Thus, we could argue that the regime reskilled the entire rural workforce to realize its socialist vision. The state's efforts to skill rural populations had far-reaching effects on rural society since they shaped rural people's perception of socialist modernity.<sup>1</sup> Through learning new skills, they were trained to work in collectives under supervision, becoming and feeling that they were part of a state pursuing production and orders.

As part of its efforts to skill rural populations, the state introduced many technologies to villages. A close examination of these technologies offers a clue to understanding the skilling schemes in socialist China because technology offers an excellent tool for rethinking history while encouraging us to consider how societies translated goals, values, and power regimes into

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<sup>1</sup> Jacob Eyferth, “Remote Control: Field Management Regimes and the Agricultural Labour Process on Chinese Collective Farms, 1956 to 1980,” forthcoming.

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material practices and artifacts. Throughout history, every society has developed unique perceptions of the forces mobilized by technological activities of all kinds, how they should be used, their effects, and their political, moral, or metaphysical significance.<sup>2</sup> In this sense, technology is a “material manifestation of the various ways men and women throughout time have chosen to define and pursue existence.”<sup>3</sup> Therefore, studying technologies that were pervasively used during collectivization campaigns can shed light on how the regime changed production processes and laborers to accomplish its goals. Furthermore, a study of these technologies can reveal how power functioned in socialist China since the pervasive adoption of technology manifests who has the power to define problems and choose the technologies to solve them. An analysis of the interactions between different interest groups to resolve disputes over technology adoption can shed light on how power is distributed across society. Therefore, studying the most prevalent technologies used during the collectivization era could also reveal many tensions and nuances of what is commonly believed to be an authoritarian regime.

This thesis examines two fisheries technologies that were pervasively adopted and then quickly abandoned during the collectivization era: the *qiaogu* method (敲罟法) and kelp raft cultivation (海带筏式养殖).<sup>4</sup> While there were many similarities between the two cases, they also differed in many ways. Although they were both promoted by the state, their motives were different. One served to maximize resource exploitation, while the other served to meet the state’s many pragmatic and political goals. Additionally, they were both abandoned in some

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<sup>2</sup> Francesca Bray, *Technology, Gender and History in Imperial China: Great Transformations Reconsidered*, 1st edition (London ; New York: Routledge, 2013), 5.

<sup>3</sup> George Basalla, *The Evolution of Technology*, Reprint edition (Cambridge England ; New York: Cambridge University Press, 1989), 15.

<sup>4</sup> The kelp raft cultivation was abandoned in some places in the 1960s but existed in other places for a long period of time.

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sense. The former was abandoned by the state, whereas the latter was rejected by fishers in some areas. Moreover, while both technologies influenced local societies, one had an impact on ecology and the other on the economy. Although these technologies are asymmetric, they both reveal how politics and technology interacted during the collectivization campaign. As such, they both demonstrate what the regime believed was good technology, as well as the complicated process of promoting a particular technology. Furthermore, by illustrating interactions between the state, local cadres, and individuals during the adoption of technologies, these cases shed light on the politics of technology at the time.

Through a focus on the development, transfer, adoption, and subsequent abandonment of these technologies, as well as their ecological and social impacts, this thesis presents three arguments. First, the state had the final say over what was a problem and what was a good technology to solve that problem. A key problem that the state identified during the collectivization campaign was how to scale up production and organize rural populations into collectives. Therefore, agricultural technological change in socialist China was driven by the state's dual goal of simultaneously maximizing production and revolutionizing rural society. As a result, the state—intentionally or unintentionally—selected technologies that favored collective work, which reinforced collectivization campaigns by involving many people working together. Second, the state was not a monolith, and state-led schemes were incoherent to a certain extent. Since different levels of government might have different goals, they perceived certain technologies differently, thereby complicating state-led technology transfer programs. Some of the frontline officials ignored state requests, while others incorporated their own needs into the programs. The role the frontline officials play in the politics of technology deserves attention since the common person rarely encounters the state on a daily basis. Instead, they encounter the

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agents of the state, frontline officials, who implement the planners' visions on a day-to-day basis.

Thirdly, although the state held ultimate power over the adoption of certain technologies, rural populations (including fishers) were not passive recipients—materially or ideologically. Some may change or even refuse technologies introduced by the state, while others may insist on using technologies banned by the state. In doing so, they partially rejected the ideological information that the state intended to convey to them through the use of those technologies, even though they often did so for their own survival.

All three arguments should be understood within the theoretical background of treating technologies as social and political constructs. By adopting this perspective, the present thesis attempts to rethink James C. Scott's ideas in *Seeing Like a State* and the politics of technology in the Mao era by studying the technological revolution in fisheries, namely the “Blue Revolution.”

### **1. Fisheries technologies as social and political constructs: A conceptual framework**

The introduction of the *qiaogu* and kelp raft cultivation methods represents a shift in the technology adoption of fisheries in coastal China during the late 1950s. During that time, discourses on technology adoption were highly political. Discourses such as these, in which key stakeholders decide what problems need to be addressed and how to solve them, are called framing processes. According to Bijker, a frame is a boundary, while framing is the process of producing this boundary. The concept of technological frames refers to how relevant social groups (e.g., authorities, fishers, and local cadres) attribute various meanings to the broad concept of fisheries technology. Thus, technological frames encompass the recognition of what counts as a problem as well as the available strategies for resolving it. In this manner, a

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technological frame becomes a socially and politically constructed combination reflecting bargaining among stakeholders as well as different norms and values.<sup>5</sup>

The theory of interpreting technology as a social construct suggests that politics and society are largely associated with the acceptance or rejection of a given technology. Accordingly, stating that a given technological adaptation is "the best" is not sufficient to explain its success. Researchers should instead examine how "being the best" is defined and perceived within a particular field. It is also important to consider which groups and stakeholders participate in the definition-making process. In particular, researchers must ask why, for whom, and for achieving which social and political ends certain technologies are developed and disseminated, or manipulated and rejected.<sup>6</sup>

Concerning the introduction of the *qiaogu* and kelp raft cultivation methods, relevant social groups, such as fishers, top officials, and local cadres, could be defined as groups that were related to or affected by the new technologies. According to Pinch and Bijker, it is essential to state that different actors or social groups are carriers of different interests, values, and norms, which influence their perceptions of technology.<sup>7</sup> In the case of the *qiaogu* method, some interest groups considered it an effective method to increase production and organize fishers, while the fishers initially viewed it as a threat to their limited resources, and then as an advanced technique. Similarly, while top officials saw kelp cultivation as a technology showing the

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<sup>5</sup> Wiebe E. Bijker, Thomas Parke Hughes, and Trevor Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Anniversary Edition (Cambridge, MA, USA: MIT Press, 2012).

<sup>6</sup> Paul Josephson, "Totalitarian Science and Technology," *Faculty Books*, January 1, 2005, <https://digitalcommons.colby.edu/facultybooks/2>.

<sup>7</sup> Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," *Social Studies of Science* 14, no. 3 (August 1, 1984): 399–441, <https://doi.org/10.1177/030631284014003004>.

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superiority of the socialist regime, local cadres regarded it as a way to settle down boat dwellers.

However, fishers refused to use the technology because they could not use it to directly obtain food. In both cases, different interest groups perceived problems and solutions differently. This constructivist understanding is the main theoretical framework of this thesis, which shows how different social groups comprehended a given technology and reacted to it based on their comprehension.

## **2. From “seeing like a state” to “seen like a state”**

The study of politics and technology has also been influenced by James C. Scott’s brilliant and influential work, *Seeing Like a State*. In this book, Scott criticizes a system of beliefs he calls high modernism, which centers on overconfidence in the ability to design and operate society in accordance with scientific laws. Socialist states, including socialist China, are regarded as great examples of high-modernist regimes, which are characterized by being aggressively anti-traditional, obsessed with order and control, and possessed of an almost religious belief in the necessity for and rationality of state planning. In his book, Scott also uses collectivization in the USSR and the Great Leap Forward (GLF) in China as examples to show how well-intentioned grand schemes for improving human conditions went tragically awry.

According to Scott, to achieve high modernism, many states utilized various technologies to help them make society legible. For example, planned forests in Germany in the late 18<sup>th</sup> century, “scientific agricultural” techniques in Tanzania in the 1970s, and “machine-friendly” crops worldwide in the 20<sup>th</sup> century. These technologies assisted states in simplifying complex phenomena to impose order; however, they also disrupted what had otherwise been well-functioning social, political, or economic orders, sometimes debasing and degrading them irreparably and thereby leading to tragedies.



Following Scott's lead in *Seeing Like a State*, scholars have increasingly paid attention to how states see—i.e., how states make populations “legible.” However, since states are also seen by their populations, we would do well to consider how populations view their states. Unlike states, which pursue a synoptic vision of their populations in Scott's rendering, an individual's view of a state is often particular.<sup>8</sup> Scott gets at this perspectival point in *The Art of Not Being Governed* and *Weapons of the Weak*, showing how hill-dwellers in Southeast Asia viewed the valley states and the image of the state through the eyes of peasants in Malaysia. From this bottom-up perspective, technology also plays an important role. For example, in *Weapons of the Weak*, the Green Revolution and the Malaysian government introduced fundamental changes to rice production in Malaysian villages, such as the use of new planting practices. From the perspectives of local peasants, these technologies stripped poorer farmers of much-needed earning opportunities, thereby destroying the fragile moral economy.<sup>9</sup>

However, one key part that is neglected in Scott's work to some extent is the inconsistency of the state. To put it differently, there are many interest groups within a state. Every common people's view of the state is nuanced, shaped by the position one holds in the local social and political order. Moreover, intra-administrative struggles are part and parcel of statecraft.<sup>10</sup> Different interest groups and how the state is seen by them are worthy of further research. The study of state-led technology transfer programs can also shed light on these nuances if it could explore how different perceptions of certain technologies interact with others and shape such programs to the end.

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<sup>8</sup> Smith, “Seen Like a State.”

<sup>9</sup> James C. Scott, *Weapons of the Weak: Everyday Forms of Peasant Resistance*, Reprint edition (New Haven: Yale University Press, 1987).

<sup>10</sup> James C. Scott, “Further Reflections on Seeing Like a State,” *Polity* 53, no. 3 (July 2021): 507–14, <https://doi.org/10.1086/714549>.

### 3. Green revolution, red revolution, and “blue revolution” in China

As noted in Scott’s *Weapons of the Weak*, the Green Revolution serves as a good case to examine the relationship between technology and politics. The Green Revolution is the set of research technology transfer programs occurring between 1950 and the late 1960s, which aimed to increase agricultural production in parts of the world. Born of the Cold War, the Green Revolution intended to provide technological fixes for social and political problems. It originated from a technocratic vision that if farmers around the world could be raised from poverty through technological improvements to agriculture, they might be less likely to embrace the “red” communists.<sup>11</sup>

However, in communist countries like China, political leaders also believed in the magic of technology. China also experienced a “Green Revolution,” the goal of which was also to transform the material conditions of agriculture through mechanization, introduce new seeds, and apply modern chemicals to increase production and raise living standards. However, compared to the US vision of the Green Revolution, which urged faith in technological solutions, the socialist Chinese vision insisted that new technologies could only be legitimate if they emerged from politically and socially revolutionary contexts.<sup>12</sup> The “red” state mobilized the enthusiasm and dedication of the newly liberated masses to kick-start the technological revolution. Collectivization allowed the state to compensate for limited material and financial resources by mobilizing vast amounts of man- and woman-power, which was set to perform agricultural work

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<sup>11</sup> Prakash Kumar et al., “Roundtable: New Narratives of the Green Revolution,” *Agricultural History* 91, no. 3 (July 1, 2017): 397–422, <https://doi.org/10.3098/ah.2017.091.3.397>.

<sup>12</sup> Sigrid Schmalzer, *Red Revolution, Green Revolution: Scientific Farming in Socialist China* (Chicago: University of Chicago Press, 2016).

and build infrastructure.<sup>13</sup> Meanwhile, the socialist state made full use of the revolutionary potential of the peasantry and the creative potential of the working masses. In this manner, the technological landscapes of the Chinese countryside were transformed materially, socially, and morally, creating a revolutionary technological culture that challenged classic technocracy. Party leaders mobilized ordinary workers and peasants to take active roles in improving the technologies they used in daily life,<sup>14</sup> or in contributing folk knowledge or skills to sciences like seismology and medicine.<sup>15</sup>

The state's efforts to transfer technology can also be viewed as a means of skilling rural populations. For example, "scientific farming" required farmers to learn new skills, such as using parasites for biological control and breeding hybrid rice.<sup>16</sup> Another example is the campaigns to eradicate schistosomiasis in the 1950s and 1960s. Despite the failure of these campaigns, many of the local cadres and intellectual youth who participated gained some basic medical knowledge and many skills, such as statistics and making maps and tables. These skills contributed to the eventual resolution of the schistosomiasis problem in the 1970s.<sup>17</sup> As a matter of fact, to achieve its goal of creating a socialist state, the regime introduced new cultivation regimes and labor processes by training nearly every rural person in new techniques.

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<sup>13</sup> Eyferth, "Remote Control: Field Management Regimes and the Agricultural Labour Process on Chinese Collective Farms, 1956 to 1980."

<sup>14</sup> Schmalzer, *Red Revolution, Green Revolution*.

<sup>15</sup> Fa-ti Fan, "'Collective Monitoring, Collective Defense': Science, Earthquakes, and Politics in Communist China," *Science in Context* 25, no. 1 (March 2012): 127–54, <https://doi.org/10.1017/S0269889711000329>; Kim Taylor, *Chinese Medicine in Early Communist China, 1945-63: A Medicine of Revolution* (Psychology Press, 2005).

<sup>16</sup> Schmalzer, *Red Revolution, Green Revolution*.

<sup>17</sup> Miriam Gross, *Farewell to the God of Plague: Chairman Mao's Campaign to Deworm China* (University of California Press, 2016), <https://doi.org/10.1525/california/9780520288836.001.0001>.

These massive skilling programs also brought the socialist state's vision of modernity to villages and rural households. The impacts of technology on people's minds culminated in the GLF (1959–1962) and the Cultural Revolution (1966–1976) when “politics took command” in every arena of life, including technological policy and practice, replacing economic calculus or the supposedly neutral logic of engineering efficiency. With peasants organized in collectives and encouraged to sacrifice all they had for the sake of the Chinese Communist Party (CCP) and the nation, daily life was turned over to class struggle, while food and comfort became counter-revolutionary. People were expected to pour all their passion and ingenuity into producing bumper harvests or outstripping the annual steel quota.<sup>18</sup> Thus, the socialist state could be encountered, felt, and understood through technology by rural people.

Despite this context, rural populations were not passive recipients of these technologies at material and ideological levels. Materially, they also invented and transformed many new technologies since the regime's revolutionary vision encouraged their participation to encounter expertise, culture, and bureaucracy, thereby creating a fertile ground for many campaigns involving “mass science.” Ideologically, for small peasants, farming meant more than producing food for the state and supporting the building of a socialist country. Additionally, agriculture was their primary means of feeding their families, the basis for their culture and rural social order, and a source of identity and dignity.<sup>19</sup> Hence, we can speculate that they interpreted agricultural work, technologies, and the socialist state differently than the state wanted them to. As such, more research is needed on their interpretations of daily work and technology. Moreover, based on the previously discussed constructivist understanding of technology, rural populations can

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<sup>18</sup> Bray, “Technology.”

<sup>19</sup> Jan Douwe van der Ploeg, *Peasants and the Art of Farming: A Chayanovian Manifesto* (Practical Action Publishing | Fernwood Publishing, 2015).

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also be viewed as stakeholders whose interests were related to technological utilization. This raises the following questions: In what ways did they define and solve problems? What did they do when other interest groups—especially the socialist state, which held absolute power—contradicted their interests? These questions can be addressed by studying the technological revolution through fisheries in socialist China.

The 20th century saw a revolution in fisheries technology as small-scale artisanal fisheries gave way to large-scale commercial ones. According to a capitalist neoliberal worldview, this trend represents an effort to obtain a variety of food fish through technological innovations that promote mass production, rationalize consumption, and benefit corporations.<sup>20</sup> However, China's development of fisheries technologies before the late 1970s contradicted the neoliberal form since it saw little corporate incentive and was instead linked to the aim of self-reliance in food production along with the ambition to modernize the nation in ways that incorporated fishing households into collectives. The state's collectivization effort in the fishing industry was not merely an imitation of simultaneous agricultural collectivization because the state believed that collectivization in fisheries was more urgent than in agriculture. This urgency was caused by the characteristics of both fishers and fisheries as an industry. For instance, it was difficult for the state to administer fishers due to their mobility. Also, when compared to agriculture, traditional fisheries in China were more commercialized. Since grains were necessities, the rice markets were heavily regulated by the state. In contrast, fishing products were commodities and thus sold in the market, which made regulating the fish market a challenge for traditional empires in China. In a socialist state, the fishing industry became a

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<sup>20</sup> Lijing Jiang, "The Socialist Origins of Artificial Carp Reproduction in Maoist China," *Science Technology & Society* 22, no. 1 (March 2017): 59–77.

target due to its commercial nature, resulting in an urgent need for the state to transform the entire industry. As the Vice Minister of the Ministry of Agriculture said, individual fishers were "small privately-owned businesses, small producers, living sporadically and falling behind in the establishment of the socialist state." Thus, they needed to undergo a socialist transformation as soon as possible.<sup>21</sup> In summary, the state had to collectivize a commercial industry composed of mobile populations, which led to more tensions and problems than agricultural collectivization.

It was against this background that the technological revolution in the fisheries of socialist China first took place, which I termed the "Blue Revolution." Therefore, fisheries technology was heavily influenced by government policies. While fishers had some room to reject certain technologies introduced by the state due to their mobility, this room was certainly limited. Despite this, we cannot ignore the possibility that their mobile capacities escalated tensions between them and the state over collectivization. Furthermore, since fishers were forced to switch from producing for a market to producing for the state, their understanding of the change and related technologies might differ greatly from that of the state. Due to these tensions and contradictions, the "Blue Revolution" was a good case for exploring how the state and individuals viewed a certain technology in a socialist state. As part of the effort to understand the "Blue Revolution" in socialist China, this thesis examines two fisheries technologies from the late 1950s and early 1960s.

#### **4. Archives, background information, and thesis structure**

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<sup>21</sup> Chinese Bureau of Agriculture, 27.

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The empirical evidence presented here originates from Ningde County, Fujian Province.<sup>22</sup>

I spent a total of 4 months in two different villages in Ningde City, living with fishing households and conducting ethnographic interviews with elderly fishers. Additionally, I gathered archival materials from the county, city, and provincial archives.

Located in east Fujian, Ningde County was surrounded by mountains on three sides and faced the sea on the fourth. Since arable land was scarce in Ningde, fisheries played a crucial role in the local economy by providing locals with valuable protein. Before the establishment of the People's Republic of China (PRC), 80% of fishery players in Ningde were boat dwellers. Boat dwellers, commonly known as the Dan people (疍民/蜑民) or aquatic people (水上人), were a population group in southern China that traditionally regarded their boats as their homes, made a living by fishing or ferrying, and floated on the sea for almost their entire lives. Since they lived on boats by the sea, they were sometimes referred to as "sea gypsies" by both Chinese and Western scholars. In Ningde, they were also used to be called "bowlegged (曲蹄)" for their bow legs caused by spending a long time with their legs bent in tiny boats.<sup>23</sup> Following the establishment of the PRC, these boat dwellers were swept up into the socialist revolution, being "classified" and then "collectivized." Since they had no houses on land or very fixed anchorage, they complicated the state's efforts to collectivize them. Their mobility magnified tensions

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<sup>22</sup> Ningde County does not exist anymore. The name "Ningde" used to refer to a county in Fujian. Since 1999, "Ningde County" was abolished, and "Ningde" became the name of a newly established city, that is, Ningde City (宁德市) today. The city of Ningde consists of eight counties and one district. Former Ningde County was renamed as Jiaocheng District (蕉城区).

<sup>23</sup> Huang Xiangchun, "Going beyond Pariah Status: The Boat People of Fuzhou in the Chinese People's Republic", in *The Fisher Folk of Late Imperial and Modern China: An Historical Anthropology of Boat-And-Shed Living*, ed. Xi He and David Faure (London: Taylor & Francis Group, 2015), 102.

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between the state and rural populations over collectivization, thereby providing a good case study for research on those tensions.

The present thesis is divided into four chapters. The second chapter outlines the overfishing of yellow croakers caused by the *qiaogu* method in Ningde, while the third chapter highlights the reasons for the failure of the kelp industry in Ningde. The final chapter sums up the main findings and arguments by comparing these two cases.



**Chapter 2 The *Qiaogu* Method and Croaking Fish: state, fishers, and technology transfer  
in Fujian's large yellow croaker fishery, 1954-1963**

*"It's still vivid in my mind the day the sun shone on the sea and heavy yellow croakers croaked," Chen Fuchun, a fisherman from Ningde, remembered the day the catch exceeded 20 tons. "In the net, there was still a lot of fish, but the net was too heavy to lift, so we had to cut it to let yellow croakers return to the sea. Could you imagine yellow croakers occupying several kilometers around the sea?" Chen asked.*

The Large Yellow Croaker (*larimichthys crocea*), getting its name from the noises they make during spawning season, is a species of fish native to the East and the South China Sea. It was once one of the most abundant and top four economically important marine fish in China.<sup>24</sup> However, its wild stock severely declined from the 1950s onwards. After peaking at about 200,000 tons in the mid-1970s, catches of the croaker in China plummeted by over 90 percent within two decades, putting the species in danger of extinction (see Figure 2.1). Motorized boats and mechanized gear were, as in many other cases of fishing-resources depletion, to be blamed for this ecological disaster. Yet, according to the data, before a rebound and a sharp fall in the 1970s, the first wave of the decline in catches happened in the late 1950s, the time before the

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<sup>24</sup> The other three are the Small Yellow Croaker (*Larimichthys Polyactis*), Cuttlefish, and Beltfish (*Trichiurus Lepturus*).

pervasive technological modernization in China's fishing sector, such as the motorization and mechanization of fishing craft and gear which happened midway through the 1960s.<sup>25</sup>

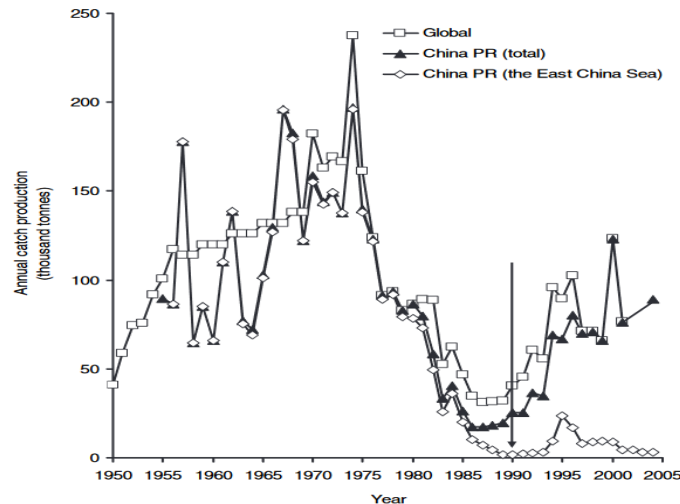


Figure 2.1: Annual global catch production (thousand tons) of the large yellow croaker, largely the contribution of China PR from the East China Sea.

Source: Liu, Min, and Yvonne Sadovy De Mitcheson. "Profile of a Fishery Collapse: Why Mariculture Failed to Save the Large Yellow Croaker." *Fish and Fisheries* 9, no. 3 (2008): 219–42.

Without a dramatic change in fishing equipment, how could we explain the overfishing in the catch of large yellow croakers since the late 1950s? A possible explanation is associated with the problem of using common-pool environment resources. A common-pool resource is commonly defined as a resource that is generally easily accessible for people but whose consumption detracts from that of others. The fishery is considered one of the paradigmatic

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<sup>25</sup> Jan J. Solecki, "Economic Aspects of the Fishing Industry in Mainland China" (Vancouver: Institute of Fisheries, University of British Columbia, 1966).

examples of common resources.<sup>26</sup> Thus, under conditions of open access, fishers fight for productive fishing spots. In these instances, “the problem is not that the resource is being overexploited or that it is on the verge of destruction. Rather, the problem is that some fishing spots are better than others, with conflict erupting over who can fish where.”<sup>27</sup> Competition for the best fishing spots and interference between boats, nets, or other gear can lead to intense and costly disputes that cut into benefits obtained from fish stocks. Other problems arise when fishers do not consider the effect that their harvesting activities have on the resource as a whole. Since greater catches by one user have the potential to reduce the amount of fish available to others, everyone takes as much as he can as quickly as he can. More intensive harvesting may begin to decrease the amount of fish left for future use, leading to their eventual exhaustion. Yet the above analysis is frequently misapplied or overemphasized as an explanation for marine resource destruction since the failure in protecting fishing resources is often assumed to be the fate of resources held in common without social and historical contexts.<sup>28</sup> Certainly, there are critics of the analysis. In addition to Ostrom's influential work which contextualizes many economic assumptions,<sup>29</sup> Acheson, McCay, and others also make important contributions by examining differing examples and definitions of “the commons” and the ways in which local cultural factors, historical conditions, and community settings can play a role in maintaining viable

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<sup>26</sup> H. Scott Gordon, “The Economic Theory of a Common-Property Resource: The Fishery,” *Journal of Political Economy* 62, no. 2 (April 1954): 124–42, <https://doi.org/10.1086/257497>.

<sup>27</sup> *Rules, Games, and Common-Pool Resources*, 6–8, accessed July 9, 2022, [https://www.press.umich.edu/9745/rules\\_games\\_and\\_common\\_pool\\_resources](https://www.press.umich.edu/9745/rules_games_and_common_pool_resources).

<sup>28</sup> Stefano B. Longo, Rebecca Clausen, and Brett Clark, *The Tragedy of the Commodity: Oceans, Fisheries, and Aquaculture* (Rutgers University Press, 2015).

<sup>29</sup> Elinor Ostrom, “Coping with Tragedies of the Commons,” *Annual Review of Political Science* 2, no. 1 (1999): 493–535, <https://doi.org/10.1146/annurev.polisci.2.1.493>.

“common property” fisheries.<sup>30</sup> Their studies demonstrate the importance of contextualizing the problem of common-pool resources when studying overfishing.

Once we take historical contexts into analyzing the overfishing of the yellow croakers in China, one factor that should be considered is Socialist China’s policies and rhetoric concerning the environment and ecology. Some scholarship describes Socialist China's environmental rhetoric as destructive and militaristic, and its policies as irrationally extractive. Among them, Judith Shapiro makes perhaps the strongest argument against Mao Zedong and his regime, stating Mao's "war against nature" was devastating for the environment, leading to deforestation, desertification, and badly implemented engineering projects that impacted major river courses.<sup>31</sup> Similarly, Frank Dikötter asserts that a destructive and frenetic mindset is to blame for the decimation of trees during the Great Leap Forward.<sup>32</sup> By highlighting Mao’s imperious character, Shapiro and Dikötter attribute many ecological disasters in socialist China to the government’s environmental policies, which they portray as irrational and unscientific, even rabid in their destructive urges.

However, Shapiro and Dikötter, in making their arguments, only present a one-sided picture of the period. They overemphasize the rhetoric of aggression and focus on what they

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<sup>30</sup> Bonnie J. McCay, *Oyster Wars and the Public Trust: Property, Law, and Ecology in New Jersey History* (University of Arizona Press, 1998), <https://doi.org/10.2307/j.ctv1prss4r>; James M. Acheson, “The Lobster Fiefs: Economic and Ecological Effects of Territoriality in the Maine Lobster Industry,” *Human Ecology* 3, no. 3 (1975): 183–207; James M. Acheson, *The Lobster Gangs of Maine*, 1st edition (Hanover, NH: University Press of New England, 1988); David Feeny et al., “The Tragedy of the Commons: Twenty-Two Years Later,” *Human Ecology* 18, no. 1 (1990): 1–19.

<sup>31</sup> Judith Shapiro, *Mao’s War against Nature: Politics and the Environment in Revolutionary China*, Studies in Environment and History (Cambridge: Cambridge University Press, 2001), <https://doi.org/10.1017/CBO9780511512063>.

<sup>32</sup> Frank Dikötter, *Mao’s Great Famine: The History of China’s Most Devastating Catastrophe, 1958-1962*, unknown edition (New York: Bloomsbury USA, 2011), 174.

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perceive as Mao's objectified, domineering, and destructive view of nature. They neglect, in particular, scientific aspects of environmental policies pertaining to some resources during the Mao era. In Socialist China, for example, the rhetoric of forestry and the environment, in general, was scientific, rational, and even constructive regarding tree planting, as Li Cheng and Liu Yanjun's study shows.<sup>33</sup> Another example is that, according to Christopher Reed, Mao and the Chinese Communist Party (CCP) did try to protect the environment, and even enhance it, during the Great Leap Forward.<sup>34</sup> When it comes to fisheries, Micah Muscolino illustrates the continuity between the People's Republic of China (PRC) and the Republic of China in terms of the goal of rationalized exploitation of fisheries resources.<sup>35</sup> Of particular importance was that the Chinese government issued *Temporary Regulation for Breeding and Protection of Aquatic Resources* (Draft) (《水产资源繁殖保护暂行条例 (草案) 》) as early as 1957. The draft set regulations for protecting certain fish populations, which included yellow croakers. As part of those regulations, sizes for fish that were allowed to be caught were set to avoid fish becoming food before they had the chance to reproduce. In addition, certain destructive fishing methods were banned and spawning grounds were protected.<sup>36</sup> These efforts contradict the irrational image of the state in terms of environmental issues during the Mao era that Shapiro and Dikötter portray.

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<sup>33</sup> Cheng Li and Yanjun Liu, "Selling Forestry Revolution: The Rhetoric of Afforestation in Socialist China, 1949–61," *Environmental History* 25, no. 1 (January 2020): 62–84, <https://doi.org/10.1093/envhis/emz081>.

<sup>34</sup> Christopher Reed, "Sino-Silviculture: State-Sponsored Green Forestry Initiatives in Mao's China," in *Environmentalism under Authoritarian Regimes: Myth, Propaganda, Reality*, ed. Stephen Brain and Viktor Pál, 1st edition (London ; New York, NY: Routledge, 2018), 180–90.

<sup>35</sup> Micah S. Muscolino, *Fishing Wars and Environmental Change in Late Imperial and Modern China*, Illustrated edition (Cambridge, Mass: Harvard University Asia Center, 2009).

<sup>36</sup> Chinese Bureau of Agriculture, *Shuichan Gongzuo Wenjian Xuanbian 1949-1977 [Selected Documents in Fishery Work 1949-1977]* (Beijing: Chinese Bureau of Agriculture Internal Documents, 1983), 147.

Unfortunately, socialist China still failed in protecting many natural resources, including large yellow croakers. Like China, many other socialist states didn't succeed either in protecting their natural resources, even though they are believed to possess necessary capacities to do so. According to conventional Marxist dogma, environmental deterioration is precipitated by the logic of capitalism and its relentless pursuit of profits. Fishing resources are also victims of the capitalist economy. Longo et al. even developed a term, “the tragedy of the commodity,” to replace “the tragedy of the commons” in their analysis of overfishing, in order to highlight the role of capitalist commodity production in modern fisheries decline.<sup>37</sup> In contrast, socialism would avoid capitalism's excesses since it acts as a central authority over many natural resources and owns the means of production. Accordingly, socialist states possess powers that should, in theory, enable them to protect resources more efficiently, and prevent a wider range of ecological disasters, including overfishing.<sup>38</sup> However, many cases prove that the socialist economies were also ecological catastrophes. The decline of natural resources is due in part to socialist planners' fixation on heavy industry at the expense of the environment. For example, in Cuba, water pollution contributed to the severe reduction in shrimp stocks.<sup>39</sup> Similarly, the construction of the Balkhash dam and reservoir in the late 1960s greatly reduced spawning and feeding areas for carp (*Cyprinus carpio*).<sup>40</sup> Moreover, many socialist planners lacked the knowledge necessary to rationally coordinate economic activity. In their 1989 book, *The Turning Point*, Soviet

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<sup>37</sup> Longo, Clausen, and Clark, *The Tragedy of the Commodity*.

<sup>38</sup> Ian T. Joyce, “Socialism and the Fishery: A Case Study of the Cuban Shrimp Fishery,” *The Canadian Geographer / Le Géographe Canadien* 43, no. 1 (1999): 53–69, <https://doi.org/10.1111/j.1541-0064.1999.tb01360.x>.

<sup>39</sup> Joyce.

<sup>40</sup> Steven G. Pueppke et al., “Challenges for Sustainable Use of the Fish Resources from Lake Balkhash, a Fragile Lake in an Arid Ecosystem,” *Sustainability* 10, no. 4 (April 2018): 1234, <https://doi.org/10.3390/su10041234>.

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economists Nikolai Shmelev and Vladimir Popov offer an illustrative example. To bolster the production of gloves, the Soviet government more than doubled the price it paid for moleskin. Warehouses soon filled with mole pelts, but glovemakers were unable to use them all, so many rotted.<sup>41</sup> To sum up, many results in ecological protection were the opposite of what socialist states intended even though the states are believed to possess both resources and means of production.

The socialist states' paradoxical failure in protecting natural resources could be explained by James C. Scott's theory about "how certain schemes to improve the human condition have failed," which criticizes the overconfidence of the state in making society legible. Yet, when it comes to the case of the large yellow croakers, the state played a major part, but it was not the only one. Contrary to their weak images, fishers ignored the government's ban on using a destructive technique to capture large yellow croakers in the late 1950s, resulting in the decline of fish stocks in the early 1960s. Why did the fishers in this case play such a paradoxical role? What was the state's role in the process? Using archival sources and oral-history materials about the Large Yellow Croaker fishery in Guanjingyang (官井洋), a famous fishing ground in Fujian (福建), China, the chapter explores how the fish were over-fished during the late 1950s and early 1960s. The case study reveals how fishers and the state interacted over the adoption and transfer of a fishing technique that negatively affected the environment. After putting their interactions within social and historical contexts, the chapter calls for rethinking the state's and the individual's roles in developing and protecting common resources, such as fisheries, as well as their roles in other governance issues.

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<sup>41</sup> Nikolai Shmelev and Vladimir Popov, *The Turning Point: Revitalizing the Soviet Economy*, 1st edition (New York: Doubleday, 1989).

## **1. Fujian's Large Yellow Croaker fisheries before 1949: Indigenous knowledge and technology impeding the form of common resources**

Pre-modern fisheries are typically characterized as a common property resource with open access. Due to the lack of clear boundaries set by sovereign states, some people may assume that traditional fishermen are free to enter the fishery and catch as many fish as possible. Although this may be true in some cases, there is a growing body of literature demonstrating that in many premodern fishing societies in the world, rights to fish were controlled and fishing territories were not common property resources.<sup>42</sup> A wide variety of types of sea tenure systems, influenced by rituals,<sup>43</sup> empires,<sup>44</sup> and local leader groups<sup>45</sup> existed pervasively in the premodern world. While in the case of the Large Yellow Croaker fishery in Guanjingyang before 1949, indigenous technologies and knowledge were important factors contributing to the fishery not becoming a common one.

Guanjingyang is an inshore fishing ground off East Fujian, China (see Figure 2.2). It covers an area of 88 km<sup>2</sup>; the length and width of it are 17 km and 13 km, respectively. Since the mouth of Guanjingyang—the Dongchong waterway (东冲水道)—is only 3 km wide, and many streams enter Guanjingyang, seawater meets fresh water there generating rapid currents and an abundance of plankton. Guanjingyang, therefore, is a perfect place for the large yellow croakers

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<sup>42</sup> James M. Acheson, "Anthropology of Fishing," *Annual Review of Anthropology* 10, no. 1 (1981): 275–316, <https://doi.org/10.1146/annurev.an.10.100181.001423>.

<sup>43</sup> Muscolino, *Fishing Wars and Environmental Change in Late Imperial and Modern China*.

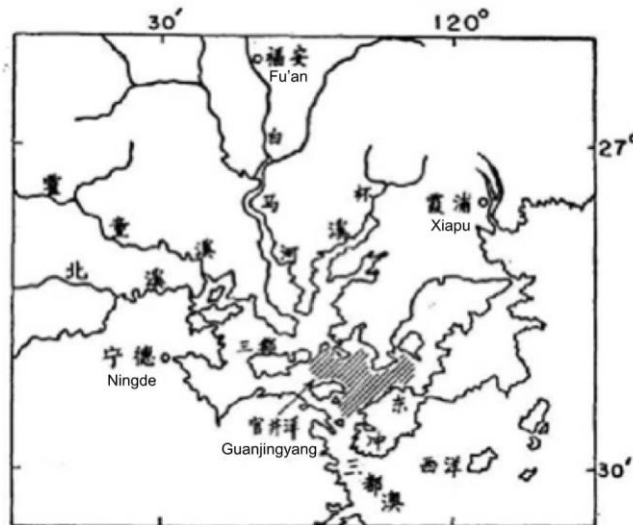
<sup>44</sup> Edward Norbeck, *Takashima: A Japanese Fishing Community* (University of Utah Press, 1954).

<sup>45</sup> Robert Earl Johannes, *Traditional Law of the Sea in Micronesia*, 1977.



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to spawn.<sup>46</sup> Early in the summer, yellow croakers leave their wintering grounds in deep oceanic waters and migrate to Guanjingyang to spawn. In the past, during the yellow croaker's spawning season, fishers from three counties near Guanjingyang (Ningde County, Xiapu County [霞浦县], and Fu'an County [福安县]) flocked to Guanjingyang to catch fish. Although the croaker's spawning season, from mid-May to the end of June each year, was short, it played a crucial role in East Fujian's fishing industry. In Ningde there is a saying that says, "Guanjingyang supplies us with catch for half a year" (官井洋, 半年粮)—symbolizing Guanjingyang's position in the local fishery. The local saying was confirmed after the establishment of the People's Republic of China (PRC) by a fishing investigation. According to Ningde Fisheries Bureau, the fishermen captured 1,517 tons of fish in 1950, half of which came from Guanjingyang, indicating the importance of Guanjingyang in Ningde's fishery and its abundance of fish resources.<sup>47</sup>



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<sup>46</sup> Guanqiong Ye et al., "Could the Wild Population of Large Yellow Croaker *Larimichthys Crocea* (Richardson) in China Be Restored? A Case Study in Guanjingyang, Fujian, China," *Aquatic Living Resources* 33 (2020): 24, <https://doi.org/10.1051/alr/2020025>.

<sup>47</sup> Ningdeshi shuichanju(Ningde Fisheries Bureau), *Ningdeshi Shuichanzhi [Fishery Chronicle in Ningde]* (Ningde, 1993), 80.

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Figure 2.2: A map of Guanjingyang

Source: Fujiansheng Shuichan Kexue Yanjiusuo (Provincial Institute of Fisheries Science in Fujian), Fujian guanjingyang dahuangyu shengzhi zhongqun de tantao (Exploration of the reproductive population of the Large Yellow Croaker in Guanjingyang), in *Zhongguo Haiyang Huzhao Xuehui 1963 Nian Xueshu Nianhui Lunwen Zhaiyao Huibian* (A compilation of abstracts from the annual academic meeting of the Chinese Marine Lakes and Marsh Society, 1963) (Beijing: Science Publishing House, 1964),11.

Even with Guanjingyang's abundant fishing resources and its proximity to both Zhejiang Province (浙江省) and Middle Fujian, two areas known for their fisheries, only East Fujianese came to fish in Guanjingyang during fishing season. Aside from the distance of travel, fishers from other places were also prevented from coming to Guanjingyang due to lack of understanding of Guanjingyang's terrain and environment, as well as the difference in fishing techniques and gears. In Guanjingyang and elsewhere, fishers accumulated different fishing experiences and, as a result, developed different fishing equipment and technologies appropriate to local conditions. As a result, fishers were unable to catch fish in unfamiliar environments, which created a barrier to free access to certain fishing grounds.

As Guanjingyang has rough seafloor and rushing currents, if fishers who are unfamiliar with the area entered Guanjingyang by accident, their nets and boats might be damaged by rocks and reefs, not to mention fishing. This was confirmed by a report written in 1951 by the Ningde Fisheries Bureau, which stated: "the ground of Guanjinyang is rough and there are many hidden reefs, so inexperienced fishers often encounter situations where their nets are cut and their boats

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are broken due to reefs, sometimes with fatal results."<sup>48</sup> To fish safely and successfully in

Guanjingyang, fishers must be familiar with the terrain configuration and tide patterns as well as the habits of yellow croakers.

Local fishers could locate and catch fish there relying on their mouth-to-mouth knowledge that has been passed down from generation to generation. In 1952, a land-reform team in Ningde County discovered a book at a house of a “rich fisherman” named *Eighteen Hidden Reefs and the Secrets of Successfully Catching Fish in Guanjingyang* (《官井洋拾捌只招腊与讨鱼秘诀》).<sup>49</sup> The book provides pithy formulae for capturing croakers in Guanjingyang based on indigenous knowledge, including the locations of 18 hidden reefs, croakers' migration routes, and hydrological information in Guanjingyang. Scientists then confirmed the locations of the reef sites and their distances to the sea level recorded by the book were correct.<sup>50</sup> According to the preface of the book, the book was originally written by fishermen living on boats, and this copy was transcription in the 8th year of Qianlong's reign (1743). In reality, prior to the discovery of the book in 1951, many of the formulae in the book

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<sup>48</sup> Fisheries Division of Ningde County. “Ningde xian shangbanniandu yuye shengchan zongjie (Summary of fishery production in Ningde County in the first half of the year),” 1951. Ningde. Ningde Archive, 77-2-2, quoted in Chen Liang, “Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)” (Ph.D., the PRC -- Shanghai, Shanghai Jiaotong University, 2013)

<sup>49</sup> In 1950, the Chinese Communist Party initiated a nation-wide land reform in rural areas. Fujian Province also dispatched work teams to conduct land reform in fishing areas in 1951, classifying fishers into eight categories, i.e., feudal exploiters in fisheries, fishing capitalists, rich fishers, middle-class fishers, poor fishers, fishing workers, transportation workers, and fish dealers.

<sup>50</sup> Yang Ruitang, “Guanjingyang shiba zhi zhaola yu taoyu mijue yishu de kexue jiazhi [The scientific value of *Eighteen Hidden Reefs and the Secrets of Successfully Catching Fish in Guanjingyang*],” *Traditional and Modern Agriculture*, no. 03 (1992): 75-82. (“zhaola” [招腊] is a dialect for “reef” in Ningde)

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were common knowledge among Ningde's fishing communities. Therefore, it can be assumed that fishers in Ningde have been familiar with Guanjingyang for centuries

Fishers near Guanjingyang also developed a fishing technique called cover-netting, which was tailored to the sea bottom features of Guanjingyang. Cover-netting involves two boats (locals call them a pair of boats to catch croakers, 瓜对), one large and one small. On the small boat, four or five people paddle; on the larger boat, six people paddle while the other looks for places to cast nets. The person responsible for locating fish is called the "master of nets (网师)". The master of net usually inserts a hollow bamboo pole into the sea face so he could listen to yellow croaker sounds and locate yellow croaker shoals based on his experience. Fishing nets used in cover-netting are "cover-nets" (掩网), which look like cones (See Figure 2.3). With dozens of plummets hanging to the end of a cover net, it weighed about 25 to 30 kg. Fishers cast a cover over a shoal of yellow croaker, and then tighten the end of the net before lifting it up. Fishing with a cover net is inconvenient because it is heavy. The net, however, is not easily influenced by reefs or rush currents, so it was suitable for Guanjingyang.<sup>51</sup> Consequently, cover-nets were only used in Guanjingyang to catch fish in the past.

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<sup>51</sup> Fujiansheng Shuichan Kexue Yanjiusuo (Provincial Institute of Fisheries Science in Fujian), *Fujiansheng Haiyang Yuju Diaocha Baogao [The Survey Report of Marine Fishing Gear in Fujian]* (Fuzhou: Fujian People's Publishing House, 1960),156.

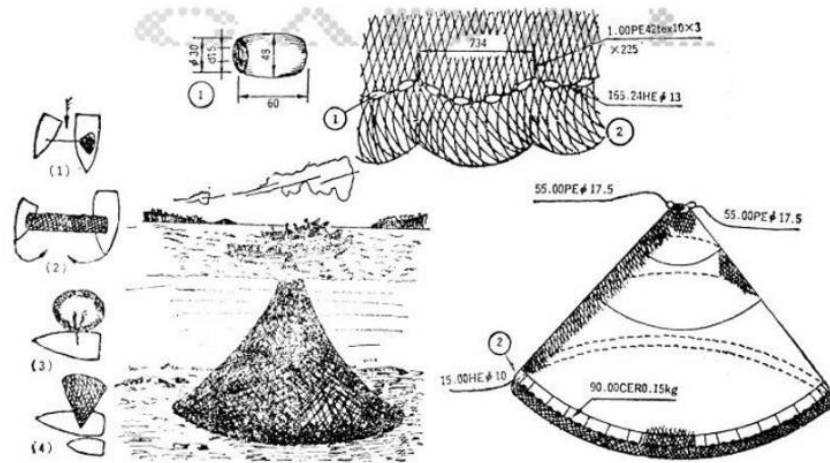


Figure 2.3: Cover-net

Source: Feng Shunlou, *Zhongguo Haiyang Yuju Tuji (Atlas of Marine Fishing Gear in China)* (Hangzhou: Zhejiang Science and Technology Press, 1989),281.

In contrast, fishermen in other yellow croaker grounds, such as Zhejiang or Middle Fujian, used gillnets to catch the fish. A gillnet is a fishing net that hangs vertically from a line with regularly spaced floats that keep the line in the water (See Figure 2.4). Gillnetting requires a small boat with four to five fishers. One person paddles and the others cast nets to places where the large yellow croakers usually pass. After casting their nets, fishers let the nets flow with the sea current and lift them five to six hours later.<sup>52</sup> Gillnets are lighter than cover nets and are therefore easier to use, but they are not ideal for fishing grounds like Guanjingyang with many reefs and rapid currents. Thus, fishers who adopt gillnetting would not be able to catch fish in Guanjingyang, even if they know where the reefs are and where the fish gather.

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<sup>52</sup> Fujiansheng Shuichan Kexue Yanjiusuo (Provincial Institute of Fisheries Science in Fujian), *Fujiansheng Haiyang Yuju Diaocha Baogao [The Survey Report of Marine Fishing Gear in Fujian]*.



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Therefore, fishermen used different categories of nets and did not compete for the same space.<sup>53</sup>

On the island of Runnö, Sweden, villagers used to divide their waters according to technologies, from herring nets, and cod lines, to the seining of salmon.<sup>54</sup> In both cases, the destruction of such traditional technology-based marine tenure systems was caused by the later modernization of fishing boats and gear, such as nylon nets and boat engines, resulting in turning local fisheries into common resources. Likewise, in Guanjingyang in the 1950s, a new fishing technique—*qiaogu* (beating boats 敲罟)—was also introduced to fishers in Fujian and led to similar consequences, but this technology did not use modern gear and boats.

## 2. *Qiaogu*: A technique appropriate to work collectively

In the summer of 1952, Ye Hangmin (叶航民), a teacher at the School of Aquatic Science and Sailing Technology in Jimei, Fujian (集美水产航海学校), visited Dongshan island (东山岛), Fujian, to investigate its fisheries. Ye found that due to the military tension in the Taiwan Strait between the Kuomintang and the CCP, local fishers could not go deep-sea fishing so they could only catch small amounts of fish offshore. Ye remembered a fishing method called *qiaogu* he saw in Guangdong 20 years ago, which was highly productive. In order to assist local fishers, Ye sent a report to Fujian Aquatic Bureau recommending *qiaogu* to top officials. Fujian Aquatic Bureau then sent a few cadres to Shantou County (汕头市), Guangdong Province (广东省) to study the *qiaogu* method, which proved extremely effective in catching fish offshore. In

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<sup>53</sup> John Cordell, “The Lunar-Tide Fishing Cycle in Northeastern Brazil,” *Ethnology* 13, no. 4 (1974): 379–92, <https://doi.org/10.2307/3773053>.

<sup>54</sup> ORVAR LÖFGREN, “Marine Ecotypes in Preindustrial Sweden: A Comparative Discussion of Swedish Peasant Fishermen,” in *North Atlantic Fishermen: Anthropological Essays on Modern Fishing*, ed. Andersen (Mouton, 1979), 83–106.

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1954, Fujian Aquatic Bureau first tried the *qiaogu* method at two experimental sites in Dongshan and Zhao'an (诏安), both of which were successful. The *qiaogu* method soon spread quickly throughout Fujian. At the end of 1956, Fujian had 46 *qiaogu* teams.<sup>55</sup>

*Qiaogu* is a collective fishing technique that uses sound waves to stun and catch fish. This fishing technique involves more than 200 fishers working together as a team (local people called a team a *gu* 罟) in two big boats and 32-38 small boats. In a given location, two large fishing boats throw 100-meter-long rectangular nets into the sea, and smaller ones form a semicircle around them (See Figure 2.5). In each small boat, one person row the boat, and two more beat the water with bamboo poles. As croakers have large otoliths in their heads, these otoliths will vibrate when bamboo poles are struck, causing fish to feel dizzy. Then, the fishers drive dizzy croakers into the fishing net, catching them all in one action. The catch of *qiaogu* is extremely high, usually ten times that of other conventional fishing methods.<sup>56</sup>

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<sup>55</sup> Ye Junjian, “Wenzhou qiaogu yuye de xingqi yu yingdui (The rise of the qiaogu method in Wenzhou and the government’s response to it, 1956-1957),” *Studies of Chinese Economic History*, no. 01 (2018): 156–68.

<sup>56</sup> Guangdongsheng Shuichan Kexue Yanjiusuo (Provincial Institute of Fisheries Science in Guangdong), *Guangdong Haiyang Bulao Jishu Yanjiu [The Study of the Technologies of Marine Capture Fisheries]* (Guangzhou: Fujian People's Publishing House, 1959), 73.



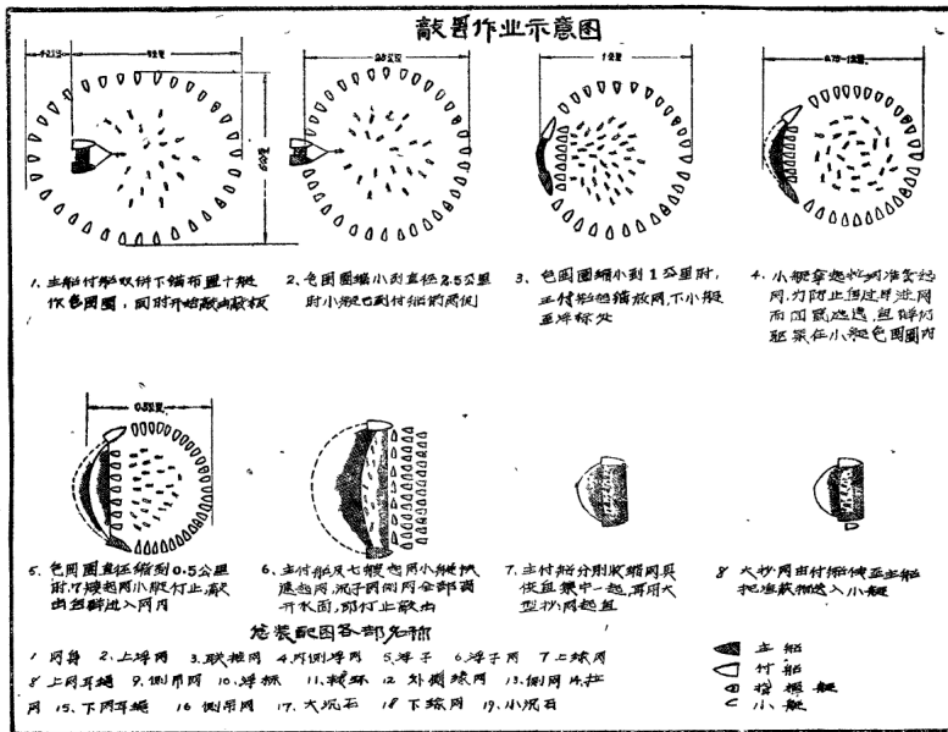


Figure 2.5: the workflow of qiaogu

Source: Guangdongsheng Shuichan Kexue Yanjiusuo (Provincial Institute of Fisheries Science in Guangdong), *Guangdong Haiyang Bulao Jishu Yanjiu [The Study of the Technologies of Marine Capture Fisheries]* (Guangzhou: Fujian People's Publishing House, 1959),73.

*Qiaogu* was not a newly-developed fishing technique with modern gears and tools. The fishing technique first emerged in the Chaoshan (潮汕) area of Guangdong during the reign of the Jiajing Emperor in the Ming dynasty (1522-1566 CE). In the past, why had this highly-productive technology not spread more widely? In reality, the *qiaogu* neither spread to other places nor was it welcomed by local fishers in Guangdong. Since *qiaogu* killed both juvenile and adult fish, it was called "self-slaughter fishing" (自杀渔法) in Guangdong. Some fishers vowed never to use the *qiaogu*; some in Zhanjiang County (湛江市), Guangdong, even placed a stone

tablet to warn others not to use it. Even though some Guangdong fishers still used the *qiaogu*, the number was small, and those fishers that used the *qiaogu* were derided by others.<sup>57</sup>

However, as a fishing method loathed by many fishermen, *qiaogu* suddenly became popular in Fujian in 1956 and was even proclaimed an "advanced technology" (先进技术) by Fujian Aquatic Bureau.<sup>58</sup> Why did the *qiaogu* become so popular? The answer lies not only in the state's interest in increasing fish catch but also in its attempts to collectivize individual fishers. The *qiaogu* method had the potential to solve problems that the collectivization campaign faced in local fishing societies, and was thus endorsed both by local government and newly-found fishing cooperatives in the late 1950s.

Let me first introduce the collectivization campaign in the fishing sector in the 1950s. Collectivization in the fishing industry was not merely an imitation of simultaneous agricultural collectivization. Instead, collectivization was viewed as suitable for the development of fisheries.<sup>59</sup> For one thing, the state believed that collectivization in the fisheries was more urgent than in agriculture due to the fact that individual fishers were "small privately-owned businesses, small producers, living sporadically and falling behind in the establishment of the socialist state,"

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<sup>57</sup> Ye, "Wenzhou qiaogu yuye de xingqi yu yingdui(温州敲罟渔业的兴起与应对(1956-1957)) [The rise of the qiaogu method in Wenzhou and the government's response to it, 1956-1957]."

<sup>58</sup> Fisheries Division of Dongshan County. "Dongshan chengguan qiaogu zuoye fazhan guocheng (The development of the qiaogu method in Dongshan County)," 1955. Dongshan. Dongshan Archive, 42-1-11, quoted in Chen, "Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)."

<sup>59</sup> By 1953, land reform had fundamentally changed the countryside, but in the CCP's blueprint, it was merely the first step in a series of institutional changes eventually leading to a fully socialist collective agriculture. Similar to agriculture, the fishing industry also underwent sweeping organizational changes after 1953. Nationally, fishers were initially organized to form mutual aid teams and then to establish fishing cooperatives. The collectivization of the fishing industry was accelerated in 1958, which saw the formation of fishing communes.

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thus they needed to undergo a socialist transformation as soon as possible;<sup>60</sup> for another thing, the central government thought that collectivizing individual fishers would be easier than collectivizing peasants because fishers had a long tradition of cooperating, and fishing involved complex divisions of labor. As a result, the collectivization will increase fishery production."<sup>61</sup> Therefore, "collectivizing fishers and increasing fishery production are two sides of the same coin," Deng Zihui (邓子恢), the head of the Department of Rural Work of the CCP Central Committee (中共中央农村工作部), concluded in 1954.<sup>62</sup>

Was collectivizing fishers as easy as the central government imagined? In Ningde, the answer turned out to be No. According to local archives, Ningde met two problems concerning the collectivization campaign in the fishing sector. The first problem was that fishers failed to adapt to collective fishing because their fishing methods did not require much labor. Traditionally, fishers in Ningde used six methods to catch fish, each only requiring 2 to 5 laborers, so a household or two could handle it. The local government dubbed those techniques as "six small-scale (六小)." In light of fisher's small-scale household-based fishing methods, organizing them to fish collectively proved difficult. Nominally, many fishers formed mutual aid teams or cooperatives, but in reality, they fished individually.<sup>63</sup> To solve the problem, there was a need for a new method to let many fishers fish at the same time; the second problem concerns dividend distribution. Families with skilled and strong labor were wary of joining mutual aid teams and cooperatives because they were worried that others might take advantage. One report

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<sup>60</sup> Chinese Bureau of Agriculture, 27.

<sup>61</sup> Chinese Bureau of Agriculture, 39.

<sup>62</sup> Chinese Bureau of Agriculture, 36.

<sup>63</sup> Ningde County Committee. "Ningdexian Aojiangxiang yuye shengchan hezuoshe jiancha baogao (A report of fishing cooperatives in Aojiang Township, Ningde County)," 1955. Ningde. Ningde Archive, 20-1-4-70.

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in 1955 stated that some fishers felt dissatisfied with collectivization because "individual fishing is superior to collective fishing. Even though we catch more fish when we fish together, they are all others rather than mine."<sup>64</sup> Thus, how to dispute dividends fairly was a major challenge for the collectivization movement in fishing areas. To solve these problems, the local government decided to help fishing co-ops increase the fish catch. It was assumed that, once the fishing production increased, the government could thus convince more fishing households to join. In a report about how to organize fishing cooperatives, the local government said that "organizing fishing cooperatives should go hand in hand with increasing production. By doing this, we can avoid isolating ourselves from the rest of society... (thus) we should make production plans for our cooperative members, assisting them in increasing production." The methods included enlarging nets, working longer hours, rotating fishing techniques, and mobilizing female fishers to participate fully in fishing.<sup>65</sup> In this case, we can see that it's hard to tell whether the increase in production was the result of collectivization as the central government claimed since it was also the prerequisite of collectivization.

All in all, to better collectivize fishers in Ningde, the government needed to accomplish three goals: 1) find a fishing method that could organize many fishers to fish together; 2) fairly divide the profits; 3) increase production to meet both the central government's requirements and the need to entice individual fishers.

Coincidentally, *qiaogu* is a method that perfectly meets the above requirements. Firstly, *qiaogu* is a method of collective fishing involving approximately 200 fishers. In Wenzhou (温州

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<sup>64</sup> Ningde County Committee. "Aojiangxiang shiban yuye shengchan hezuoshe diyibu gongzuo zongjie (The summary of the work on attempts to establish fishing cooperatives in Aojiang Township)," 1954. Ningde. Ningde Archive, 2-1-2-49.

<sup>65</sup> Ningde County Committee. "Zenyang jianli yige yuye shengchan hezuoshe (How to establish a fishing cooperative)," 1955. Ningde. Ningde Archive, 2-1-5-7.

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州), a neighboring area of Ningde, fishermen said, "This sort of large-scale fishing (*qiaogu*) can only be done after we fishers are collectivized to work together."<sup>66</sup> Secondly, *qiaogu* was easy and had little difference in labor input. This could reduce tension in distributing dividends in terms of labor input and skills. Thirdly, *qiaogu* could greatly increase production. Therefore, *qiaogu* was welcomed by both fishers who yearned for higher incomes and governments seeking to increase production. As *qiaogu* could also be used on any fishing ground, it spread quickly in Fujian and then to Zhejiang Province (浙江省), becoming the primary technique used by fishers in China's northeastern sea areas to catch the large yellow croakers.

Interestingly, the *qiaogu* method also changed fishers' perception of what was a good fishing method. When the *qiaogu* method was introduced to Ningde in 1956, many fishers refused to use it, believing it would harm the fisheries in the long run. Some complained that "fish's sons and grandsons (鱼子鱼孙) have all caught up. There will be no fish in the long run."<sup>67</sup> However, the *qiaogu* allowed fishers outside East Fujian to fish in Guanjingyang, so competition over limited fishing resources in Guanjingyang was rising. When fishers in other counties all used the *qiaogu* method and achieved high yields, fishers in Ningde felt that if they did not use *qiaogu*, there would be no fish left for them. Under such pressure, Ningde's fishers

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<sup>66</sup> Wenzhou County Committee. "Wenzhou diqu qiaogu yuye qingkuang ji jinhou yijian de baogao (A report on the qiaogu method in Wenzhou and suggestions for further development)," 1957. Hangzhou, Zhejiang Archive, 122-1-10, quoted in Ye, "Wenzhou qiaogu yuye de xingqi yu yingdui (温州敲罟渔业的兴起与应对(1956-1957) [The rise of the qiaogu method in Wenzhou and the government's response to it, 1956-1957])."

<sup>67</sup> Zhonggong fu'an diwei yanhai diqu gongzuo bu (The party bureau of coastal areas in Fu'an). "Guanyu chuli qiaogu yuye wenti de yijian (An opinion on dealing with the *qiaogu* method)," 1957. Ningde. Ningde Archive, 77-2-29, quoted in Chen, "Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)."

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also began using the *qiaogu* method.<sup>68</sup> Meanwhile, the local government trumpeted *qiaogu* as advanced technology, influencing the perception of what is a good technology among fishers. In this process, "increasing outputs," "advanced technology," and even "modernization" became familiar concepts to fishermen, helping spread the *qiaogu* method. But that was not a mere result of political education, but rather a result of direct competition for limited resources.

Accordingly, I develop a concept—collectively appropriate technology—to characterize "*qiaogu*" in order to distinguish it from indigenous practices such as cover netting and gillnetting mentioned in the first section. Collectively appropriate technologies match collective working perfectly and were therefore proclaimed by the authorities during the collectivization campaign. Thus, the authorities introduced the technologies to many places, replacing many indigenous ones. Throughout the process, the state also gradually altered individuals' mindsets by instilling new ideas. Similar technologies could be seen in other agricultural sectors. For example, previously, most Chinese cotton farmers picked cotton in the shell and took it home to let it dry out until it could be removed from the shell. However, during the collective era, the collectives insisted that people pick cotton only when it was ripe and easy to remove from the shell. That meant a lot of extra work but improved the total yield and quality of the cotton. The main reason for the change, however, was that with the new technique, it was easier to move the cotton out of the countryside immediately after the harvest, thus ensuring that farmers did not keep it for themselves. These collectively appropriate technologies, therefore, not only enabled the state to increase production but also better collectivize households and individuals, resulting in better governance.

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<sup>68</sup> Zheng Wangchai, interview, May 5, 2021; Ou Zengjin, interview, May 3, 2021; Lian Xingde, interview, May 29, 2021

### **3. The development of *qiaogu*: The formation of common resources and the depletion of fishing resources**

The popularity of *qiaogu* during the collectivization campaign led us to see a strong state that could impart new technologies to local societies. As per James C. Scott's theory, we can speculate that a strong state with an unsustainable production method combined with a weak society that is powerless to refuse it is what leads to the tragedy of the large yellow croakers. But that wasn't what happened in China in the late 1950s.

Since *qiaogu*, as a sound-attack technology, was applicable to all kinds of sea environments and landscapes, it allowed fishers to freely access a wide range of fishing grounds. Furthermore, the state set up many fisheries research institutes to obtain information such as undersea terrains, hydrological data, and fish migration patterns in many important fishing grounds. This information was shared with all fishers fishing on the fishing grounds, no matter if they were local or not. In this way, the *qiaogu* method, coupled with shared information, lowered technology and knowledge barriers for free access to fishing resources. Fishers in Zhejiang and other counties in Fujian also went fishing in Guanjingyang, while those in East Fujian went fishing in other fishing grounds.<sup>69</sup> The Large Yellow Croaker fishing grounds thus became true common resources.

After the fishing grounds turned to be common resources, the problem of competition and rivalries also arose. Since the number of fishers rapidly increased on fishing grounds while the number of fish was limited, it was not hard to imagine that rivalry over fishing resources would

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<sup>69</sup> Chen, "Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)."

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happen often. Meanwhile, the *qiaogu* method worsened competition over fishing resources because it is a large-scale fishing method, encompassing a large area, but the fishing area on each ground is limited. Thus, disputes over the distribution of limited fishing resources and fishing grounds occurred on many fishing grounds.<sup>70</sup> In 1956, when the Fujian Provincial Government requested permission from the central government to organize fishers from Fujian to fish in Guangdong and Zhejiang Provinces, the central government agreed but said "numerous fishing boats are using the *qiaogu* method to catch fish on Zhejiang's fishing grounds. To avoid conflicts, the Fujian government should contact the Zhejiang provincial government right away."<sup>71</sup> In light of this piece of information, we could also speculate that conflicts often occurred between fishers using the *qiaogu* methods on many fishing grounds. That was also confirmed by local fishers recallings. Zheng Wangchai, a fisher in Ningde, said that whenever one of the boats needed to return to port to unload its cargo, other boats had to remain in the area. "We had to stay, otherwise there'd be nowhere to cast our nets when we returned," he said.<sup>72</sup> In response to rivalries, many fishers began developing new fishing grounds.

In this context, the Taishan fishing ground (台山渔场) was developed by fishers from Ningde County. Taishan is located along the migration routes of the Large yellow Croaker to Guanjingyang. Early in the 1960s, fishers in East Fujian began fishing for the large yellow croakers in the Taishan area. The development of the Taishan fishing ground led to an increase in fish catch. In 1961, some members of agricultural communes in Ningde complained that "the categories of fish are dwindling. There are only large yellow croakers for exchange. There were

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<sup>70</sup> Ye, "Wenzhou qiaogu yuye de xingqi yu yingdui(温州敲罟渔业的兴起与应对(1956-1957)) [The rise of the qiaogu method in Wenzhou and the government's response to it, 1956-1957])."

<sup>71</sup> Chinese Bureau of Agriculture, 140.

<sup>72</sup> Zheng Wangchai, interview, May 7, 2021



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no other options for us.” At that time, fishers in Fujian were allowed to keep 30% of their catch while the rest was purchased by the government. The government also encouraged fishers to exchange the remaining 30% for grains or other goods with agricultural communes. But many agricultural communes refused to exchange for the large yellow croakers in 1961 because they were sick of croakers.<sup>73</sup> These were all clear signs of how important the Taishan fishing grounds were to the fisheries of Ningde in the early 1960s.

With the expansion of fishing grounds and increased production, the Large Yellow Croaker population was soon exhausted. In 1962, during the fishing season in Guanjingyang, fishers were reluctant to go to Guanjingyang to catch fish. The main concern was that "fishers practiced *qiaogu* fishing in Taishan and so fewer large yellow croakers migrated to Guanjingyang, so Guanjingyang had fewer croakers." The complaints were corroborated by data. In 1960, fishers caught 843.3 tons of fish in Guanjingyang, but 57.5 tons in 1963.<sup>74</sup>

However, the ecological tragedy was not solely caused by the greed of the state. As early as August 1956, just a few months after it was introduced to Guanjingyang, the provincial government in Fujian prohibited *qiaogu* fishing. As stated in the conference report, the reason to stop the practice is that "15-30% of fish caught are larvae and 15-20% are juveniles. We must stop using *qiaogu* otherwise the large yellow croakers will extinct."<sup>75</sup> The report indicates that

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<sup>73</sup> Fu'an zhuanshu shuichanju (Fisheries Bureau of Administrative Office in Fu'an). "Quanqu qiaogu shengchan zuotanhui de jianbao (A brief report of the meeting on the qiaogu fishing)," 1962. Ningde. Ningde Archive, 77-1-16, quoted in Chen, "Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)."

<sup>74</sup> Ningde Fisheries Bureau, 80.

<sup>75</sup> Zhonggong fu'an diwei yanhai diqu gongzuo bu (The party bureau of coastal areas in Fu'an). "Guanyu chuli qiaogu yuye wenti de yijian (An opinion on dealing with the *qiaogu* method)," 1957. Ningde. Ningde Archive, 77-2-29, quoted in Chen, "Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)."

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the province banned this fishing method because of its detrimental effects on aquatic resources and the long-term interests of fishers. The authorities had realized that even though it resulted in high production, the *qiaogu* method was unsustainable.

The *qiaogu* method, however, did not disappear in Fujian as the provincial government intended. According to a report by the command post of fishing grounds in East Fujian: "In 1959, after the severe natural disasters affecting farming, the fisheries encountered immense challenges. Fishers suffered from a lack of production materials, including nets, as well as dwindling income and production. In East Fujian, there is a huge trend in reviving the *qiaogu* method. Additionally, some *qiaogu* tools and gears remain preserved by fishing communes after the *qiaogu* was suspended in 1957. Consequently, the *qiaogu* method revived quickly."<sup>76</sup> This report indicates that the *qiaogu* method was revived after 1959 despite the provincial government's ban on it. "After three years of natural disasters, everyone was starving. When we learned that we could use this method, we couldn't resist", a fisherman in Ningde explained. "The government's policy was good, even though we didn't obey it ourselves. But there was nothing else we could do," he said with a sigh.<sup>77</sup> Fishers knew that the *qiaogu* would inevitably lead to a collapse in fish stocks, but first, they had to survive.

Even though the local government did not specify how to deal with *qiaogu*, we may infer that they turned a blind eye to reduce the pressure on providing food to fishers, since the *qiaogu* remained popular for several years during the early 1960s until the central government banned the *qiaogu* and ordered local authorities to confiscate all *qiaogu* tools, gears, and boats in

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<sup>76</sup> Mindong yuchang zhihuibu (the command post of fishing grounds in East Fujian). "Qiaogu yuye shengchan zongjie (A summary of the *qiaogu* method)," 1963. Ningde. Ningde Archive, 77-2-81, quoted in Chen, "Country, Technology and Market: A Research on the Causes of Marine Fish Population Structure Change in Taiwan Strait (1492-1966)."

<sup>77</sup> Zheng Shuxing, interview, April 29, 2021

1964.<sup>78</sup> However, it was too late—the large yellow croakers in Guanjingyang had already been destroyed by the *qiaogu* method. A study shows that, due to the *qiaogu*, the average age of the population declined from 1962, indicating that fewer mature fish came to Guanjingyang to spawn.<sup>79</sup> Though the catch on Guanjingyang resumed after the ban on *qiaogu*, the amount did not reach the previous levels (See Figure 2.6). In the late 1980s, fishers could barely hear large yellow croaks croaking there.

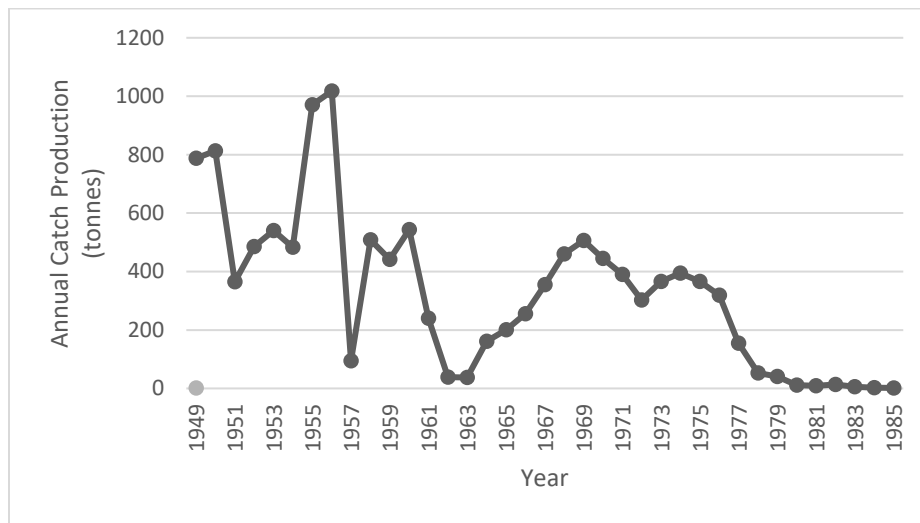


Figure 2.6: Annual catch production (tons) of the large yellow croaker on Guanjingyang

Source: Ningde Fisheries Bureau, 80-82.

#### 4. Summary

Before the establishment of the People's Republic of China, there were different fishing techniques for catching the large yellow croakers in different fishing grounds in Fujian and

<sup>78</sup> Ningde Fisheries Bureau, 17.

<sup>79</sup> Ye et al., “Could the Wild Population of Large Yellow Croaker *Larimichthys Crocea* (Richardson) in China Be Restored?”

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Zhejiang Provinces. Indigenous fishing knowledge, techniques, equipment, and tools enabled fishers to fish in their neighboring grounds but hindered them from gaining access to other grounds requiring different skills and know-how. Therefore, fishing grounds were not common resources before 1949. The barriers set up by indigenous techniques were removed by the spread of *qiaogu* after 1954. The wide spread of the *qiaogu* can be explained by its match with the requirement of collectivization. With the spread of local knowledge and the population of the *qiaogu*, fishers were able to fish freely in many fishing grounds, making fishing grounds a true common resource. In the process, rivalries and competition over limited fishing resources arose, resulting in an ecological tragedy. It was a tragedy caused both by the state and the fishers. When the central government banned the destructive *qiaogu* method, fishers revived it as a way to survive the hardest times.

In this case, the tragedy of the Large Yellow Croaker exposes the complexities of a failed scheme. The state-led technology transfer meant different things to different actors, leading to the incoherence of promoting the technique.<sup>80</sup> For the state, the *qiaogu* method meant a technology for boosting production and organizing fishers into collectives; for local cadres, it meant a way to relieve the pressure of supplying food to fishers; and for fishers, the meaning of the method shifted from an unsustainable practice to a more advanced one and eventually to one that could save them from starvation. As a consequence of varied meanings, there were varying actions, making the scheme process complex: when the central government banned the *qiaogu* method, local governments were reluctant to enforce the ban when the *qiaogu* could benefit them to some degree. Meanwhile, fishers ignored the central government's mandate and used the *qiaogu* to survive the hard days. Rather than passively receiving government requirements, they

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<sup>80</sup> Scott, "Further Reflections on Seeing Like a State."

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participated actively in the fishing industry. Ironically, their participation resulted in an ecological tragedy, and they directly hurt their interests in the long run. They found themselves caught in a mechanism in which they were both the villains and the victims, leaving the large yellow croakers croaking mournfully.

Unlike the qiaogu method, the kelp industry in China in the late 1950s did not cause ecological disasters. Nevertheless, it also failed in many places, resulting in economic damage. As was the case with the yellow croakers crisis, disputes over technology adoption between different interest groups also partly caused the failure of the kelp industry, which is the topic of the next chapter.

**Chapter 3 Three Encounters and Three Images: the kelp industry in Ningde in the late**

**1950s**

*"In 1958...We, fishermen, were not allowed to do anything else. Farmers were producing steel while we fishermen were making kelp (做海带). (But) kelp (cultivation) was not successful. 'The Great Leap Forward, the blind command (大跃进, 瞎指挥).' The bamboo pilings should be inserted 2.2 chi into the seafloor. (But) we inserted far short. On December 29th of the lunar calendar, the rafts were swept away by the waves. A cadre made a phone call to the navy; the navy then steered a navy vessel to help us chase the rafts. We did not celebrate the Lunar New Year that year. The rafts floated away, and so did kelp (industry). We hadn't cultivated kelp anymore for many years since then."*<sup>81</sup>

For approximately 1000 years, Japanese kelp *Laminaria japonica* has been a welcome dish on Chinese tables under the name *haidai* (sea ribbon). It is not a Chinese plant but is native to the cold temperate coastal regions of northern Japan. It is also found in northeastern Korea and Siberia at 40°N or higher. After the founding of the PRC, the fledging state supported kelp cultivation studies, which led to a breakthrough in extending kelp cultivation to South China.<sup>82</sup> In 1958, during China's GLF, a campaign to cultivate kelp was launched in seven coastal provinces. In an amazingly short period, an enormous new industry was created and developed. For example, in 1958, 120 breeding sites were opened in Fujian province alone, with a breeding area of more than 10,000 *mu*. A total of 30,000 to 40,000 fishers directly participated in kelp

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<sup>81</sup> Zheng Shuxing, interview, April 29, 2021

<sup>82</sup> Jan J. Solecki, "Economic Aspects of the Fishing Industry in Mainland China," 91–96.

production, while more than 10,000 additional people were organized to cut the bamboo necessary to produce kelp.<sup>83</sup>

The kelp cultivation campaign could be viewed as a pervasive state-led project transferring technology from the state to fishers. This leads to a series of questions: What made the state choose kelp cultivation over other technologies to skill fishers? How did the state skill fishers who had never grown seaweed before? How did fishers perceive kelp cultivation? How did fishers respond to this new technology? To answer these questions, this chapter examines a series of encounters that occurred during the skilling processes: a new technology was encountered by the state, a new regimentation of labor forces entered the fishers' lifestyles, and a new technology met local wisdom. The three encounters reveal three images of kelp cultivation: a technology meeting the pragmatic and political objectives of the state, an industry capable of transforming boat dwellers' lifestyles, and a technology unable to provide food directly to producers. Three encounters and three images were entangled with each other, resulting in the failure of the kelp industry in Ningde. Using kelp farming in Ningde as a case, this chapter explores how the state, technology, and a local community interacted in a socialist "skilling" project.

### **1. When the state encountered a new technology**

When the CCP took over China in 1949, the country had gone through the War of Resistance and the Civil War, which devastated industries and the fisheries apparatus. Years of relapses during the wars had nevertheless given marine and freshwater species some time to recover from earlier exploitation during the late Qing and Republican periods. Given the relative

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<sup>83</sup> Fujian Provincial Fisheries Bureau, "Nian Fujiansheng Haidai Yangzhi Shengchan Chubu Zongjie [A Preliminary Summary of Kelp Cultivation in Fujian Province in 1959]," *China Fisheries*, no. 02 (1960): 7–8.

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abundance of wild fish sources, the early communist state decided to focus on capture-based fisheries first and then make aquaculture a second priority.<sup>84</sup>

The shift was largely brought about by the growing demand for aquatic products in the domestic and international markets. At the time, the Chinese population in many parts of the country did not receive enough protein. However, as one of the major providers of protein, the fishing industry remained underdeveloped. In parallel, the drive to become part of the global economy through exports illustrated the potential of aquaculture as a diplomatic and economic tool. Fisheries products gradually became recognized as additional raw materials for industry and medicine, as well as sources of stock feed and fertilizer. These products could all be exported to communist countries such as the Soviet Union and East Germany. Since fisheries were important both domestically and internationally, in the "National Program for Agricultural Development" issued in 1956, it was proposed that China should "utilize all suitable waters to develop aquaculture."<sup>85</sup>

China's next step was to decide which development approaches it should employ. Capture- and cultivation-based fisheries were considered in both their practical and ideological dimensions. Practically, cultivation-based fisheries were considered by the Ministry of Aquatic Products to be more appropriate for China. As stated by the Head of the Ministry of Aquatic Products, Xu Deyan (许德珩), China lacked the necessary technology and advanced equipment to engage in pelagic fisheries. Thus, he suggested that China should give leadership to the masses for developing coastal fishing and aquaculture. He also mentioned that China had the

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<sup>84</sup> Lijing Jiang, "The Socialist Origins of Artificial Carp Reproduction in Maoist China," *Science Technology & Society* 22, no. 1 (March 2017): 59–77.

<sup>85</sup> Chinese Bureau of Agriculture, *Shuichan Gongzuo Wenjian Xuanbian 1949-1977 [Selected Documents in Fishery Work 1949-1977]* (Beijing: Chinese Bureau of Agriculture Internal Documents, 1983), 162–66.



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potential to develop aquaculture. Its long coastline and extensive foreshore made China an ideal location for offshore aquaculture. Using these waters would allow the fishing industry to produce more than 30,000,000 *tons* of seafood per year, according to an estimation from the Ministry of Aquatic Products.<sup>86</sup> Soon, in 1958, a socialistic interpretation of cultivation-based fisheries was offered by the new Assistant Minister of the Ministry of Aquatic Products, Gao Wenhua (高文华). In his speech, "*The Struggle Between Cultivation and Capture (养捕之争)*," Gao pointed out that pelagic fisheries relied on expanding ocean fishing territories and often involved encroaching on other countries' sea areas. As such, the pelagic fishery was unmistakably colonial and imperialistic in nature. On the other hand, aquaculture was non-invasive and could maximize contributions from common fishermen instead of relying solely on experts. Thus, aquaculture was a socialist fishery mode.<sup>87</sup>

Furthermore, Gao emphasized that cultivation and capture were two principles at odds (原则之争). In Gao's analysis, most experts who prioritized capture had previously studied in Japan, the United Kingdom, or the United States. Since those countries favored pelagic fisheries over aquaculture, researchers studying there repeated their ideas without considering China's actual situation. Unlike western countries, China has a long tradition of raising fish and has enriching experiences in freshwater aquaculture, making it an ideal place for aquaculture development. Additionally, since China had collectivized the fishing sector, it could mobilize collectives of fishermen to "follow the mass line" and develop aquaculture by relying on the masses. According to Gao, sticking to "capture" is a sign of dogmatism, which the fishing

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<sup>86</sup> Chinese Bureau of Agriculture, 115.

<sup>87</sup> Wenhua Gao, "Yang Bu Zhizheng [The Struggle between Cultivation and Capture]," *Hongqi*, no. 3 (1958): 26–28.

industry in China needs to avoid. "If the struggle over capture and culture is not upgraded to the controversy between principles, the fisheries sector will not make strides toward its goal."<sup>88</sup>

A major push to develop aquaculture emerged after the GLF. After Mao famously announced in November 1957 that China's steel production would surpass that of Britain within 15 years, the Ministry of Aquatic Products eagerly proposed an equivalent agenda, promising that "by 1962, the fishery and aquatic products will catch up with and surpass that of Japan, and become the first in the world."<sup>89</sup> To achieve this goal, the state should depend on labor power from the masses, rather than mechanized ships, to increase fish production.<sup>90</sup> Thus, in the Second Meeting of the 8th Party Congress, the principle of "cultivating first" (养殖为主) was officially adopted as the guiding principle for fisheries.

Following the establishment of the cultivation principle, a crucial question arose: "What species should we cultivate?" The Ministry of Aquatic Products paid particular attention to seaweed—especially kelp. Xu Deheng specifically mentioned kelp cultivation in his speech at the Fifth Session of the First National People's Congress in February 1958.<sup>91</sup> Kelp cultivation was promoted for both pragmatic and political reasons. Pragmatically, kelp production in China was first stimulated by its effectiveness as a treatment for hyperthyroidism. Although kelp as seaweed could not provide proteins, it contains iodine, which was in desperate demand in China at that time, especially in the mountainous areas. Therefore, kelp culture was considered the most practical measure the regime could take to alleviate the shortage of this element.<sup>92</sup>

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<sup>88</sup> Gao.

<sup>89</sup> Chinese Bureau of Agriculture, 177.

<sup>90</sup> Chinese Bureau of Agriculture, 169–70.

<sup>91</sup> Chinese Bureau of Agriculture, 179.

<sup>92</sup> Tien-Hsi Cheng, "Production of Kelp - a Major Aspect of China's Exploitation of the Sea," *Economic Botany* 23, no. 3 (1969): 215–36.

Kelp cultivation was also promoted for political reasons. Although China had a long history of kelp consumption, kelp had been the leading imported aquatic product in the past. Most kelps had been imported from Japan, which dominated global seaweed production. Overtaking Japan in kelp production would boost China's international status.<sup>93</sup> Additionally, kelp farming was seen as an example of socialist scientific development and the superiority of socialist technology. Kelp was long thought to only grow in colder waters. Notably, a belt of warm water prevented the kelp from naturally spreading down to the Yellow Sea region. In the 1950s, China developed southward transplanting kelp technology and made great strides. The extension of kelp cultivation to South China was considered one of the three major achievements in fisheries by the young state.<sup>94</sup> The related technology was also listed on the confidential list of aquatic science and technology.<sup>95</sup> Moreover, transplanting kelp to South China was also considered the result of "harnessing *tu* and *yang* together." It was reported that the technique of breeding kelp sporelings was developed with the help of "*yang*" science (土洋结合), while kelp raft cultivation (海带筏式养殖技术) was the result of indigenous wisdom and brought production costs down. Kelp cultivation thus became a model of socialist science and technology, demonstrating the superior characteristic of socialist science as "achieving more outcomes with higher speed, better quality, and fewer costs (多快好省)."<sup>96</sup>

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<sup>93</sup> Department of Mariculture in Ministry of Fisheries (Shuichanbu Haishui Yangzhi Si) , "Cong Quanguo Haidai Yangzhi Shidian Zhong Kanchu De Jige Wenti [Several problems can be seen in the national kelp culture pilots]," *China Fisheries*, no. 04 (1958): 7–9.

<sup>94</sup> Chinese Bureau of Agriculture, 185. The other two technologies are artificial means of controlling the spawning and incubation of silver carp and bighead carp, and the technology of capturing Fin Whales.

<sup>95</sup> Chinese Bureau of Agriculture, 235.

<sup>96</sup> Chinese Bureau of Agriculture, 186–87.

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Thus, cultivating kelp in South China became a key project of the second five-year plan for the aquacultural industry. The goal of the plan was to expand the area of kelp farming and increase the production output of kelp so that China's kelp production would jump to first place in the world. The specific plan was to produce 400,000 tons of fresh seaweed in 1962—a 32-fold increase from 1957.<sup>97</sup>

To achieve the aforementioned goals, seven coastal provinces (Fujian, Guangdong, Zhejiang, Jiangsu, Hebei, Liaoning, and Shandong) formed the national kelp seedling breeding committee (全国海带育苗委员会), working together to breed sporelings in Lüda (旅大). Their cooperation was organized in the following manner: Dalian provided the sporelings for Fujian and other southern coastal provinces, Shandong provided technicians and skilled workers, and the southern provinces supplied bamboo, palm ropes, and other materials that were scarce in North China. The cooperation between regions was praised by the regime as the so-called "Great Socialist Cooperation," which showed the communist spirit of "one for all, all for one" (我为人人, 人人为我) and represented the superiority of socialism over capitalism.<sup>98</sup> An unprecedented national kelp cultivation campaign was then initiated by the Ministry of Aquatic Products nationwide.

## **2. When a new regimentation of labor forces encountered fishers' lifestyles**

In 1958, the Bureau of Aquatic Products in Fujian (福建省水产局) sent a group of cadres and fishermen to Lüda for "the battle of breeding kelp sporelings (育苗会战)". Participating in the breeding of sporelings allowed them to learn cultivation techniques. As they returned to

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<sup>97</sup> Chinese Bureau of Agriculture, 178–79.

<sup>98</sup> "Qisheng Xiezu Yang Haidai [Seven Provinces Cooperate to Cultivate Kelp]," *China Fisheries*, no. 03 (1958): 3.

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Fujian, they took back both the techniques and sporelings they had cultivated in Bohai Bay. A total of 150 fishers and cadres from Ningde County joined the study group in Lüda. Notably, 108 of them were boat dwellers.

For the Ningde government, kelp cultivation held more meaning than an economic industry, which was the reason why they sent the 108 boat dwellers to Lüda. In 1956, Ningde County established Aojiang (鳌江) as a settlement site for boat dwellers. The total of 48 houses and a school were also built in Aojiang by the local government to mobilize boat dwellers to live on land.<sup>99</sup> However, boat dwellers preferred to live on their boats because it was more convenient for them to fish offshore. After a period of reflection, the committee came to realize that the transformation of one's mode of living necessarily also entailed a transformation of one's production activities. Thus, kelp farming in Ningde gained more political significance as the County Committee sought to utilize kelp farming to change boat dwellers' traditional lifestyle based on offshore fishing.<sup>100</sup>

To better transform boat dwellers, the government established a seaweed farm in Ningde. This farm was jointly owned and run by both the state and the fishing communes (国社合营), with the state providing investment while the fishing communes provided labor.<sup>101</sup> To put it differently, the boat dwellers were hired by a state-owned company as farm workers. This new occupation forced boat dwellers to abandon their previous livelihoods and modes of living to live on land as kelp growers.

Apart from the lifestyle change, boat dwellers also needed to learn new technology (kelp raft cultivation) and adapt to a new labor process and form of labor division. Kelp raft cultivation

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<sup>99</sup> Ningdeshi Shuichanju, 169.

<sup>100</sup> Ningdeshi Shuichanju, 10.

<sup>101</sup> Ningdeshi Shuichanju, 178.

is a cultivation method that was developed by Chinese scientists and widely used in China during the 1950s and 1960s.<sup>102</sup> Raft cultivation was performed in bays where the water is approximately 10 meters deep. The seaweed grew on ropes tied to floating bamboo rafts that were staked or weighted to the sea bottom. The first step was to collect spores from mature plants in late autumn and lodge them on short "ladders" of bamboo splints hanging from the poles. By January, when the spores grew into sporelings, the sporelings were transplanted and fixed to ropes by growers (see Figure 3.1). Growers then tied the ropes to rafts at regular intervals. With a certain amount of artificial intervention and control at each stage, it took sporelings 4 to 5 months to develop into kelp that was 3 meters or more in length and ready to be harvested.<sup>103</sup>

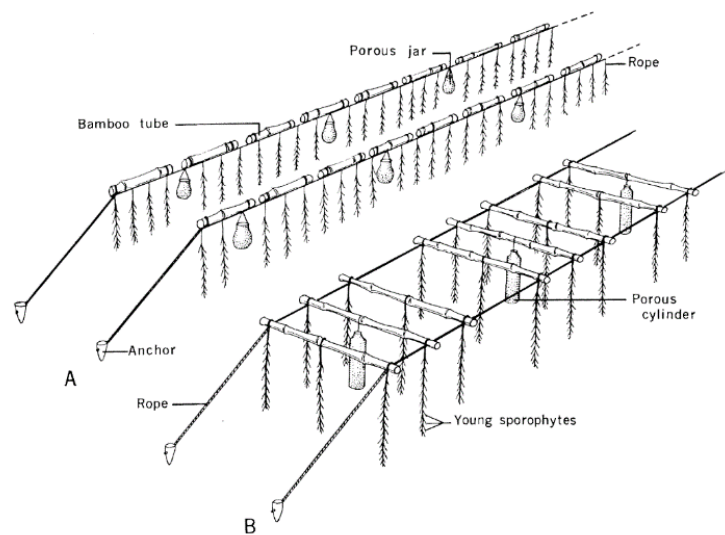


Figure 3.1: Rafts for kelp cultivation

Source: Tien-Hsi Cheng, "Production of Kelp - a Major Aspect of China's Exploitation of the Sea," *Economic Botany* 23, no. 3 (1969): 215–36.

<sup>102</sup> Jan J. Solecki, "Economic Aspects of the Fishing Industry in Mainland China," 92.

<sup>103</sup> Zeng Chengkui, "Kelp-Farming, a New Industry," *China Reconstructs* 13 (1964): 36–39.

Raft culture involved many processes (see Figure 3.2) requiring collaboration among workers and the division of labor. As a result, boat-dwelling households who were previously engaged in small-scale offshore fishing were not only required to learn new skills, but also to adjust to new modes of production and labor division.

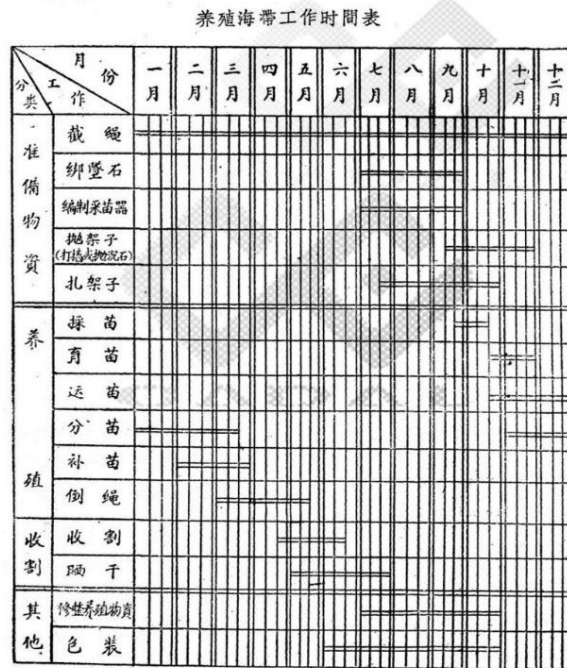


Figure 3.2: the timeline of kelp cultivation

Source: Department of Fisheries in Zhejiang Province, *Haidai Yangzhi [Kelp Cultivation]* (Shanghai: Medical and Health Press, 1958), 22.

Traditionally, the boat-dwelling community in Ningde used six methods to catch fish, each only requiring two to five laborers. Thus, a household or two could handle the work. The local government dubbed those techniques as "six small-scale (六小)." Moreover, there was no obvious gender-based division of labor. The division of labor was mainly divided according to age: older people were responsible for mending nets and other technical labor, while younger

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people were responsible for picking up fish and other simpler labor, and young and strong people were the main laborers in family-based fishing. Female boat dwellers generally had complete fishing skills and participated in all aspects of fishing. According to Wu Gaozi's research on the boat dwellers of the Min River (闽江), "in the family of the Dan household (蟹户), women are also bread earners. Dan household women are mostly physically strong and have superior arm strength. An investigation of boat dwellers in Hainan (海南) found that the overlap of the Dan people's living and working places may explain the blurred role of gender in their production activities."<sup>104</sup>

Nevertheless, when kelp cultivation was introduced, a new division of labor emerged to enable those fishers to work together on a big farm. To some extent, this new division of labor is based on gender:

**Women attached sporelings to ropes**—When sporelings arrived in Aojiang, they covered bamboo splits and people could not see them with the naked eye. After being immersed in seawater for several days, sporelings would grow into small seedlings. Then, growers attached those seedlings to ropes. Two growers formed a group. Strands of attached ropes were unwound at the prescribed intervals by one grower while a companion inserted a selected young seedling into each opening as it was made (see Figure 3.3). Since most of this job was performed by women, attaching seedlings was associated with their memory. While 10 out of 20 women that I interviewed in Aojiang did not have any memory of kelp cultivation, the ones that did only had the memory of "attaching seedlings to ropes" (打绳子). This might be because women were

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<sup>104</sup> Li Liu, "Hainan Danjia Nvxing de Kongjian Shenti Yu Quanli [Space, Bodies, and Powers of Female Boat Dwellers in Hainan]," *Open Times*, no. 01 (2019): 210-221+8.



believed to have more deft hands than men, so they were believed to be adept in rope making.<sup>105</sup>

However, this assumption was not correct in the case of boat dwellers since female boat dwellers also engaged in offshore fishing; thus, their hands were rough rather than deft. One of them complained that "making rope was hard. The cadres said, 'we women should be good at making ropes, (but) I was not.'"<sup>106</sup> Another also complained: "My finger was stubby. I found it hard to insert my fingers into the ropes to make knots."<sup>107</sup>



Figure 3.3: Attaching seedlings to ropes

<sup>105</sup> Xiaofei Gao, "Maritime Manchuria: Empire, State, and Laborers, 1905-2016" (Ph.D., United States -- California, University of California, Santa Cruz), accessed February 21, 2022, <https://www.proquest.com/pqdtglobal/docview/2088904913/abstract/C55ACEB390314312PQ/1.106>

<sup>107</sup> Zheng Xiulan, interview, May 21, 2021

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Source: Fujiansheng Zaolei Yangzhi Chang(The Algae Farm in Fujian Province), *Haidai Yangzhifa Tujie [Illustrations of the Kelp Culture Method]* (Fuzhou: Fujian People's Publishing House, 1959), 71.

**Men tied ropes to rafts**—When women were busy attaching kelp to ropes, men were busy tying ropes to rafts. Two men formed a group, dragging ropes to junks and sailing to the sea, and then tying the ropes to rafts (Figure 3.4). Tying ropes to rafts was considered a hard task better suited to men, who were commonly perceived as stronger than women. Since time was ticking, they still sailed out on rainy days. "No rest, no excuses; we kept tying ropes to rafts no matter how strong the waves were," one fisherman described.<sup>108</sup> To make matters worse, it was winter in Ningde. The temperature was nearly 0°C offshore and could also drop to 0°C in the night and early morning on land. But fishermen had no option since they had to sail to the cultivation areas at the first faint glimmering of dawn, immersing their hands in cold sea waters to tie ropes to rafts. One of them recalled that "it was always cold outside, (and) we had no warm clothes to wear...and we didn't have enough food to eat. My stomach was always empty. I wanted to take a rest because I was tired. But I was not allowed to do so. That was really, really hard!"<sup>109</sup>

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<sup>108</sup> Ou Chengtai, interview, June 21, 2021

<sup>109</sup> Lian Qingqin, interview, June 3, 2021



Figure 3.4: Tying ropes to rafts

Source: Fujiansheng Zaolei Yangzhi Chang (The Algae Farm in Fujian Province), *Haidai Yangzhifa Tujie [Illustrations of the Kelp Culture Method]* (Fuzhou: Fujian People's Publishing House, 1959), 74.

Here, we can observe the elaborate gendered division of labor that emerged after the introduction of the kelp industry. Women took the responsibility of making ropes and catering to housework on land, while males and some females sailed out every day to cultivate kelp. The kelp industry broke the Dan people's previous labor division and modes of production while training them to become members of state-owned farms.

### 3. When new technology encountered local knowledge

Kelp cultivation required many raw materials, which posed a problem for the Ningde government. Specifically, the materials included moso bamboo (毛竹), cultivation ropes (苗绳), connecting rope (吊绳), floating ropes (浮绳), anchor ropes (锚绳), hanging cultivation ropes

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(垂石繩), stone weights (垂石), and tools such as small sampans, basins, brushes, buckets, axes, and saws (see Figure 3.5).

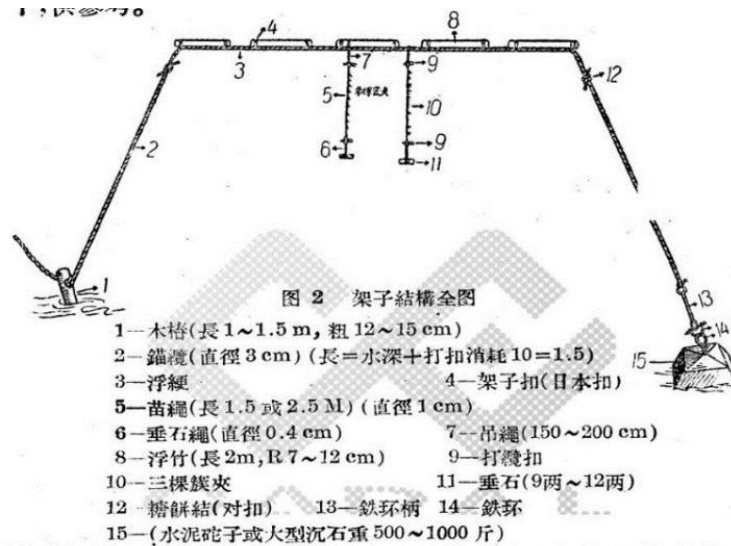


Figure 3.5: The structure of a raft for kelp cultivation

Source: Department of Fisheries in Zhejiang Province, *Haidai Yangzhi [Kelp Cultivation]* (Shanghai: Medical and Health Press, 1958), 9.

The crux of material provision was to produce enough cultivation ropes. Cultivation ropes are the actual ropes to which kelp sporelings were attached for growing. They are equivalent to furrows in a field or paddies into which young seedlings are transplanted in land-based agriculture. Cultivation ropes are usually made of strands of palm fiber coir rope. The raft cultivation of kelp required a huge amount of coir rope, with an estimated 150 *jin* of coir rope required per acre.<sup>110</sup> However, the coir rope was an industrial raw material and strategic material, so the quota for kelp cultivation was limited. To solve the problem of producing enough palm

<sup>110</sup> Zuyuan Huang, "Haidai Jiamiaosheng Daiyongpin Jieshao [The Introduction of Substitutes of Cultivation Ropes in Kelp Cultivation]," *China Fisheries*, no. 02 (1960): 11.

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ropes, the Ningde government developed two methods. The first method was to buy old ones. The County Committee mobilized people all over the county to donate or sell their old ropes to assist the development of the kelp industry. Meanwhile, cadres in coastal communes also went to communes in mountainous areas to purchase old palms. The second method was to find substitutes. The County Committee emphasized the importance of "self-dependence (自力更生)", calling for "taking the mass line, relying on local materials, and widely searching for substitutes." The committee encouraged people to try all herbaceous plants that could be used to produce strong ropes and endure corrosion by saltwater for 4 months. An old man's recollection confirmed the activity of finding substitutes.<sup>111</sup> He said, "in 1958, (we) went to Yangzhong Village (洋中村) and Hubei Village (虎贝村). At first, (we) bought old coir ropes. Then (we) grubbed up "horse grass" (马草) to make ropes."<sup>112</sup> Chen Jinyun (陈锦云), a female party member, shared the same memory. She was dispatched to buy old coir at the beginning but then transitioned to collecting horse grass.<sup>113</sup>

The shortage of ropes was not a problem that only Ningde faced. In other coastal areas, people used various plants to substitute palm, such as flax, bamboo, and the vines of sweet potatoes (see Figure 3.6). Moreover, governments also encouraged substituting other raw materials for raft cultivation to save money. For example, in Rongcheng County (荣城县), Shandong Province, people used straw to make floating ropes instead of 油草, used fishing lines as hanging cultivation ropes, and utilized used bamboo rather than new. With the help of the substitutes, the cost of one raft was 31 *yuan*. In contrast, it cost state-owned fishing factories 72 *yuan* to make a

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<sup>111</sup> "Guanyu Haidai Yangzhi Gongzuo de Jinji Zhishi [Urgent Instructions on the Work of Kelp Cultivation]," October 8, 1958, Jiaocheng Archive.

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<sup>113</sup> Chen Jinyun, interview, June 8, 2021

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raft.<sup>114</sup> While the use of substitutes certainly reduced costs, it left a hidden danger that later destroyed the kelp industry in some areas, including Ningde.

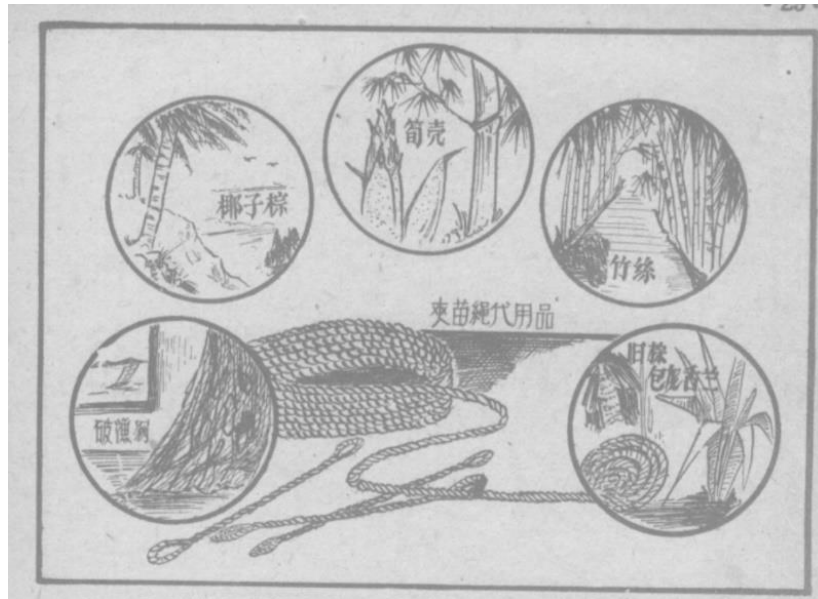


Figure 3.6: Substitutes of cultivation ropes

Source: Fujiansheng Zaolei Yangzhi Chang (The Algae Farm in Fujian Province), *Haidai Yangzhifa Tujie [Illustrations of the Kelp Culture Method]* (Fuzhou: Fujian People's Publishing House, 1959), 29.

#### **4. The result of encounters: Failure of the kelp industry and three images of kelp cultivation technology**

In 1959, Ningde originally planned to cultivate 6,300 *mu* of kelp; however, only 620 *mu* were actually cultivated, accounting for only 10% of the planned area. In that year, 675 tons of fresh seaweed were harvested, with a total income of 324,166.99 *yuan* and a loss of 1,024,659

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<sup>114</sup> Department of Mariculture in Ministry of Fisheries (Shuichanbu Haishui Yangzhi Si), “Cong Quanguo Haidai Yangzhi Shidian Zhong Kanchu De Jige Wenti [Several problems can be seen in the national kelp culture pilots]”.

*yuan* after deducting production costs.<sup>115</sup> The failure of kelp farming hit the seaweed farm hard.

All fishing communes quit the farm and no longer engaged in kelp cultivation. In September 1959, the farm was incorporated into a local state-run aquaculture farm, with only 12 cadres, 2 technicians, 83 permanent workers, 25 temporary workers, and 437 seasonal hired workers. Although this local state-run farm continued to engage in kelp farming, the annual farming area only ranged from 150 to 300 *mu*.<sup>116</sup> Thus, the vigorous kelp farming campaign in Ningde County came to a temporary end.

The local government and fishers in Aojiang provided various explanations for the failure of kelp farming. Interestingly, the fishermen's explanations match the aforementioned encounters. First, due to the state's push to promote technology and the backdrop of the GLF, the kelp industry was immersed in a fervent atmosphere that overlooked many realities. For example, according to a fisherman who went to Dalian to study kelp cultivation, "the place for the kelp industry was not suitable for kelp growth. The currents there were strong, (so) the seawater there was not transparent. The kelp did not have enough sunlight there. Now, we cultivate kelp in other sea areas rather than that area, because it was not a feasible place." When I asked him why people chose that place for cultivation, he replied that "it was decided by the County Committee. And the County Committee made that decision without having much knowledge of kelp cultivation. They did not take the transparency into account."<sup>117</sup> Secondly, the local government recruited too many workers to the kelp cultivation industry because it viewed it as a way to transform boat dwellers. According to the local government, 70% of the workers were unnecessary. The third reason was that many substitutes for cultivation ropes proved

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<sup>115</sup> Ningde Fisheries Bureau, 90.

<sup>116</sup> Ningde Fisheries Bureau, 90.

<sup>117</sup> Ou Zengjin, interview, May 3, 2021

insufficiently strong after being corroded by seawater, leading to the washing away of much kelp, which resulted in a loss of 200,000 yuan.<sup>118</sup>

In addition to these reasons, local fishers' understanding of the technology was also crucial. They were not interested in participating in kelp cultivation since it could not fill their empty stomachs after a long day of work. One fisher complained, "if we catch fish, at least we can eat some fish. Fish won't make us feel full, but it will keep us from feeling hungry. (However,) kelp grows slowly in a short period, so when you go back home after work, you have nothing to eat. (That's why) many people did not work hard (in kelp cultivation). They had no interest."<sup>119</sup> Another fisher gave a similar account, saying that "at first, people were active. As time went by, when we had nothing to eat, we preferred to catch fish. (But) we were not allowed. All junks were used for kelp cultivation. (So) many of us collected small fish (捡鱼) after the tides. Collecting fish was the main thing we cared about. Kelp? Nobody cares. Even if it was successful, we could not eat it and it could not fill our stomachs."<sup>120</sup> The explanations reveal the image of the kelp technology in the fishers' eyes: a technology that required long-term efforts and would have fewer short-term rewards. When compared to offshore fishing, they weren't particularly interested in this technology.

Their perception of the technology contrasted with those of the state and local cadres in Ningde. In the state's view, kelp cultivation was a valuable technology that could not only solve the problem of iodine shortages in the country but also demonstrate the state's scientific achievements. Additionally, as an aquacultural technology, it fitted the state's socialist vision by enabling the state to be self-sufficient rather than colonizing other countries. As a result, the state

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<sup>118</sup> Ningde Fisheries Bureau, 90.

<sup>119</sup> Chen Jinmei, interview, April 28, 2021

<sup>120</sup> Zheng Wangchai, interview, May 7, 2021



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promoted the technology enthusiastically or even blindly. For local cadres in Ningde, establishing kelp industries was not just a matter of fulfilling higher government mandates, but also a wonderful opportunity to create jobs for boat dwellers and change their lifestyles. As a result, they recruited as many boat dwellers as possible into this industry. Ultimately, the three images of the technology intertwined and resulted in the failure of the industry.

## Chapter 4 Conclusion

This thesis examines two fisheries/aquaculture technologies adopted and abandoned in Ningde County, Fujian Province during the early years of the collectivization era. These technologies show how the state, local cadres, and rural populations interacted over their adoption.

As a productive technique entailing a large number of workers, the *qiaogu* method was promoted by the state to maximize fish catch and collectivize fishing households. However, the spread of this method caused an ecological tragedy since it allowed fishers to fish in whichever fishing grounds they wanted, thereby turning fishing resources into true common resources. Soon, the state banned this method to exploit natural resources sustainably. Nevertheless, fishers revived the destructive *qiaogu* method since they relied on it as a way to endure famine. Fishers' revival efforts were ignored by local governments, resulting in the tragedy of overfishing yellow croakers.

Kelp raft cultivation was a scientific achievement of the fledgling regime in the 1950s. Additionally, the state attached its pragmatic goal of producing iodine, its political vision of defeating Japan on the world market, and its understanding of socialism to the kelp cultivation technology. As a result, in an amazingly short period during China's GLF, an enormous new industry was created and developed, which turned fishers in seven coastal provinces (including Fujian) into kelp cultivators. However, since the industry was built in a hurry while ignoring many realities, it failed in Ningde County. Additionally, because the local government combined the task of transforming boat dwellers' livelihoods into the industry, too many people were recruited, which caused a greater burden to maintain the industry. More importantly, since

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fishers thought they would not be able to feed themselves with kelp cultivation, they reacted negatively to the technology.

Notably, the two cases are analyzed differently. One case focuses on the ecological impacts of the technology, while the other focuses on its economic and social impacts. However, the two cases both reveal some facts regarding the politics of technology during the collectivization campaign.

First, both cases demonstrate how agricultural technologies were closely related to the regime's ultimate goals, both practical and political. Pragmatically, the state sought to maximize production, which is why it promoted both the *qiaogu* method and kelp raft cultivation. Politically, a particular technology might also be infused with several political meanings by the state to accomplish its objectives in both international and national politics. This was very obvious in the case of the kelp industry. However, there was one political reason for the promotion of both technologies: the state's desire to collectivize fishers. We should acknowledge that technological change always involves reorganizing production processes and regimenting laborers. For example, the shift from handicrafts to large-scale capitalist industries entailed not only the development of the labor market but also the reduction of the work process to regimented repetitive motions while bringing together large numbers of workers under a single roof. In socialist China, many technologies also involved the task of turning a socialist vision into reality by regimenting labor relations and recasting labor processes. In this sense, technology shaped the socialist revolution in China. In fact, in the blueprint created by the CCP, collectivization would be coupled with mechanizing agriculture, resulting in machines like tractors populating the country's fields. Mechanization provided the material basis for revolutionary social reorganization since the adoption of tractors would enable larger field sizes

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and the transition from family farming to communal agriculture. However, throughout the Mao era, tractors remained in short supply. The pace of mechanization in China during the collectivization campaign was slow due to steel, electric power, and coal shortages, as well as debates among China's top officials.<sup>121</sup> Thus, it should not be surprising that the state simultaneously promoted other non-mechanized methods and technologies to achieve its dual goal of social change and maximum resource exploitation. The *qiaogu* method and kelp raft cultivation are both good examples showing how the state achieved two goals without mechanization.

Furthermore, when the socialist state was seeing its population and turning it into legible productive laborers, this was also seen by its people. Understanding how people saw certain technologies promoted by the state can provide insights into how they saw the state. Although the state held ultimate power over the adoption of certain technologies, its citizens and low-level officials were not passive recipients. Producers might either change certain technologies—such as substituting kelp cultivation ropes or refusing some technologies, as in the case of the kelp industry in Ningde—or even adopt a banned technology such as the *qiaogu* method. The reactions to state-promoted technologies varied locally, indicating that negotiations were possible. As the two cases presented here have shown, the room for negotiation was often associated with local officials when they infused their own expectations or needs with the technology. As agents of the state, those frontline officials implemented technology transfer schemes. Their existence and influence complicate James C. Scott's accounts of how certain massive state-led schemes fail, exposing the incoherence of statecraft. In the field of PRC

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<sup>121</sup> K. P. Kannan, "Agricultural Mechanisation in China," *Economic and Political Weekly* 12, no. 26 (1977): 1011–13.

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history, local cadres have received much attention since they were the actual link between the central government and the peasants. Moreover, their role was potentially a dynamic one—they sometimes colluded with the state and sometimes with fellow villagers.<sup>122</sup> As such, their role in the politics of technology in socialist China is worth more attention.

In general, this thesis examines the "Blue Revolution" of socialist China through the study of two fisheries technologies in Ningde, Fujian (i.e., kelp cultivation and the *qiaogu* method). Through this thesis, I focus on these two collectively appropriate technologies in socialist China to reveal the state's dual goals in revolutionizing the fishing sector through technology. Meanwhile, the thesis also examines the complex nature of the revolution process, resulting from various interest groups' divergent perceptions. Through a focus on tensions and conflicts between these perceptions, the thesis differentiates between three interest groups (i.e., the central government, frontline officials, and common citizens), which can be used to study the politics of technology in other cases

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<sup>122</sup> Helen F. Siu, *Agents and Victims in South China: Accomplices in Rural Revolution* (Yale University Press, 1989); Vivienne Shue, *The Reach of the State: Sketches of the Chinese Body Politic* (Stanford: Stanford University Press, 1988); Philip C. C. Huang, *The Peasant Family and Rural Development in the Yangzi Delta, 1350-1988* (Stanford: Stanford University Press, 1990).

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