

## Article

# Territorial Pluralism in China: Local Water Users' Adaptation Strategies in the South–North Water Transfer Project

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**Abstract:** China's South–North Water Transfer Project has been questioned as it has resulted in significantly negative issues. Drawing on the notion of hydrosocial territories, this article examines the contested hydraulic configuration and counter-imaginaries from local water users' perspectives and their specific adaptation strategies in the South–North Water Transfer Project. This article argues that local water users in a Chinese context can only adopt adaptation strategies that are determined by their socio-economic backgrounds. This has led to significant social and environmental injustice. Addressing these issues is crucial for tackling inequities in the South–North Water Transfer Project and achieving the ambitious development goals of the project.

**Keywords:** hydrosocial territories; water governance; territorial pluralism; SNWTP; China



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## 1. Introduction

China has developed the world's biggest inter-basin water transfer project—the South–North Water Transfer Project (SNWTP). The project aims at transferring large amounts of fresh water from the Yangtze River in southern China to the Yellow River, Huai and Hai basins in the north [1]. China's northern region has long been short of water [2]. For example, as [3] shows, despite being home to approximately 45% of the total population and accounting for approximately 65% of the total arable land in China, the northern region only has 19% of the country's total water resources, and its water availability per capita per year is just around half of the international threshold level. Therefore, the SNWTP is expected by the central government to deal with water scarcity and ensure normal human activities and socio-economic development in northern China [4]. The eastern and middle routes of the SNWTP have been in operation since 2013 and 2014, respectively. The SNWTP has already provided northern China, including the two mega municipalities Beijing and Tianjin, with fresh water, mitigating the over-exploitation of groundwater and alleviating the water shortage issue. In this sense, scholars have justified that the SNWTP is needed and successful [5,6].

However, the SNWTP has long been questioned by the academic circle. For example, Ref. [7] points out that the SNWTP has resulted in significantly negative issues, including environmental risks, forced resettlement, and uncoordinated management of the water courses. Ref. [8] shows exorbitant costs for installing pumps in the eastern route to divert water to the north, recouping resettlement, and controlling pollution, thus raising doubts about the long-term sustainability of the SNWTP. Emerging studies have engaged with the politics of water in China to understand how power, governmentality, and political nature of technology in the water domain play out in the SNWTP. For example, Ref. [9] concludes

that the SNWTP reflects the ideas of Ecological Modernization and Authoritarian Environmentalism as it prioritizes technological solutions to address environmental pollution and restricts non-governmental participation in the policymaking process. Ref. [10] argues that while the SNWTP is being presented as politically neutral by the Chinese government through the discourse of “human-exacerbated water stress with naturalized narratives about water scarcity”, its ultimate goal is to pursue continued rapid economic development and consolidating the political legitimacy of the ruling party. In other words, the operation of the SNWTP ignores the anthropogenic causes of the water shortage in northern China.

The notion of hydrosocial territories could contribute to the analysis of water politics in the SNWTP. This is because the notion of hydrosocial territories concerns the top-down water control embedded in China’s political–economic system, characterized as the state’s hydrosocial territorialization process. Reflecting the will of the state, such hydrosocial territorialization often accompany the “process of inclusion and exclusion, development and marginalization, and the distribution of benefits and burdens” [11], and, therefore, may subsequently affect social and environmental justice in the use of water between different stakeholders [12]. In this sense, the notion of hydrosocial territories also pays attention to the contested territorial configuration of non-state stakeholders through “territories-in-territory”, or “territorial pluralism” to understand how non-state stakeholders strive to build and defend their hydrosocial territories [13]. However, currently, no studies have drawn on the notion of hydrosocial territories to examine the contested hydraulic configuration and counter imaginaries from local water users’ perspectives and their specific adaptation strategies in the Chinese context, not to mention in the SNWTP.

This article attempts to fill the research gap. This article attempts to investigate the emergence of the “territories-in-territory” and “territorial pluralism” in the SNWTP, in which local water users endeavor to claim their water rights and sustain their livelihoods, and that is contrasting to the state hydrosocial territorialization and techno-political imaginaries in the project. This investigation helps understand local water users’ diverse interests and capabilities in the decision making and implementation of the SNWTP. Specifically, this article conceptualizes the SNWTP as a hydrosocial territory to explore the distinct views, aspirations, and interests of local water users and how they respond to the state-constructed hydrosocial territory depending on specific adaptation strategies. This article classifies local water users into two types: large and small water users. It asks three key research questions: (1) How do the state-constructed hydrosocial territory and imaginary differ from large and small water users’ views, aspirations, and interests in the SNWTP? (2) What specific strategies do large and small water users employ to adapt to the state territorialization in the SNWTP? (3) What are the consequences and implications of large and small water users’ different adaptation capacities? To answer these research questions, primary data were collected through a combination of content analysis, semi-structured interviews, and participant observation.

This article contributes to our understanding of the notion of hydrosocial territories and the Chinese mode of water governance in at least three aspects. Firstly, by analysing how national scalar plans of organising hydrosocial territories in the SNWTP differ from the water claims at a local scale, we make a contribution to the ongoing discussion of the scalar politics of territorial reconfiguration. Secondly, we enrich the notions of territorial pluralism, “territories-in-territory” and counter-hydropolitical imaginaries, by exploring the specific adaptation strategies deployed by large and small water users in the SNWTP. Finally, by concentrating on the role of the political instruments in constructing the SNWTP hydrosocial territory, we provide new insights into Chinese water governance, such as the political nature of China’s hydraulic projects and water challenges.

This article proceeds as follows. In the next section, we review the concepts of hydrosocial territories and adaptation strategies and use the Chinese context for illustrations. Section 3 introduces the case area, the Gaoyou Irrigation Area (GIA) in Jiangsu province, a water source area of the eastern route of the SNWTP, and the data collection process. Section 4 discusses the plural form of hydrosocial territories in the GIA. This includes the

state-dominated territorialization in sending fresh water from the GIA to northern China, large and small water users' views, aspirations, and interests toward the SNWTP, and their specific strategies to adapt to the state-dominated territorialization. The discussion highlights how the SNWTP has resulted in territorial pluralism, "territories-in-territory" and counter-hydropolitical imaginaries between the state and local water users. Section 5 discusses the consequences and implications of the local water users' different adaptation capabilities. Section 5 also concludes the article with some theoretical and practical implications to the field.

## 2. Hydrosocial Territories and Adaptation Strategies in the Chinese Context

It has been widely acknowledged that water is inescapably a political issue [14,15]. The hydropolitical framework, in this sense, is critical as it helps examine the relations between water, power, and different techniques of states in water governance [11]. Hydrosocial territory is a space that is constituted by interlinked natural, social, and technological elements for specific purposes, such as political control, natural conservation, or resource utilization [16]. To construct a specific hydrosocial territory, states build unchallenged political orders, hierarchies, authorities, and implement particular water practices and policies. They strategically deploy discourses and imaginaries as the rationalities of their techniques to justify their objectives [17,18], such as supporting local people through expert knowledge modernization [19] and portraying water infrastructure projects as a "symbol of national pride" [20]. Ref. [11], therefore, defines a hydrosocial territory as:

"The contested imaginary and socio-environmental materialization of a spatially bound multi-scalar network in which humans, water flows, ecological relations, hydraulic infrastructure, financial means, legal-administrative arrangements, and cultural institutions and practices are interactively defined, aligned and mobilized through epistemological belief systems, political hierarchies, and naturalizing discourses".

The state's hydrosocial territorialization has often been imposed in a top-down manner and through hierarchically organized institutions [21]. Ref. [22] indicates that there are significant socio-spatial inequalities or injustices in the issues related to hydrosocial territories. China is a typical example. In China, the state holds absolute power and prioritizes its interests above all else through various means [23]. For example, Ref. [24] argues that the Three Gorges Project "asserted the power of the central state" and "depended critically on the political goals of the central state". Ref. [25] introduces China's Water Pollution Control Law as a manifestation of authoritarian environmentalism; its mode of governance is largely based on a state-centric and command-and-control approach. Therefore, the critical role of state intervention has been emphasized in constructing hydrosocial territories. For example, Ref. [26] explains the construction of a hydrosocial territory in the Xin'an River basin eco-compensation pilot. They point out that the central government promotes forging an alignment between the local governments of Huangshan and Hangzhou and closely links the official discourse of the project to China's ecological civilization imaginary. This is in order to "deal with the imbalance between the development level of territories and the responsibility for water governance" in Huangshan and Hangzhou. Also, state territorialization takes place on various scales. For example, as [26] explains, the hydrosocial territory in the Xin'an River basin eco-compensation pilot is shaped by resource mobilization and responsibility allocation between national and local scales. Ref. [27] discusses that China's water governmentality in advancing Lancang-Mekong Cooperation reflects its effort to construct a governable hydrosocial territory on a regional scale through the official and popular discourse of "promoting multilateral politics, economic benefits, and social integration". Therefore, understanding hydrosocial territories requires an understanding of their scalar dimensions and interrelations.

Infrastructure projects have increasingly become objects of the study of hydrosocial territories and state territorialization processes [28]. In this sense, the SNWTP can be understood as a new hydrosocial territory constructed by the central government. This is because the central government attempts to govern water, society, and people on a

local scale through a series of government programs and techniques in the SNWTP. For example, Ref. [7] discusses that to ensure a clean water supply from the Danjing reservoir catchment area in the middle route of the SNWTP, socio-economic development in the area has been restricted, leading to “the impoverishment of the hundreds of thousands of people who were forced to move”. Ref. [29] argues that the SNWTP represents China’s techno-political water management regime and reflects a far-reaching Water Machine. They further explain that the SNWTP is to consolidate “a mega-economic region joining Beijing, Tianjin, and Hebei (including Xiong’an New Area)”, maintaining the powerful political and economic position of Beijing, the capital city of the country. Ref. [30] introduces that the institutional arrangement in the SNWTP has a significant political nature. The state intervenes in pricing the water, and there is still a mentality of “party leads everything”. In contrast to these studies, other scholars have drawn on this concept and hydrosocial territories to understand China’s particular governing rationalities and practices in the SNWTP. For example, [31] reveals that the SNWTP has reconfigured hydrosocial relations as “certain cities and counties are identified as source areas that have responsibilities and subordinate interests with respect to those water receiving areas”. As [32] explains, “by ‘decentering’ the central state in China’s hydropolitics, a governmentality with multiple centers, diverse practices, and techniques emerges”. Also, Ref. [33] outlines the tools of the government being mobilized in the SNWTP, including planning instruments, financial transfer, displacement, and discursive imaginings. They explain that these tools are used to achieve the primary objective of the SNWTP but have marginalized the local hydrosocial territories of the neighboring counties and the downstream areas of the Dan River.

It is clear that state hydrosocial territorialization is based on its power and techniques to configure a specific territorial arrangement. The state often makes its hydrosocial territories and imaginaries hegemonic and unchallengeable, and local territories comprehensible, exploitable, and controllable [34]. However, distinct views, aspirations, and interests over how a specific hydrosocial territory is and should be constructed always exist. This has led to contested territorial configuration and making different “territories-in-territory” and “territorial pluralism” [11]. As [35] points out, these “territories-in-territory” and “territorial pluralism” are structured by “different rules and normative frameworks, sources of legitimacy, forms of authority and related discourses” and, therefore, interacting, conflicting, opposing and competing with each other. Various articles show that the root cause of territorial struggle is that new attempts at water control have undermined and transformed long-standing local territorial governance and autonomy [36,37]. All of these interactions, conflicts, oppositions, competitions, and struggles are to maintain and strengthen their own territorial control, for example, sustaining their livelihoods and self-defining their own territorial rules, values, meanings, and identities [35]. Therefore, the reconfiguration of hydrosocial territories shows they “are integral part of social strategies and serve as the arena where struggles for control and empowerment are fought” [38]. Also, as [16] indicates, whether particular local territorial stakeholders can achieve their desires regarding the territorial proposals in territorial struggles depends on the power they hold and the strategies they employ.

Scholars have discussed local territorial stakeholders’ specific counter-forces and strategies in opposing state-initiated hydraulic projects around the world. For example, [13] introduces that in the Ilisu Dam development in Turkey, the archaeologists complained about the dam at the 2001 World Archaeological Forum, and the people who were affected by the dam handed over “1500 signed letters to European embassies in Ankara (2008) or a local delegation meeting European ambassadors in person (2009)”. They voted for the dam-opposing parties in the election [39]. Ref. [35] finds that in responding to the Ecuadorian state’s water policies and institutional reforms and demanding respect for local autonomy and self-government over the use of water, indigenous communities create multi-scalar federations and networks to mobilize over 300 grassroots organizations for massive street protests. They also transcend their provincial geographical and administrative boundary to build a network with multiple stakeholders on a national scale, including

state institutions, academics, and multi-ethnic groups. In rural Nicaragua, to protect and promote local autonomy and ownership of water access and gain state support in water governance, uniting approximately 30,000–40,000 rural residents, Potable Water and Sanitation Committees scale up their concerns to work with national and international actors and networks, which allows them to “transcend their localities, engage with state authorities and integrate themselves into policymaking processes” [40]. Also, Ref. [41] finds that in Bolivia, rural communities, who are not included in the Inter-basin Irrigation Water Transfer Project Yungas de Vandiola, change their hydro-territorial imaginaries and establish multi-scalar alliances to strategically support their hydrosocial imaginaries and claim their water rights. Related to counter-forces and strategies in opposing China-launched hydraulic projects, Ref. [27] argue that in the Lancang–Mekong region, competing discourses and imaginaries of multiple actors on multiple scales in Chinese discourses and imaginaries are prevalent. This is due to the diversity of actors’ preferences and interests, the inapplicable coercive mechanisms of China, and various values, cultures, established authorities and locally accepted knowledge.

However, within the Chinese jurisdiction, it is more appropriate to examine local territorial stakeholders’ adaptation strategies rather than opposing strategies. In China, it is almost impossible to oppose the central government’s hydrosocial territories and environmental imaginaries. For example, while [42] find that while ecological civilization may fall short of addressing multi-dimensional and multi-scalar social and environmental justice issues, it still underpins China’s transformative development vision in the Guangdong–Hong Kong–Macao Greater Bay Area, and one is able to oppose it. This is because China’s mode of water and environmental governance is largely based on authoritarian environmentalism, which has a non-participatory nature in policymaking [23]. Local opposition to the central directives through large-scale street protests and demonstrations and networks with civil society and international organizations, which have been found in other contexts, are highly restricted in China. Opposition to state-initiated policies may result in huge risks to local people as the state often resorts to repressive and coercive measures to deal with opposition. As [43] reveals, while local villagers in Chongming island perceive the introduction of rural domestic wastewater treatment as a threat of urbanization and displacement of their livelihoods, they do not react radically but resist softly, including using social networks to block construction and deploying a hybrid discourse comprising traditions. Therefore, in this article, according to previous studies’ definitions of adaptation strategies in the context of environmental changes [44,45], we define local territorial stakeholders’ adaptation strategies as a series of actions of reducing or ameliorating risks and vulnerabilities that result from the state’s hydrosocial territorialization. Through a wide range of capitals, such as physical capital, human capital, financial capital, and social capital, these adaptation strategies are to ensure the daily use of water for irrigation so as to sustain livelihoods. Compared with those opposing strategies, local territorial stakeholders’ adaptation strategies in China are less radical and do not seek to fight against the state-enforced hydrosocial territorialization that results in livelihood risks and vulnerabilities.

To date, relevant studies have not focused on the contested hydraulic configuration and counter imaginaries from local territorial stakeholders’ perspectives in the SNWTP, including the distinct views, aspirations, and interests of local territorial stakeholders in the water source area over SNWTP hydrosocial territory and their specific adaptation strategies to respond to the territorialization and political practices of the state. Filling this research gap would help enhance the understanding of “territorial pluralism”, “territories-in-territory”, counter-hydropolitical imaginaries, and hydrosocial struggles and strategies. It would also help to explain how China’s mode of water governance serves national interest, imposes significant socio-economic and environmental burdens on the powerless local people through large-scale central interventions in local socio-economic processes, and falls short of addressing social and environmental justice between different stakeholders.

### 3. Methods

In this article, we selected the GIA in Jiangsu province as the location of the fieldwork. Figure 1 below shows the location of the GIA. There are several lakes around the GIA, including Hongze lake (volumetric capacity: 3.1 billion m<sup>3</sup> and Gaoyou lake (volumetric capacity: 900 million m<sup>3</sup>) in the northwest and Shaobo lake in the southeast. The GIA's water source comes from the Beijing–Hangzhou Grand Canal. The GIA is one of the biggest irrigation areas in China. Its total area, arable land area, and effective irrigation area are 649,000,000 m<sup>2</sup>, 346,765,320 m<sup>2</sup>, and 336,366,360 m<sup>2</sup>, respectively. In the GIA, the main grain crops are rice and wheat, and the main cash crops are vegetables. The GIA has a total population of 471,000, including an agricultural population of 241,100. In this sense, agricultural production and irrigation water are vital for the large population to sustain livelihoods in the GIA. In fact, the Gaoyou area has abundant water resources and is called the “land of fish and rice”. For example, as the third largest lake in Jiangsu province, 55.3% of Gaoyou lake's total area is within the Gaoyou area. The Gaoyou area's runoff is about 150 million m<sup>3</sup> per year, and the density of its water network is 2.83 km/km<sup>2</sup>. In 2019, the irrigation water supplied to the GIA was about 450 million m<sup>3</sup> per year and of that, 15.3% was from the local water in the Gaoyou area, which is about 69 million m<sup>3</sup> per year. This number, 69 million m<sup>3</sup> per year, is about half of the Gaoyou area's runoff (150 million m<sup>3</sup> per year) due to environmental flow, water conveyance losses, and water uses for other purposes.

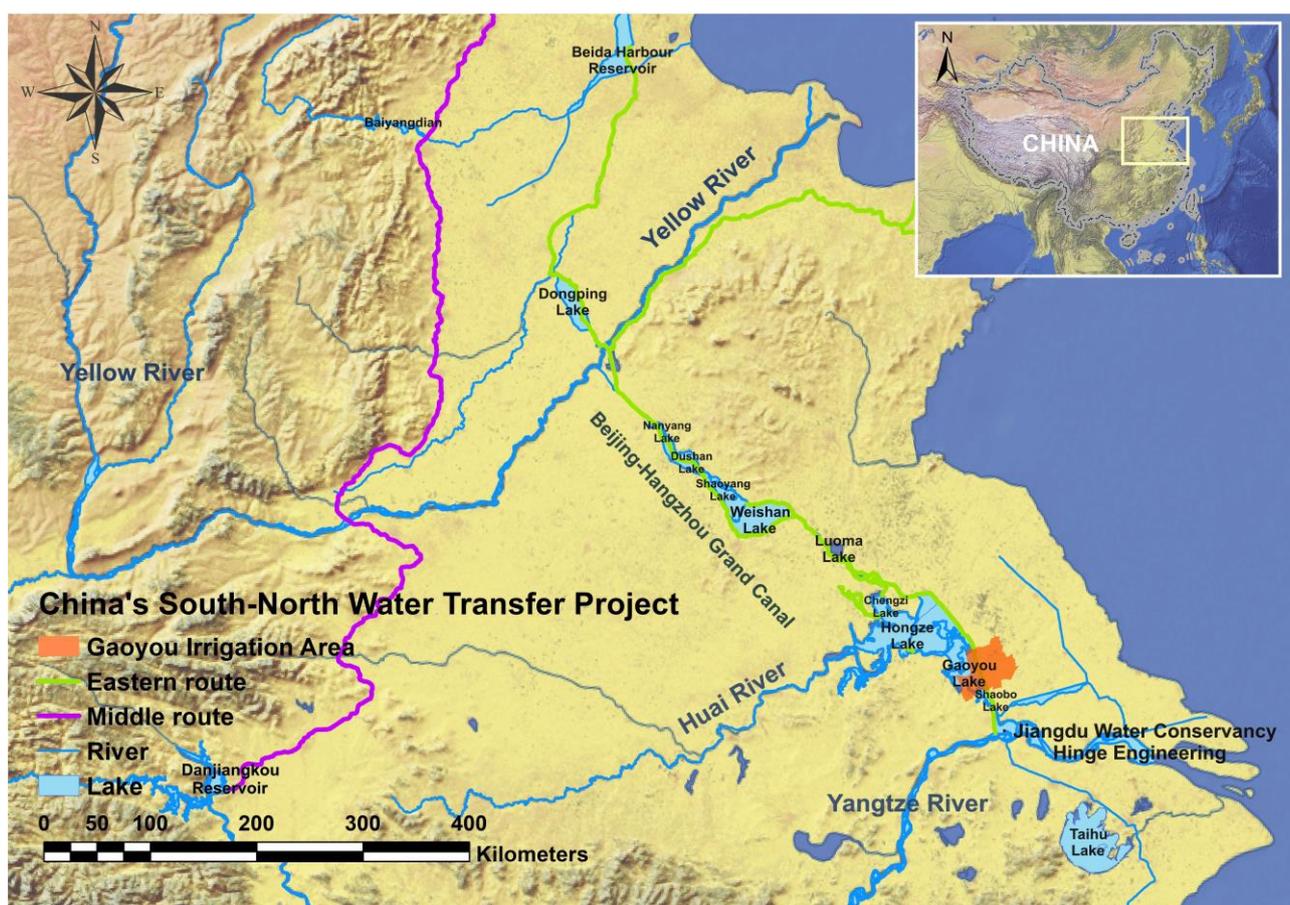


Figure 1. The GIA in the SNWTP.

The eastern route of the SNWTP uses the Beijing–Hangzhou Grand Canal as the main canal to transfer water to the north. Because the Beijing–Hangzhou Grand Canal also supplies water to the GIA, the GIA, therefore, needs to save water in order to guarantee fresh water transfer from the Beijing–Hangzhou Grand Canal to the north and ensure the normal operation of the SNWTP. In the GIA, the Water Resources Bureau of Gaoyou is

in charge of allocating water for the SNWTP; its duties include switching on and off and monitoring the most important infrastructure of the project, the water pumping stations. Table 1 below shows the water transferred from the GIA for the SNWTP. On the other hand, the Water Resources Bureau of Gaoyou is also in charge of allocating water to the local water users for irrigation. It has a time slot for water allocation, which is normally 6 h a day and 24 h in total over 4 days. Water allocated to local water users is through gravitational flow. The GIA diverts water through nine sluice gates along the Beijing–Hangzhou Grand Canal to achieve the gravitational flow, with a designed water diversion capacity of 159 m<sup>3</sup>/s. Currently, the GIA has nine main water diversion canals and sub-main canals (115.1 km), 124 branch canals (421.3 km), and 3250 lateral and sub-lateral canals (2598 km). Also, there are nine supplementing water pumping stations in the middle and lower reaches of the GIA. When the gravitational flow is insufficient, the water source of the Lixia River network will be extracted to the main canals, with a designated water lifting capacity of 63.5 m<sup>3</sup>/s. The local water users are charged CNY 0.027/m<sup>2</sup> for the water, and if the gravitational flow water does not reach the farming land, the local water users need to pay an extra CNY 0.012/m<sup>2</sup> for pumping irrigation.

**Table 1.** Water transferred from the GIA for the SNWTP (million m<sup>3</sup>).

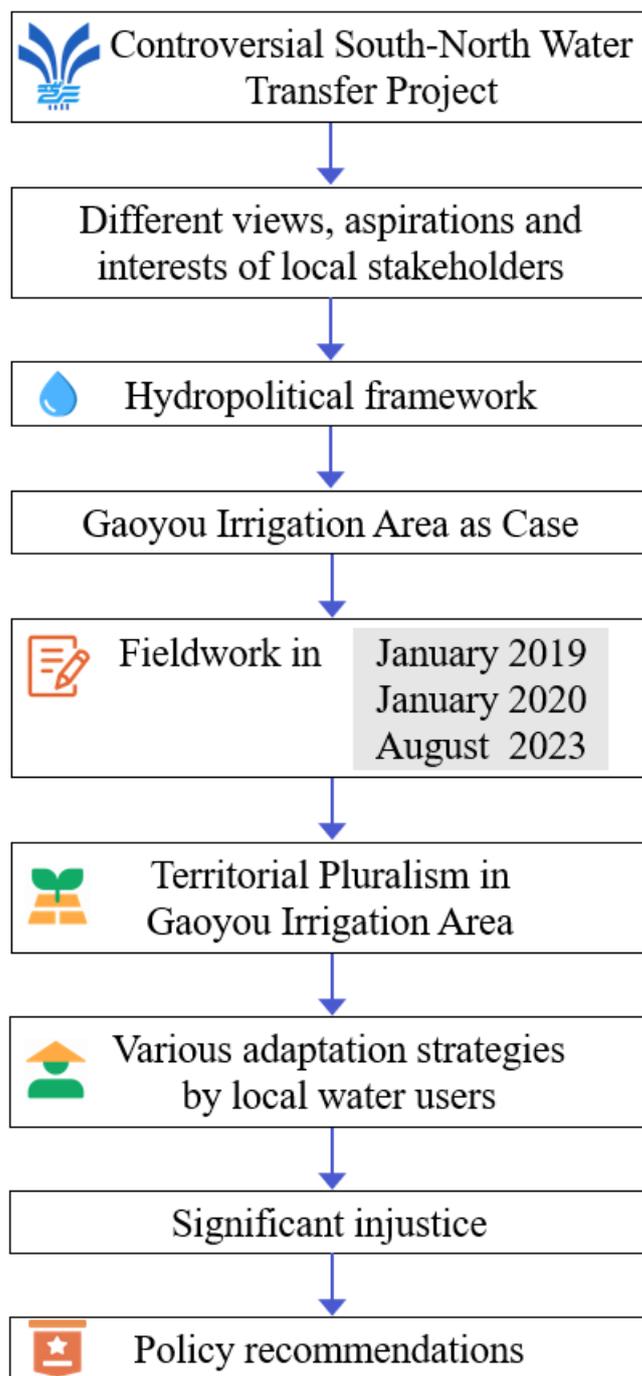
Year	Water Transfer Permission	Water Transfer Counted by GIA Information System	Water Transfer Reported by Water Resource Direct Reporting System
2019	360.00	300.31	
2020	360.00	304.70	329.88
2021	360.00	307.60	312.44
2022	360.00	351.21	275.20
2023	310.00	316.49	268.40

Note: source: The Water Resources Bureau of Gaoyou.

In this sense, the GIA has to take the responsibility of balancing the relationship between the water transfer of the SNWTP and the local use of water for agricultural irrigation purposes. This is to meet the needs of both the central government and the local water users. This position makes the GIA a prime location for conducting this research and collecting in-depth data. Considering the Gaoyou area’s abundant water resources, that is to say, if the SNWTP does not transfer water from the GIA, local water users may not face water shortage problems. This is the context of the research: the controversial SNWTP constructed by the central government as a new hydrosocial territory has resulted in “territories-in-territory” and “territorial pluralism” of the local water users. The local water users have adopted various adaptation strategies to respond to the state territorialization process and defend their water claims. The adoption of adaptation strategies is determined by local water users’ socioeconomic conditions, leading to significant injustices between them. Figure 2 below shows a flowchart of this research.

In total, we conducted three rounds of fieldwork in January 2019, January 2020, and August 2023 in the GIA. We collected primary data through interviews with 16 local water users, including both large and small water users. Locating a sufficient number of representatives of local water users was not an easy task. This is because each interview was about one to two hours in duration to allow for detailed exploration of the relevant issues, and local water users may not be willing to sit down and answer our interview questions for that long time. Therefore, it was important to develop a rapport with the local water users and establish the necessary trust for obtaining honest and authentic data. In this article, one researcher’s affiliated institution helped us connect with the Water Resources Bureau of Gaoyou (the institution has a great cooperative relationship with the bureau; it has conducted several projects in the GIA, such as agriculture land circulation, water allocation in an irrigation area, and the performance of peasant water use organization, and these projects are also insightful in relation to this research). The Water Resources Bureau of Gaoyou recommended the local water users to the researchers for the interviews. The

interview questions included the local water users' views and aspirations on the SNWTP, how the SNWTP affects their interests and livelihoods, what specific adaptation strategies they applied to respond to the change in water use, and what factors affect their decisions to apply certain adaptation strategies.



**Figure 2.** Flowchart of this research.

We also interviewed five relevant officials in the Water Resources Bureau of Gaoyou and village committees during the fieldwork. Although the main focus of this study is on the local water users, interviews with representatives of the Water Resources Bureau are significant. These interviews help understand the background information of the GIA; the overall progress of the SNWTP in the GIA; the GIA's roles, responsibilities, and tasks in the water transfer; and the ways in which the Water Resources Bureau of Gaoyou and

village committees help local water users to adapt to the changes that resulted from the SNWTP. It is believed that the concerns, actions, and strategies of the Water Resources Bureau of Gaoyou significantly influence the local water users' views and aspirations on the SNWTP, and, therefore, influence their specific adaptation strategies to respond to the state territorialization in the SNWTP. All the interviews were carried out in the interviewees' preferred locations, mainly offices of the Water Resources Bureau of Gaoyou and village committees, homes, and restaurants. In addition, we used site observation and synthesized secondary data mainly from academic studies, government documents, and media reports in order to further understand the context of the hydrosocial territorial reconfiguration in the GIA.

#### 4. Plural Form of Hydrosocial Territories in the GIA

This section discusses the plural form of hydrosocial territories in the GIA. The discussions include three parts. In the first part, we discuss how the state has constructed a hydrosocial territory in the GIA in order to send fresh water to northern China. In the second and third parts, we discuss the adaptation strategies adopted by large and small water users, respectively, in the GIA. As will be discussed, the adaptation strategies are to respond to the state-dominated hydrosocial territorialization to strive for more water for their irrigation uses. The adoption of the adaptation strategies depends on individual water users' socio-economic conditions.

##### 4.1. State-Dominated Hydrosocial Territory

Water saving, pollution control, and environmental protection are at the core of state-dominated hydrosocial territory in the GIA. For example, the first SNWTP plan, "The SNWTP Overall Planning", was approved by the central government in 2002 [46]. In this plan, the principle of the SNWTP was defined, that is "water transfer is followed by water saving, water connection is followed by pollution control, and water use is followed by environmental protection". The plan specifically emphasized that the provinces and cities along the eastern route of the SNWTP, including the GIA, would have to strengthen pollution control efforts to ensure the quality and safe supply of water. This would affect the country's socio-economic sustainable development and the long-term interests of future generations. This is a typical top-down state hydrosocial territorialization process, with the centralized planning instrument in the local water source region to achieve the central goal of transferring water to the north.

In the context of operating the SNWTP, the GIA's water resource no longer belongs entirely to itself, but it has been scaled up to affect the national strategy [47]. For example, the planning emphasizes that the SNWTP will bring significantly prominent social, economic, and ecological benefits [48]. In terms of the social benefits, the SNWTP will solve the water shortage problem in China's northern region, promote the progress of socio-economic development and urbanization in the northern region, and solve the problem of 7 million people drinking high-fluoride-containing water and brackish water over a prolonged period of time. In terms of the economic benefits, due to the massive investment, the SNWTP will boost China's economy by 0.12% per year, and the northern region will increase its annual output value of industry and agriculture by 50 million, and 150,000 people can be employed annually. In terms of the ecological benefits, issues related to over-exploitation of underground water can be contained, and the SNWTP will increase the water supply for ecological and agricultural use by about 6 billion m<sup>3</sup>. Therefore, as a water source area, the GIA has to carefully manage its water resources. Doing so would help bring about those social, economic, and ecological benefits and help construct a state hydrosocial territory.

In this sense, the GIA has been given enormous responsibility for saving sufficient water resources first and then transferring water to serve the national interests and ensure the smooth operation of the SNWTP, regardless of whether such responsibility will affect local water needs. In fact, discourses and imaginaries to justify the planning instrument and governance practice have been widely deployed. As [29] reveals, during the construction

of the SNWTP, a discourse of “eating bitterness” is used as a way of persuading people to accept devotion and extreme self-sacrifice. Such discourse was popular in the context of Maoism socialism in China. As one official in the Water Resources Bureau of Gaoyou explained, “for GIA, supplying water to the northern region is a major political task and important measure to improve the people’s livelihood. We have a clear water use priority: domestic water first, then transportation, then industrial water, and agricultural water, including irrigation the last”.

In this context, given the reduced water supply for irrigation, local water users in the GIA have to eat bitterness. According to the interviews, the crops planted by the farmers (water users) in the GIA need about 1.28 m<sup>3</sup> of water per m<sup>2</sup> (1280 mm) per year; however, the water transferred by the SNWTP has led to about a 30% reduction in water to the farmers, which has directly caused a loss in crop yield of about 75 g/m<sup>2</sup> to 150 g/m<sup>2</sup>. In order to further promote water saving in the GIA, in 2021, the Ministry of Water Resources and National Development and Reform Commission appointed the GIA as the Irrigation Area Water Efficiency Leader [49]. In 2022, the Ministry of Water Resources appointed the GIA as a National Water Saving Irrigation Area. As a response to these national awards, in the GIA, a few more pumping stations have been built to control the local use of water. As the official explained, “we have to adjust the time for supply water and force local people to reduce water use time”.

#### 4.2. Adaptation Strategies of Large Water Users

In the GIA, large water users have good socio-economic conditions. They are professional farmers renting land for profit. Normally, they rent a large tract of land to plant rice, wheat, and vegetables for commercial purposes. For example, among our interviewees of large water users, Wang rents 199,980 m<sup>2</sup> in Ziying village, Tang rents 399,960 m<sup>2</sup> in Wanfu village, Yao rents 166,650 m<sup>2</sup> in Yigou village, Huang rents 199,980 m<sup>2</sup> in Yaowei village, another Wang rents 799,920 m<sup>2</sup> in Donghu village, and Sun rents 633,270 m<sup>2</sup> in Zhoubeidun village. The rent of their land is similar, ranging from CNY 1.35/m<sup>2</sup> to CNY 1.5/m<sup>2</sup>, which is determined by each village and land owner. These professional farmers have invested heavily in mechanizing their farms. Unmanned aerial vehicles are used to spray seed and fertilizers, and smart monitoring systems are used to monitor the growth of the crops. Wang in Donghu village said to us that, “Annually, my land can produce 500 kg of rice per mu and 650 kg of wheat per mu. So, in total, my 799,920 m<sup>2</sup> land can produce 600,000 kg of rice and 780,000 kg of wheat. According to the current market prices of rice and wheat, I can earn 2.16 million Yuan of gross profit from selling rice and 2.34 million Yuan of gross profit from selling wheat. The total profits are good even after the production cost”. Compared to Wang’s land in Donghu village, Yao’s land in Yigou village is smaller, but the annual profit is also good. Yao said to us, “Annually, my land can produce 550 kg of rice per mu and 500 kg of wheat per mu. In total, my 166,650 m<sup>2</sup> land can produce 137,500 kg of rice and 125,000 kg of wheat. While the market prices are not stable, in average, I can earn 247,500 Yuan of gross profit from selling rice and 225,000 Yuan of gross profit from selling wheat. My farm has been mechanized, allowing me plenty of spare time to do other business”.

As these professional farmers’ land is large, they have a huge demand for water. They are concerned about the reduced water supply as a result of water saving in the GIA. This shows their distinct views, aspirations, and interests in the reconfiguration of the hydrosocial territory in the GIA, which the state has promoted to ensure the smooth operation of the SNWTP. For example, Tang in Wanfu village told us, “I am very dissatisfied with that they reduced water supply without our consent. The reasons they reduce water supply include flood prevention and the SNWTP. The governments just want to accomplish the political task of transferring water. They do not fully understand our difficulties. Their interests and our interests are conflicting. I have complained many times, and I call the mayor’s phone, but no one has responded to our appeal. Also, agricultural insurance does not cover accidents caused by drought and flood. We have to bear the loss ourselves”.

Other large water users also expressed similar opinions that the SNWTP in the GIA has led to more difficult days in regard to using water.

With good socio-economic conditions, large water users' adaptation strategies to address the water shortage problems are proactive. For example, on their farms, large water users have installed their own water pumps. When there is insufficient water to irrigate their crops, they will use the water pumps to ensure sufficient irrigation. For example, Sun in Zhoubeidun village said to us, "I have ten pumps, and each pump costs me about 2000 to 3000 Yuan. While this is an extra cost, it is affordable for me. This is the easiest way for me to adapt to the change of water use because I can control the use of the pumps". Similarly, Huang in Yaowei village said to us, "While the village helps us sometimes by coordinating and mobilizing water resource, for most of the time, we have to have our own adaptation strategies. Taking myself as an example, I have installed three pumps, which cost me about 5000 Yuan. There is no compensation from the government for the costs of installing pumps. I need to cover the costs, and this is affordable for me". Related to their priming through work and relational experiences, large water users are able to build personal relationships with relevant people and have access to more water. These are important adaptation strategies. For example, Wang in Donghu village told us, "I have good relationships with the Water Resources Bureau and the village committee. Every time when they reduce the water supply, I know it beforehand. This gives me more time to cope with the water shortage". Yao in Yigou village added that, "I have connections with the officials. When they drain off the water, they will drain off a bit longer so I can store the water. To be honest, for me, the SNWTP does not affect us too much because I can adapt to it".

#### *4.3. Adaptation Strategies of Small Water Users*

Similar to large water users, small water users have also suffered in contested territorial configurations. They made significant efforts to maintain their own hydrosocial territorial control to sustain their livelihoods. However, compared with the adaptation strategies adopted by large water users, small water users' adaptation strategies are passive. This is largely because small water users' socio-economic conditions are weaker, and they do not have enough resources and capital to actively adapt to the water shortage. Our interviewees of small water users have only 600 m<sup>2</sup> to about 3000 m<sup>2</sup> of land, and some of them do not plant crops for profit, but only to feed themselves. For example, Li in Ziyang village said to us, "I have 1999.8 m<sup>2</sup> land planting wheat and rice. My land is very small, and I cannot rely on it to make money. The land is my feeding land. My wife and I do not have other income sources. We highly rely on the land for living, and our ability to live under pressure is very low". Xu in Yaowei village told a similar story: "My land is only 1999.8 m<sup>2</sup>. It is impossible for me to make a profit through such land. The land is feeding land. I sometimes go to cities to find temporary jobs to increase incomes".

Specifically, given small water users' weaker socio-economic conditions, when there is an insufficient water supply, many of these small water users just wait for rain as their adaptation strategy. As Huang in Donghu village told us, "We depend on heaven for food". Except for waiting for rain, small water users rely on large water users' help to adapt to the reduced water supply. For example, Zhu in Yigou village said to us, "In our village, the large water user's land is next to my land—a very close distance. We are from the same village, know each other very well, and have a great personal relationship. So, during the water shortage, they use their own water pumps to irrigate their land, and at the same time, they often help irrigate my land. My land is small, only about 2600 m<sup>2</sup>. It does not need too much water". Xu in Yaowei village added, "I really appreciate the large water user's help. Without his help, all my crops will die. Personally, I do not have any effective adaptation strategies to address the water shortage. I have to say that due to the SNWTP, the water shortage happens more frequently. Their help is even more valuable in a sense". When asked what happens if large water users are not willing to help, almost all of these small water users said this never happens because they have great relationships.

Small water users also seek village committees' help to adapt to the changes caused by a reduced water supply. This type of 'jump scale' is used to gain wider recognition and support. First, it is impossible for people's relationships to always be harmonious. When large water users do not want to help small water users, which is understandable, village committees will build a bridge for communication between large water users and small water users. One official from the Zhoubeidun village committee told us, "Conflicts happen sometimes. One time, a small water user insisted on using pumping water first. The large water user, whose land is next to the small water user, does not agree because, in his opinion, such help is voluntary. It does not make any sense to force him to irrigate other's land first". The official added, "In this case, we coordinate through negotiations, and the village committee pays the electricity fee to use the pumps that time". Since then, village committees have realized the importance of installing water pumps in villages so small water users do not always need to rely on large water users. For example, Huang in Donghu village said to us, "Our village asks us to form several groups. Each group is made up of several small water users whose land is close. So, when the village uses its water pumps, it uses based on the groups, which is more cost-efficient". Dong in Zhoubeidun village said, "Our village has installed several pumps. We seek the village committee's help when we need water. Our difficulties are also the village committee's difficulties because their goal is to serve the people and solve people's problems".

## 5. Discussion and Conclusions

As a water source area in the eastern route of the SNWTP, the GIA now provides clean water for northern China. The GIA can be understood as a newly constructed hydrosocial territory for the SNWTP. To construct hydrosocial territory in the GIA, the state has mobilized a number of interlocking tools. These tools include the centralized planning instrument, the integration of water saving targets into the local water management system, water infrastructure, the official discourses of devotion and self-sacrifice, and a coalition of the central government on a local scale, i.e., the Water Resources Bureau of Gaoyou. Through the wholesale reconstruction of the hydrosocial territory in the GIA, the central government is able to control the local water resources, trumping the local water interests with national-level water priorities. Such a reconstruction of the hydrosocial territory in the GIA has significant local impacts. As we have demonstrated, both large and small water users have encountered significant water shortage issues that significantly affect their farming businesses or livelihoods. In this sense, our findings are not new as they again show how China's mega hydraulic projects have been controversial [50].

In spite of the state-dominated hydrosocial territory meant to carve dedicated, water-efficient, and mutually beneficial imaginaries of the GIA, one cannot deny that the water resource is inescapably contested [14]. Different stakeholders may construct different hydrosocial territories and socio-natural imaginaries according to their backgrounds and interests. In this research, we find clear evidence of a plural form of hydrosocial territories proposed by large and small water users in the GIA. These local water users adopt various adaptation strategies to respond to the frequent water shortage caused by the state hydrosocial territorialization in the GIA. The main differences between large water users and small water users are their different types of adaptation strategies. Large water users' adaptation strategies are active; they either install their own water pumps to irrigate their crops or store more water in advance through personal relationships with relevant officials. Their active adaptation strategies are largely endorsed by their greater backgrounds. As mentioned, they are professional farmers with good economic conditions, and their investments in the agricultural industry in the villages help them gain local officials' support. Their adaptation strategies aim to ensure their farming business runs smoothly. In comparison, small water users' adaptation strategies are passive; they either wait for rain or rely on the help of large water users and village committees. This is mainly because small water users do not have background experience, which would enable them to adapt to water shortages as large water users do. Small water users' adaptation strategies aim to maintain their livelihoods

as they rely on the land for feeding themselves. In the end, both large water users and small water users have created “territories-in-territory” and “territorial pluralism” in the GIA.

As discussed above, how local stakeholders react to mega-hydraulic development projects and create alternative hydrosocial territories is determined by the power resources they possess and the political–economic system they are in. Many local stakeholders around the world usually oppose hydraulic projects through radical strategies, such as launching large-scale protests, voting against the ruling party, exposing the issues to the international community, and scaling up to work with national and international actors and networks. Our case study’s theoretical lens of “territories-in-territory” and “territorial pluralism” showcases that the counter-forces and strategies adopted by the local water users in the GIA are not opposing, although they are dissatisfied with the reduced water supply. The local water users in the GIA are not opponents of the SNWTP; they do not attempt to challenge the SNWTP. Their adaptation strategies are just important means for them to defend their access to water and offer ways for them to live in the state-reconfigured hydrosocial territory. Adaptation strategies do not help local water users struggle for a voice in the decision making and implementation processes, and, therefore, do not reveal the controversies, threats, and conflicts associated with the SNWTP. In the GIA, the local water users’ choice of adaptation strategies reflects China’s mode of environmental governance, which can be characterized as authoritarian environmentalism [23,51,52]. Specifically, the party-state exercises strong intervention in the environmental development process to serve its political and economic interests. A democratic system and a civil society are weak, leading to non-participatory policymaking and policy implementation. In this sense, our engagement with the concept of hydrosocial territory shows an inconsistency with [53]’s finding that local actors enjoy a high degree of freedom and flexibility to manage their own natural resources under overt authoritarian ruling.

In China, mega environmental projects like the SNWTP have often made local stakeholders vulnerable. China’s top-down mode and command-and-control approach have been conceived as the principal sources of widespread injustice. It launches environmental policy and pursues environmental outcomes without fully considering individual rights and interests [54]. In this case, we find clear evidence that only large water users with better socio-economic conditions and access to relevant capital and resources can actively adapt to the reduced irrigation water supply caused by the SNWTP. On the other hand, small water users who lack access to necessary capital and resources are very passive. This demonstrates a significant social and environmental injustice between them, and there are no institutional arrangements that recognize their diverse interests and capabilities in the decision making and implementation processes of the project. Therefore, to address the injustice issues associated with the SNWTP, grassroots activities and bottom-up responses to social and environmental injustice issues should be encouraged. Environmental policies and public platforms that concern those who are disadvantaged and subjected to disproportionate impacts from socio-economic and environmental activities, practices, and regulations should be formulated and established. Such policies and platforms, if formulated and established, would ensure adequate recognition of different stakeholders, their exposure to risks and compensation needs, and more just participation in the development of environmental policies as well as rights to monitoring implementation procedures. Addressing these issues is crucial for tackling inequities in the SNWTP and achieving the ambitious goals of the project. While this research specifically focuses on China, the findings and policy recommendations of this research can provide other countries with potential strategies to cope with similar economic, social, and environmental challenges. For example, in the Global South, environmental politics shaped by political, economic, and cultural imperialism legitimizes private gains and imposes injustice on marginalized citizens [55]. In Mexico, there is a lack of legal protection, regulatory capacity, and opportunities for democratic public participation [56].

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