

Article

The Transformation of Fishermen's Livelihoods in the Context of a Comprehensive Fishing Ban: A Case Study of Datang Village at the Poyang Lake Region, China

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Abstract: How fishermen produce and live has been a hot topic of academic concern in recent years. However, existing research has focused excessively on marine fishermen. Inland fisheries make a significant but often overlooked contribution to rural livelihoods in developing countries. In this paper, we constructed a framework for fishermen's livelihood strategies and used questionnaires and in-depth interviews to study 275 households of inland fishermen in a professional fishing village at Poyang Lake. The results show that (1) the impact of the comprehensive fishing ban has led to significant changes in the livelihood capital of inland fishermen, leading to fishermen being forced to change their livelihood strategies. (2) The current livelihood strategies can be divided into four categories, which are non-fishing employment, self-employment, public welfare positions and retirement respectively. (3) Livelihood capital such as age, education, social interaction and fishing rights influence their choice of livelihood strategies. (4) The fishing ban proposal generally meets the interests of fishermen, but there is some capacity for improvement in terms of implementation details and policy flexibility. Based on these findings, we recommend that the government conducts further in-depth research and adjusts and improves its policy options in good time. To the satisfaction of all parties, the current policy protects the environment and achieves sustainable human development, making Chinese contributions and proposing Chinese plans to address global environmental change.

Keywords: livelihood strategies; policy change; inland fishermen; employment conditions



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1. Introduction

Global environmental change deeply affects marine and terrestrial biodiversity [1] and changes in fisheries policy are shaped by the environment [2–5]. China is the world's largest fishing nation in terms of fishing fleets, the number of people working in the fishing industry and the production of marine fish [6,7]. However, approximately 57% of China's marine fish resources are overexploited. The rapid growth of coastal cities has put enormous pressure on marine ecosystems, resulting in the loss of 80% of coral reefs, 57% of mangroves and over 50% of coastal wetlands, most of which are important spawning, nursing or feeding grounds for fish [8]. To conserve fishery resources, in 1987, the Fisheries Bureau of the Chinese Ministry of Agriculture proposed a “double control” system, which is to control the total number of fishing vessels powered by marine engines and their total engine power [9]. Then, the Chinese government issued policies (vessel buy-back schemes, fuel subsidy reductions, employment assistance funds, etc.) to support fishermen to transfer to other industries, in 2003 and 2015 [10]. The implementation of these policies is a positive response to global environmental change.

As marine fisheries policies continue to be explored and improved, the Chinese government is gradually turning its attention to inland rivers and large lakes. The Yangtze River is one of the richest rivers in the world in terms of aquatic biodiversity and has an

important role to play in maintaining China's ecological security. For a long time, the living environment of aquatic organisms in the Yangtze River has been deteriorating due to the impact of overfishing, sand and gravel dredging and beach dredging; the biodiversity index has continued to decline, and the resources of rare and endemic species are in overall decline [11–13]. In recent years, the average annual catch of fishery resources in the Yangtze River has been less than 100,000 tonnes, accounting for only 0.15% of China's total aquatic product production [14].

Against this background, the Chinese government has issued the Opinions on Strengthening the Protection of Aquatic Life in the Yangtze River. It is proposed to promote a ban on fishing in key waters and to scientifically delineate areas where fishing is prohibited and restricted, to accelerate the establishment of a compensation system for fishing bans in key waters of the Yangtze River basin, to guide fishermen in the Yangtze River basin to accelerate their withdrawal from fishing and switch to production, and to provide leadership in achieving a complete ban on fishing in aquatic life reserves. The rest and recuperation system for rivers and lakes should be improved, and a system of closed fishing periods of reasonable duration should be gradually implemented in key waters such as the main streams and important tributaries of the Yangtze River. As of 2020, fishing is to be banned in all of the Yangtze River Basin [15].

China is one of the world's most important fishing nations, but little is known about its inland fisheries. Most of the existing research on fishermen has been focused on marine fishermen [6,16–19]. Fishermen in this study refer to workers living in inland lakes and riverine areas who are engaged in fish production as their main occupation, excluding marine fishermen who work part-time or engage in distant-water fishing [20]. Studies have been conducted on the make-up, classification and management of inland fishers and fishing rights. Any fishery is made up of three components: the environment, the fish and the human [21]. Fishermen can be divided into broad groups depending on their purpose and how they use the resource, such as food fishermen, recreational fishermen and other stakeholders [22]. The fisherman is situated in a complex network of social, financial, ecological and administrative influences that govern his life [23]. The most discussed issue is management and legislation. They address but are not limited to policies supporting Agenda 21, the Convention on Biological Diversity, FAO Code of Conduct for Responsible Fisheries, UNESCO Convention and Ramsar Convention [22]. In the past, the restrictions on fishing were mainly seasonal cultivation, and the 10-year comprehensive fishing ban has now been introduced for the first time in China. In this context, a phased ban on fishing in key waters of the Yangtze River basin was introduced on 1 January 2020 [24]. As an important inland lake in the Yangtze River basin, more than 300 fishing villages and over 100,000 fishermen in the Poyang Lake area have ended their centuries-old way of livelihood [25]. How fishermen produce and live after going ashore has become a hot topic of concern for the community. It is essential and urgent to clarify the livelihood strategies and attitudes of fishermen towards policies in the wake of the fishing ban. However, to date, such studies have been scarce.

The overall objective of this study is to better understand how a comprehensive fishing ban changes the livelihood strategies and human-fishery relations of inland fishers. This target can be further broken down into the following specific questions. (1) What are the characteristics of inland fishermen? What are the impacts of the complete fishing ban on the livelihood capital of fishermen? (2) What are the types of livelihood strategies available after comprehensive fishing bans? (3) What are the main factors affecting the transformation of inland fishermen's livelihoods? (4) What are the attitudes of different livelihood types towards the no-fishing policy?

2. Literature Review and Theoretical Framework

2.1. Fisheries, Fishermen, and Fishing Villages

Fishing in inland waters is one of the oldest human practices, and fishing tools have been found among the earliest human remains [22]. Inland fisheries are largely governed by

the social and geographical context in which they are located and respond to demographic, economic and policy changes. Accompanying that is the evolving management of fisheries. Attempts at managing inland fisheries are very ancient. They can be traced back to medieval Europe when fishermen were grouped into guilds to manage the exploitation of fishing resources [26]. In France, inland fisheries are managed by controlling landings [27]. In other parts of the world, inland fisheries are largely regulated by local traditional religions. Modern governments have attempted to control inland fisheries by restricting seasons, locations or gear types, and implementing centralized management at the national level [28]. For example, China has had a closed season system in place for many years and a comprehensive fishing ban on the Yangtze River that has been implemented in recent years [29,30].

There have been numerous studies on the Three Rural Issues¹ [31], but little attention has been paid to the special group of fishers, and they are invisible in the shadow of the “three rural” issues [20]. Fishers are people who fish for a livelihood and can be divided into marine fishermen and inland fishers, depending on where they fish. In this study, fishermen mainly refers to inland fishermen. Funge-Smith [32] considers that inland fisheries play an important role in livelihoods and food security. However, whether in Europe or Asia, the problems faced by fishermen are much the same. For example, there is a surplus of labor and difficulties in changing jobs; income growth is slow; fishermen’s economic interests and equal rights are not effectively safeguarded and social security is inadequate; and unemployment is an increasingly serious problem due to natural conditions and human policies [33–36].

Fishing villages refer to villages where fishermen live together. The social structure and division of labor in fishing villages are relatively simple, with a low population density and a strong native culture [37]. Compared with urban areas, the contradictions between economic development and resources and environment are more obvious in fishing villages; the construction of infrastructure such as transportation, communication and energy is backward; education, health care and other social security undertakings are relatively lagging behind [38]. These conditions have a significant impact on the livelihood assets of fishermen. This in turn affects the solution to the Three Fisheries Issues². Yu et al. [39] proposed that the Three Fisheries Issues should be adjusted by public policies, and argued that there is a similarity to the Three Rural Issues, reflecting the Three Fisheries Issues characteristics of depleted fishery resources, difficult livelihood of fishermen and the weak economy of fishing villages. From the perspective of subjectivity, the topic of the Three Fisheries Issues is a special subject, which is in reality concerns the transformation of fishermen, i.e., how to conduct transformation of their industrial affiliation, livelihood and identity [20].

2.2. Fishermen Livelihood Strategy Framework

Much research has been done on livelihood strategies and the analytical framework is well developed. The UK Department for International Development’s (DFID) sustainable livelihoods framework is the most commonly used for livelihood analysis [40]. This framework has been used by many scholars to study the livelihood strategies of various groups. Mazzone [41] examines the impact of energy use on the diversification of livelihoods in the Brazilian Amazon from two decentralized systems of renewable and non-renewable sources. Su et al. [42] discussed livelihood strategies for tea farmers, and called for building partnerships between tea farmers and tourists to enhance the integration of tea and tourism, promote the participation of local tea farmers and increase incomes, especially for those with low livelihood assets. Based on existing research, Winters et al. [43] developed a framework for analyzing households’ livelihood strategies to measure their livelihood assets, activities and outcomes. For this study, the details of these frameworks need to be revised to suit the specific context of fisheries, fishers and fishing villages. However, whether it is the fishermen, the fishing industry or the fishing village, it is not an about individuals but a socio-ecological system [44]. The subsystems of fisheries resources, fisheries

management, and fisheries fishing interact with each other in the broad social, political and economic context of the external environment [9]. Most importantly, these mentioned theoretical frameworks provide the knowledge base for the development of a framework for fishermen's livelihood strategies.

Based on the characteristics of fishermen, fisheries and fishing villages, we have developed a framework (Figure 1) for analyzing fishermen's livelihood strategies by combining the sustainable livelihoods framework, the household livelihood strategies and the socio-ecological systems framework [40,43–46]. The framework deliberately highlights policy change factors. Our key goal is to understand the impact of policy change on fishers' transition and livelihood capital.

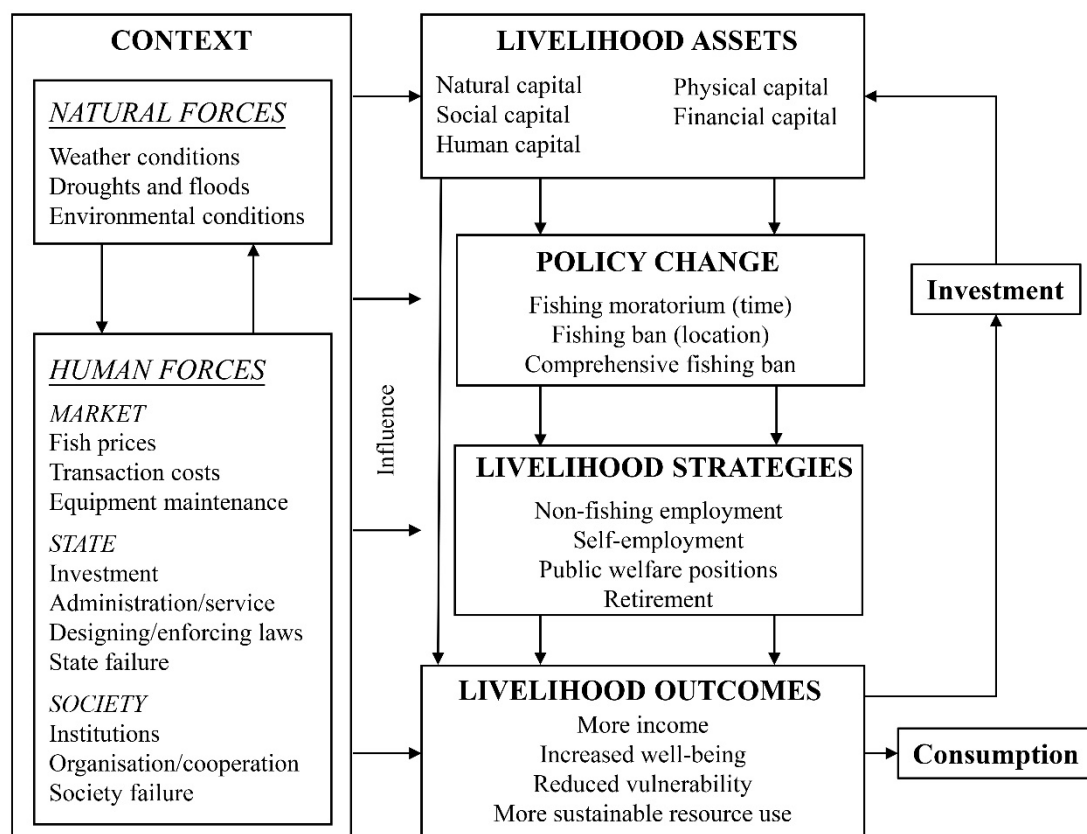


Figure 1. Fishermen's livelihood strategy framework (adapted from [40,43–46]).

This framework consists of five sections: context, livelihood capital, policy change, livelihood strategies, and livelihood outcomes. Context refers to the external environment of fishers' livelihoods, which has a direct impact on policies, livelihood capital, strategies, and outcomes. Market prices affect fishermen's willingness to fish and income; government agencies manage fishermen's rights to fish in the waters. Livelihood assets are the resource base of people and include natural, social, human, physical and financial capital. For example, fishermen need fishing boats, nets and shrimp cages to catch fish, etc. The policy changes for inland fishermen refer mainly to the three policy types of a fishing moratorium, fishing ban and comprehensive fishing ban. The two former are mainly about fishing bans at specific times and places, such as fish spawning periods and nature reserves [9]. The comprehensive band does is not allow fishing at any time or location. Livelihood strategies refer to how people choose the best way to achieve their livelihood outcomes in a certain natural and human context, in the face of policy changes, using the livelihood capital they possess, and in their production and business activities, to adapt to the external environment and to improve their livelihood situation [46]. For inland fishermen affected by bans, there are four categories of strategies to choose from, and they are non-fishing

employment, self-employment, public welfare positions and retirement [18]. Livelihood outcomes generally are the goals that people achieve through livelihood strategies, such as increased income, increased well-being, more sustainable use of natural resources and reduced vulnerability [47]. Part of these outputs are used for consumption and the rest are further transformed into livelihood assets through investment.

3. Materials and Methods

3.1. Study Area

Poyang Lake is a seasonally important lake in the Yangtze River basin, located on the south bank of the middle and lower reaches of the Yangtze River, north of Jiangxi Province [48]. It is the largest freshwater lake in China, with a maximum area of about 4000 square kilometres during periods of high water [49]. According to statistics, there are more than 300 traditional fishing villages in the lake area. More than 20,000 households and over 100,000 people have been fishing for a living for generations.

Datang Village is the largest fishing village in the Poyang Lake area in northern Jiangxi (Figure 2). It is a typical suburban inland fishing village, backed by Lushan Mountain and facing Poyang Lake. Datang Village is a key village in terms of the implementation of the fishing ban in Jiangxi Province, with a land area of 0.3 square kilometres. There are 3 groups of villagers in the village, with 388 households and 1528 people; approximately 90% of the village population make their living by fishing. Of these, 275 households have fishing licenses and support a total of 1218 family members. In addition, there are more than 100 fishermen who fish without a licence.

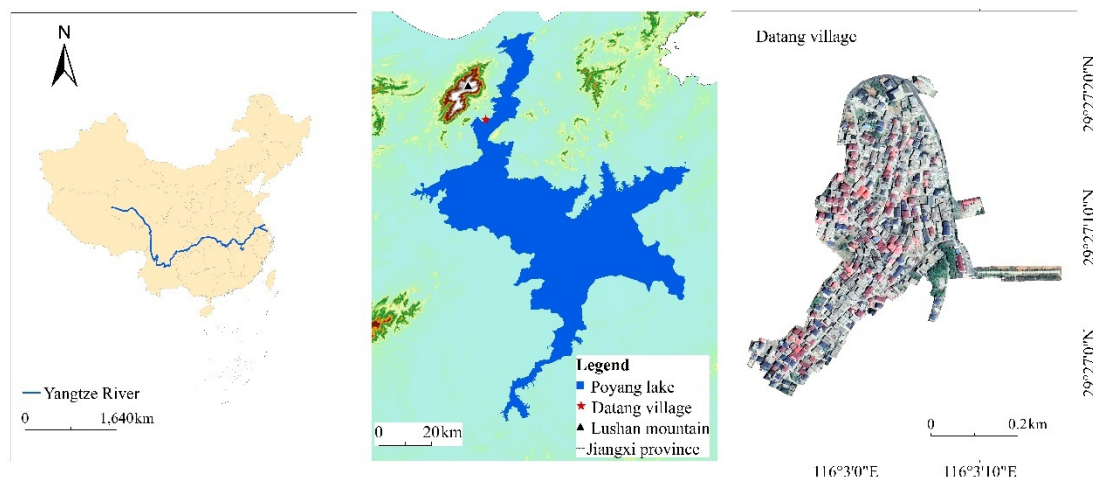


Figure 2. Location Map of Datang Village (Source: collated by the author).

3.2. Data Collection

In order to systematically understand the policy background and specific measures of the comprehensive fishing ban, we collected 12 relevant documents and circulars by means of a desktop survey. These documents are mainly issued by governments at both national and local levels. Their main contents cover various aspects such as aquatic life protection, fishing ban notices, compensation schemes, boat and net recovery, retirement protection and employment guidance. Meanwhile, we have also collected several reports and interview articles on the comprehensive fishing ban from authoritative media. These documents allow us to better understand China's policies and regulations on inland fisheries management, as well as the detailed provisions of the comprehensive fishing ban in the Yangtze River basin.

The fieldwork was carried out from March 2020 to July 2022. To explore the changes of fishermen's livelihood strategies and their influencing factors before and after the fishing ban, we conducted field surveys in the Poyang Lake area on three occasions in March 2020, December 2021 and June 2022. The first two of these were pre-studies in which we visited three traditional fishing villages in the Poyang Lake area. During this period,

the research questionnaire was designed through participant observation, and typical interviews. In the final study, 275 questionnaires were collected and semi-structured interviews were conducted with eight fishermen who had changed jobs. One household is surveyed per questionnaire and the head of the household is selected for the survey. The questionnaire included information on household demographics, housing, household income and expenditure before and after the fishing ban, social security, boat and net tools, and employment placement. The interviews covered fishermen's attitudes towards the fishing ban policy, difficulties in transitioning their livelihoods, their sense of identity after the transition, and their demands for policy adjustments. Each interview lasted approximately 30 to 60 min and was recorded throughout.

4. Result

4.1. Statistical Characteristics

Although fishermen are seen as a part of the farmer category in the context of the larger agricultural concept, there are important differences between fishermen and farmers in terms of production and livelihood [50]. Fishermen and farmers differ in many ways, notably in the lack of the necessary security of means of production and in the clear retirement age; at the same time, fishermen have a high cost of production tools and face a greater crisis of unemployment; In addition, the consequences of disasters are severe [51,52]. According to our surveys, there are 275 licensed fishermen in Datang village (Table 1), with an average age of 45.53. Under the latest fishing ban, fishermen over the age of 60 have the option to retire. A total of 202 fishermen own fishing boats, including 166 steel boats and 36 wooden boats. The average length is 11.78 m, width 2.04 m, load capacity 2.46 tonnes and power 23.88 kilowatts. Based on our interviews, it costs around 50 to 80 thousand RMB to build one of these fishing boats. Compared to other fishing villages, the living conditions of fishermen in Datang Village are relatively good. The average household dwelling area is 239 square metres, with 53.96 square metres per capita, which is higher than the national average [53].

Table 1. Statistics on the basic characteristics of fishermen.

Types	Indicators	Mean	Standard Deviation
Demography	Age	45.53	10.30
	Years of education	8.19	2.43
	Family size	4.43	1.76
	Number of dependents	0.48	0.79
	Number of people raised	1.26	1.10
Boats and gear	Steel boats	166.00	/
	Wooden boats	36.00	/
	Length of boat (m)	11.78	1.62
	Width of boat (m)	2.04	0.59
	Power of boat (kw)	23.88	11.79
	Tonnage of boat (t)	2.46	1.30
	Age at disassembly	5.87	2.27
	Valuation of boat (RMB: thousand yuan)	26,950.50	13,209.80
	Valuation of gear (RMB: thousand yuan)	6903.61	5.67
Compensation for fishing ban	Fishing license buyback (RMB: thousand yuan)	1000.00	0
	Transitional Living Allowance (RMB: thousand yuan)	12,000.00	0
	Total compensation for fishing ban (RMB: thousand yuan)	27,789.07	13,697.41
	Household income before the fishing ban (RMB: thousand yuan)	80,000.00	3997.85
	Of which, fishing income (RMB: thousand yuan)	50,000.00	3308.91
Income and expenses	Household expenses before the fishing ban (RMB: thousand yuan)	40,000.00	3742.13
	Household income after the fishing ban (RMB: thousand yuan)	31,432.73	10,375.60
	Size of family housing (m ²)	239.00	112.46
Housing	Size of individual housing (m ²)	53.96	/
	Age of housing	17.99	6.57

Source: collated by the author.

4.2. Transformation of Livelihood Strategies

Of the 275 fishermen households we surveyed, 253 had achieved a livelihood transition (92%). Fishermen in the study area identified four livelihood strategies such as non-fishing employment (LS1), Self-employment (LS2), Public welfare (LS3) and retirement (LS4), respectively.

Figure 3 shows that the largest number of fishermen chose LS1. In terms of age, the majority of them are between 30 and 60 years old (89%); in terms of employment direction, they are mainly working in the tertiary sector (79%); and in terms of education level, most of them were categorized as primary and middle school (92%). One of the most interesting observations is the group of 82 fishermen in livelihood category LS2. Their areas of business are mainly in the tertiary industry too. However, the average level of education of this group of fishermen is higher than that of people who chose LS1. Only eight fishermen chose to take up public welfare positions (LS3); this is because such positions are funded by the village council and their primary purpose is to protect the livelihood of low-income and disabled groups. A group of 10 fishermen have chosen to retire (LS4). They are all over 60 years old, in poor health and with low levels of education, making it difficult to find suitable positions for them in the job market. Therefore, retirement is a good option for them, after a lifetime of hard work.

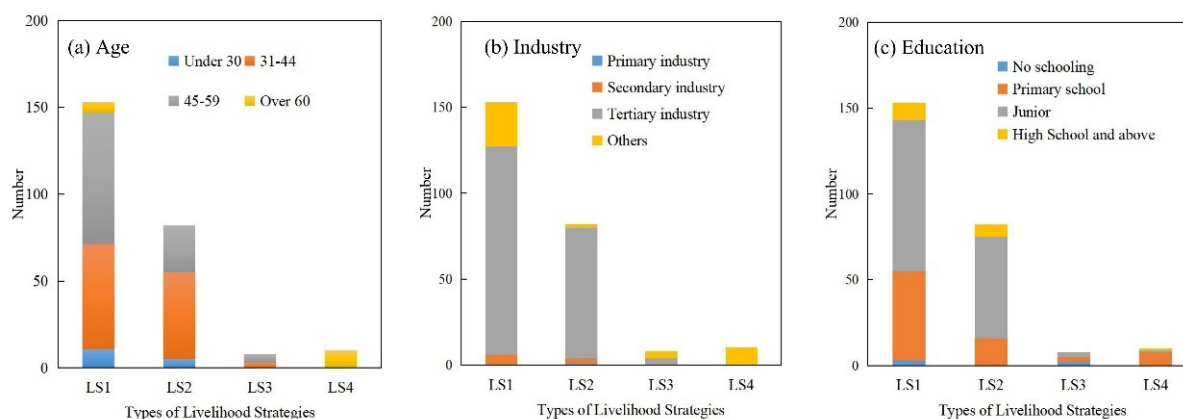


Figure 3. Analysis of fishermen's livelihood in relation to (a) age, (b) industry, and (c) education.

4.3. Factors Influencing the Transformation of Livelihood Strategies

According to the Fishermen's Livelihood Framework, livelihood capital is the main factor influencing fishermen's livelihood strategies.

Natural capital. The overall natural capital of the fishermen in the Datang village is extremely scarce. Due to its location on the outskirts of the city and facing Poyang Lake, there is almost no available land. After the government issued a fishing ban, fishermen lost their right to fish in Poyang Lake. However, the village is small and there are no freshwater ponds inside it to raise plants and animal resources such as fish, shrimps and shellfish. Fishermen who lost their fishing rights in lake waters, like farmers who lose their land, have particularly few livelihood strategies to choose from, constrained by several factors.

We are a professional fishing village, our ancestors have been fishing for generations, and our education level is relatively low. Now that fishing is not allowed, we have no skills, so we have to go out to do odd jobs, work as security guards or something like that, and some of the women have gone to garment factories. (Interview number: DT01)

Human capital. The fishermen of Datang village are suffering from schistosomiasis (100%) and are in poor health due to the long hours of production and living on the lake. The health of fishermen may be eased and restored when they retire from the lake and are removed from life on the water. However, on a cultural level, the majority of fishermen are educated at the primary or lower secondary level (92%), with only a small number having a high school education or above (7%), and some have not even attended school at all (1%),

so overall the level of education is low. Meanwhile, because of their year-round livelihood as fishermen, they have had less contact with the outside world and society, and when they leave their original environment, they easily show fear and anxiety in their psychological condition.

I am very grateful to the village committee for giving me a public service position as a cultural manager, as I only have a junior high school education and am not well enough to know what I can do after the fishing ban. (Interview number: DT03)

Social capital. The social capital held by fishermen in Datang village can be broadly divided into policy capital and family kinship and karma. Policy capital refers to the government's purchase of pension and medical insurance for all men over 60 and women fishermen over 55 years of age. This will allow them to retire with a certain amount of money (under 1000 yuan RMB) per month to make ends meet, just like city workers. Furthermore, all fishermen have medical insurance and if they fall ill, the hospital can reimburse most of their medical bills. Family kinship and karma, on the other hand, play essentially the same role as social capital, giving help to fishermen in need when their livelihoods break down. However, fishermen have relatively simple social networks and therefore social capital is scarce.

Our relatives, friends and neighbours are all fishermen and there are no social resources to rely on. Now that fishing is banned, jobs are not so easy to find. But I'm sure I can do it if I work hard, I'm still quite young after all. (Interview number: DT08)

Financial capital. The main element of financial capital owned by fishermen is expressed in terms of household income. These incomes are mainly derived from stable fishing operations, employment in business, etc. Investment income is largely absent as fishermen are not good at financial investment due to their literacy level limitations. As the market was better in previous years, many fishermen had some family savings, so after the ban, some families chose to start their businesses, but mostly concentrated in the restaurant, accommodation and water transport industries.

My family has a boat, and except for the fish spawning period and bad weather, we spend most of the time fishing in the lake, and we can sell fish for money every day when we dock, and we have saved more than 100,000 yuan over the years. Now I have a restaurant, and many tourists come to my house to eat, so business is quite good. (Interview number: DT06)

Physical capital. For the fishermen of Datang village, their physical capital is mainly their fishing boats, nets and houses. When the fishing was withdrawn, the boat and nets were bought back and dismantled by the government, which gave a certain allowance, but it was much less than the cost of the boat. Previously, the price of fish was relatively high and part of the money earned each year was used to upgrade equipment; most of the rest was used to build houses with 53.96 square metres of housing per person. From the outside, therefore, the houses in the village of Datang are quite wide and beautiful. Now, without boats and nets, sources of income are cut off and livelihoods become unsustainable.

Most of the young people have gone out to work, while some women have chosen to work in the clothing factories in and around the village; Working in the garment factory, they can earn more than 2000 yuan a month to supplement their household. (Interview number: DT01)

4.4. Emotions, Attitudes and Fishing Bans

From media reports and our deep interviews, it is possible to identify the emotions experienced by fishermen and their attitudes towards the fishing ban.

By reviewing media reports, we find that fishermen have a deep attachment to their boats, which in their hearts are not just a means of making money, but also their homes. For example, a report from The Paper News reads: The day before signing the withdrawal agreement with the county government, on 29 December 2019, Zhang Qirong (a fisherman) was preoccupied and kept thinking about her fishing boat, after the relevant recovery program had been issued to fishermen, and she estimated that all her fishing gear together was probably worth only about 10,000 yuan. She was a bit upset, saying that it was all she had. *“I have almost nothing but these (boats and nets)”* (News report number: MR200107). This feeling was also deeply felt during our fieldwork, when a fisherman in his 50s said: *Watching my boat being dismantled, I knew it was time to say goodbye to my old life. Life will be better with the help of the government and just regard fishing as a good memory* (Interview number: DT03).

However, are the media reports always true? One news report reads: *I work as a sailor in the park, responsible for visitor safety, and my wife works as a cleaning lady. The two of us together earn 4000 yuan a month, which is similar to, but easier than, fishing in the past!* (News report number: MR200113). In fact, we found in our survey that income after switching jobs was not as much as fishing and varied considerably. For example, when asked about his current income, an employee of a water transport company said: *It's not even close to what fishing used to be, it's just a way to make a living. In the past, if you went fishing, you could earn 1000 to 2000 yuan a day, or a few hundred yuan at worst; Although there indeed is less of it now, I believe it is all temporary, the reform needs a process and the days will get better* (Interview number: DT05).

Human emotions are complicated. As regards Poyang Lake, this water has fed generations of fishermen, and many people have lost their lives here for livelihood, some are grateful for it, some have hated it, but no matter what, they can never leave it.

The fishing ban not only affected the fishermen's emotions but also changed their attitude towards the government to some extent. In the process of retiring the fishermen, the government has given them a certain amount of money for the transition period, some money for buying back their boats and nets, and they have been given insurance. However, one of the fishermen said: *I am 55 years old and will not receive my pension for another five years, and I am still confused about how to spend this period* (Interview number: DT02). *We have always thought that the central government's policy is very good, but it may be that the explanation was not clear enough when it was implemented at the bottom and caused us some misunderstanding* (Interview number: DT07). At a derelict fish processing plant, several fishermen told us that *although he cannot fish in Poyang Lake, he can still raise fish in his fish pond, only with less income. But he believes this is all temporary* (Interview number: DT04).

Regarding plans, many fishermen say they hope the government will build a factory nearby so that they can work without fear; or introduce some jobs that match their skills. The previous employment assistance policy did not work well because the skills needed for the jobs did not match theirs.

5. Discussion

5.1. Characteristics of Inland Fishermen

Previous studies [39,54] suggested that fisheries, fishermen and fishing villages mainly face problems such as resource depletion, livelihood difficulties and economic weakness. However, in this study, we found that before the fishing ban, the fishing industry in Datang village was economically active, with fishermen earning significant incomes and making a good living. Most of them have used the income from fishing to build bright and spacious houses for their families, with the remaining funds being able to be invested in upgrading their fishing equipment. Consequently, the ban has led to a reduction in the quality of life of the region's fishermen and an increase in their economic vulnerability, upsetting

the original balance of life. Therefore, we have to think that it is good to protect the environment, but we face difficulties in formulating and applying policies to ensure that people's living standards do not decline in the process.

We found low levels of educational attainment and poor social mobility among fishers in Datang village, which is largely consistent with the findings of existing research on fisher characteristics [52]. However, it is worth noting that the average age of fishermen in the region is younger and the ageing population is fewer than in other types of agriculture, particularly rice farming [46]. At the same time, before the fishing ban, everyone had almost the same natural capital—the right to fish. The rapid development and changes in the community of Datang village after the fishing ban may lead to an increasing problem of disparity between the rich and the poor.

5.2. Main Transfer Paths

Livelihood strategies of inland fishers differ from those of marine fishers. According to Schultz's [55] labour transfer theory, for marine fishermen, labour transfer pathways can be divided into internal and external industrial transfers. Internal industry transfer refers to the transfer of marine fishermen to related fisheries industries, such as mariculture, fish processing and part-time fishing. External industry transfer refers to the transfer of marine fishermen to industries unrelated to marine fisheries, such as migrant labour and commerce [18]. In this study, however, we found that the industrial transfer paths of inland fishermen were very limited, mainly into secondary and tertiary employment and self-employment. A few fishermen have also chosen to take up public service jobs offered by the village, for example, cultural wardens and road cleaners.

We found that in the traditional professional fishing villages in the Poyang Lake basin, the current ban on fishing has forced them to give up fishing altogether, and even recreational fishing is not allowed. As a result, local fishermen turn to employment in areas not related to the fishing industry. In contrast, this is not the same in other parts of the world. In Brazil, in the Amazon basin, the management of fisheries is limited to specific species. There are also restrictions on the size of fishing boats and nets, which regulate fishing to a certain extent, but do not have much impact on the choice of livelihood strategies of fishermen [56,57]. In the Great Lakes region of the United States, for example, commercial fishing was once the main industry of the lakes. With the decline in biodiversity, only a small amount of commercial fishing still takes place, but the focus of the fishery has shifted to sport fishing. Moreover, for local people, fishing is a way of life that has been passed down from generation to generation, and commercial fishing and subsistence are allowed to preserve their right to livelihood [58].

5.3. Shortcomings of the Current Policy

Every policy has its positives and negatives [59]. In the case of the comprehensive fishing ban policy in the Yangtze River basin, on the one hand, it contributes to the reduction of pollution, the protection of the environment and the enhancement of biodiversity. On the other hand, it has affected the production, life and livelihood of local fishermen. In this study, we found that the policy is not yet adequate and many aspects could be further improved. First, in terms of fishing rights, its legal basis is not sufficient; there is no clear legal regulation on whether the fishing rights of Poyang Lake belong to the state, locality or residents. Furthermore, although the government carried out certain employment assistance activities, such as special job fairs, employment training sessions, job search subsidies and business start-up incentives, their outcomes are not obvious, mainly due to the poor match between the jobs offered by enterprises and the education, skills and needs of retired fishermen. Finally, the medical guarantee for fishermen who have retired from fishing needs some fine tuning. During the survey, we found that all fishermen in the area suffer from schistosomiasis, a chronic disease, but there are no details on the medical subsidies and reimbursement policies for this disease. In general, we found that the majority of fishermen were receptive to the new policies, with only a small percentage

expressing an opinion. Through our research, we consider that it will take some time to test the effectiveness of the implementation of the various policy measures.

6. Conclusions and Recommendations

This paper is the first qualitative study to examine the transformation of fishers' livelihood strategies, the factors influencing them and their response to policy change scenarios from the perspective of inland fishers' livelihoods after the implementation of a comprehensive fishing ban in the Yangtze River Basin. Based on the findings of the study, we believe that some recommendations can be made in the following areas to help people in the region to choose better livelihoods.

It involves, firstly, enhancing education and training to enhance the human capital of fishermen. For fishermen of various occupations and levels of education, we may provide aquaculture technology training, production skills, vocational skills, management and service levels, and green fisheries development concepts. For fishermen wanting to go out for employment, priority should be given to providing basic vocational skills training and guiding them to move to economically developed areas such as the Yangtze River Delta and the Pearl River Delta for employment.

Moreover, there is potential to develop tourism and other industries based on the state of local resources. A leisure fishing industry may be developed which integrates ornamental, leisure fishing, fishing experience, and fishing culture tourism; several fishing villages may be created with characteristics that connect industry, culture, tourism, production, life, and ecology. For fishermen ready, willing, and able to work across sectors and fields, priority goes to guiding them to re-employment in aquaculture, aquatic product processing, and other related familiar jobs.

Finally, the government should provide good policy protection. For example, financial support may be increased for the diversified development of the fishing industry, supporting the extension of the fishing industry chain, and developing new fishing models. In addition, it is necessary to implement tax incentives to encourage employers to hire many retired fishermen. These policies can include tax exemptions, capital subsidies, and guaranteed loans. Furthermore, a system of support and protection may be established focusing on vulnerable groups of fishermen such as the poor, the elderly, the sick, and those who are "boat-bound" and have no re-employment capacity.

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Notes

- ¹ The Three Rural Issues are three issues relating to rural development in mainland China: agriculture, rural areas and farmers. The name “Three Rural Issues” was first coined by economist Wen Tiejun in 1996, and were highlighted by China’s top leaders as areas of rural development in China that need work.
- ² Three Fisheries Issues refers to an overall term for the three issues of fisheries, fishermen and fishing villages.

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