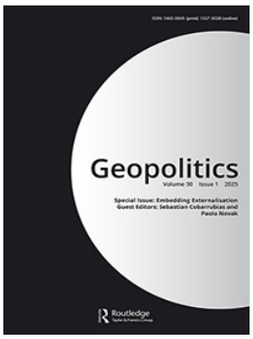

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Mei-Huan Chen

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# The Geopolitics of Water Infrastructure on the Kinmen Islands

Mei-Huan Chen

Department of Geography, The Pennsylvania State University, University Park, USA

**ABSTRACT**

This paper examines the bordering and debordering deployment of water infrastructures on the Islands of Kinmen. Located less than 5 km off the coast of China, yet 200 km from their governing authority, Taiwan, Kinmen holds a critical position in cross-strait relations, and its water infrastructures have carried opposite political intentions. The 2018 Fujian-Kinmen water transfer pipeline serves as a debordering tool as it showcases that the People's Republic of China could offer benefits to the people on the islands. In contrast, Kinmen's existing water infrastructure, established during the Cold War, served as part of the bordering campaign to counter Communist China, as it represented progress and modern living under the government of the Republic of China (Taiwan). However, rather than assuming the successful deployment of infrastructure or a passive role of the islands, this paper highlights that the planning and construction of Kinmen's water infrastructures were influenced by conditions of militarisation, shifting cross-strait relations, the islands' socio-material constraints and their relationships with Taiwan and China. The case of Kinmen illustrates the capacity of water infrastructure to serve bordering and debordering purposes, as well as how other factors disrupt or facilitate these processes.

## Introduction

In August 2018, a 16-km undersea pipeline began to supply freshwater from the Chinese coastal province of Fujian to Taiwan's outlying islands of Kinmen (see Figure 1). Located less than 5 km off the coast of China yet 200 km from their governing authority, Taiwan, Kinmen has stood as the frontline of cross-strait exchanges since 2001, with the 'Mini-Three-Links' policy enabling direct interactions between Kinmen and China. The water pipeline represents a new milestone in cross-strait cooperation and is the first to materialise among other proposed cross-strait infrastructure projects. This pipeline has served to demonstrate that the government of the People's Republic of China (PRC)

**CONTACT** Mei-Huan Chen mzc496@psu.edu Department of Geography, The Pennsylvania State University, 217 Walker Building, University Park, PA, 16802, USA

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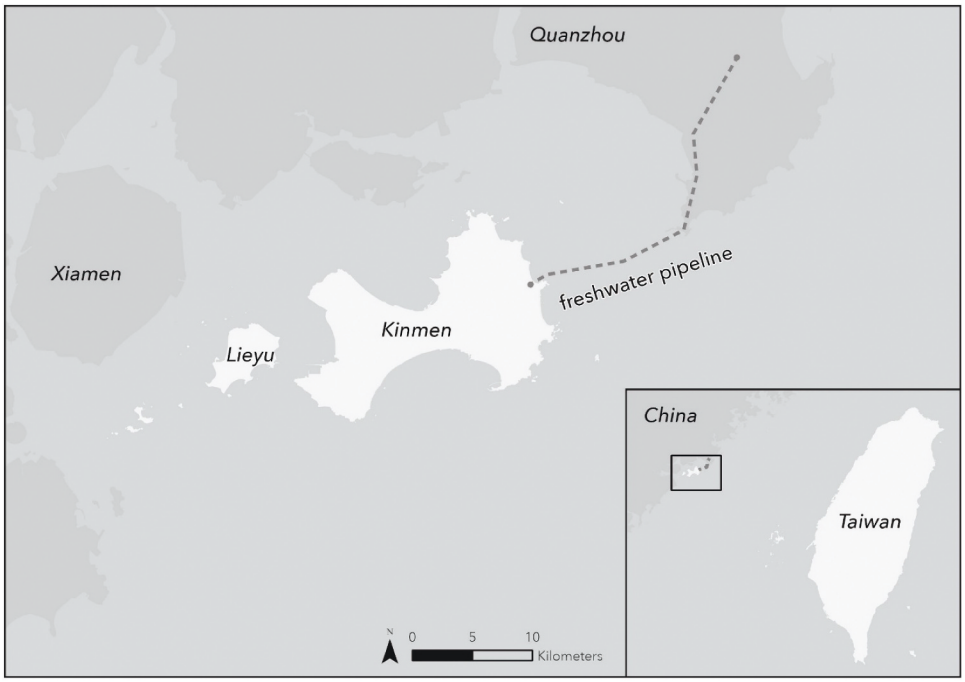


**Figure 1.** Location of the cross-strait freshwater pipeline. Source: Map made by the author.

could provide benefits to the people of Kinmen. Nonetheless, the realisation of the pipeline was not without challenges. Its planning process was also affected by changing cross-strait geopolitics and involved twenty years of negotiation and coordination.

In contrast to the recent role of the freshwater pipeline, Kinmen's existing water infrastructure, comprising several reservoirs, hundreds of irrigation ponds and dams, thousands of groundwater wells, and centralised water supply networks, was established during the Cold War – a period characterised by a contrasting political climate. Back then, Kinmen was a battlefront between the Republic of China (ROC, Taiwan) and the PRC, and the water infrastructure was constructed under a development framework with the aim of competing with the communist regime. The construction of water infrastructure was influenced by US assistance, militarisation, and constraints from the islands' social and material environments.

These two cases in Kinmen resonate with what critical studies on infrastructure have pointed out – that infrastructure often serves to achieve political goals (Hecht 2001; Larkin 2013). In geopolitical contexts, infrastructure can be used as a tool by the states to expand their economic and political power beyond territories. For instance, the United States exported large dams to other countries during the Cold War to counter the expansion of communism (Sneddon 2015), while China has in recent decades substituted this role in

exporting their infrastructure models to developing countries to expand their influence (Crow-Miller, Webber, and Rogers 2017). Kinmen's water infrastructure has also served these major powers to pursue their political agendas, particularly as a means for bordering and debordering. During the Cold War, the water infrastructure in Kinmen similarly aligned with the US-led 'Free World' campaign to counter the communist regime.[1] The infrastructure worked as part of the bordering practices as it promised better living conditions for the islands than those in mainland China. Conversely, the recently built water pipeline serves the PRC to extend its political influence over Kinmen. It becomes a debordering tool as it fits the PRC's purpose of performing care for the islands while addressing the islands' need for water. This paper argues that the water infrastructure in Kinmen has such (de) bordering capacities due to infrastructure's ability to enable new flows (Larkin 2013), function as vital systems (Collier and Lakoff 2015), and perform the state's care (Schwenkel 2015).

This study also responds to research that calls for relational and grounded views of infrastructure (Oliveira et al. 2020; Sidaway et al. 2020), by examining the ways in which infrastructure materialised on the ground. Such focus highlights that infrastructure development is not a smooth and static process but can be marked by unforeseen challenges or require time and negotiations due to shifting geopolitical dynamics or material constraints. In Kinmen's case, the earlier water infrastructure was built during particular militarised island conditions and later failed to perform as expected, while the realisation of the recent pipeline project was affected by shifting cross-strait relations and the islands' relations with Taiwan and mainland China. By examining the specific conditions and relations of islands within which infrastructure projects came into being, this paper demonstrates how other factors disrupt or facilitate the infrastructures' bordering and debordering processes.

This research is based on document analysis and twelve months of fieldwork. The analysed documents encompass archives, technical and research reports, policy documents, congress records, and media coverages. Fieldwork took place over three different periods between July 2019 to July 2023. It consisted of semi-structured interviews, informal conversations, and participant observations conducted with technocrats from water supply and planning agencies at both local and central levels, public servants from the Kinmen County Government and other agencies in Kinmen, engineers from contracting firms, academic and local researchers, and residents on the islands.

This paper speaks to ongoing critical studies on infrastructure and offers a case in an island context, which is particularly important given that islands often lack resources and infrastructure, while simultaneously holding a strategic position for geopolitical intervention (Grydehøj et al. 2020; Mountz 2015). The following section provides a review of geopolitical infrastructure and highlights the capacity of water infrastructure to serve (de)

bordering purposes on islands and islands' specific conditions and relations that affect these processes. This is then followed by two empirical sections – one on Kinmen's water infrastructure development in the Cold War, and the other on the Fujian-Kinmen freshwater pipeline in the context of current cross-strait relations. Both empirical sections are composed of one sub-section showing how infrastructure functions for (de)bordering purposes and two sub-sections illustrating the ways in which the planning and construction of infrastructure were influenced by geopolitics and other social and material factors. The final section concludes by reiterating the geopolitical messages and impacts on Kinmen's water infrastructure and the importance of examining how island conditions affect such processes.

## Geopolitical Infrastructure on Islands

Infrastructure has garnered increased attention within social science, particular in science and technology studies (STS), anthropology, sociology, and geography. Different from engineering-oriented approaches, this trend of research attends to the political nature of infrastructure, exploring how infrastructure is practiced for achieving certain political goals (Appel, Anand, and Gupta 2018; Hecht 2001; Larkin 2013; Pasternak et al. 2023). Infrastructure has such political capacity as it enables movements and circulation of people and things, thus reconfiguring space and power relations (Chua et al. 2018; Harvey and Knox 2015; Larkin 2013). Infrastructure also functions as vital systems, allowing the state to control and govern its populations while at the same time being vulnerable to disruptions (Collier and Lakoff 2015). Moreover, infrastructure represents mastery over nature and promises modern ways of living, often serving the state to showcase modernity and care to its populations (Crow-Miller, Webber, and Rogers 2017; Hecht 2001; Luxion 2017; Schwenkel 2015; Wakefield 2018). In all, infrastructure can carry multiple political purposes under its seemingly neutral appearance.

In geopolitical contexts, strong states can enact power beyond their territories through infrastructure intervention. During the Cold War, the United States exported its infrastructural technologies and engineering expertise, providing aid to developing countries as a means to strengthen US geopolitical power (Akhter 2015; Sneddon 2015). In recent years, China has overtaken this dominant role of supporting concrete-heavy infrastructure projects in developing and neighbouring countries (Crow-Miller, Webber, and Rogers 2017; Murton 2017; Paudel and Le Billon 2018). The Belt and Road Initiative (BRI) is a clear example of China's utilisation of infrastructure to enhance its geopolitical and economic power (Akhter 2018; Flint and Zhu 2019; Furlong 2021; Yeh 2016). The Kinmen Islands have also felt the influences of these two superpowers through infrastructure projects, yet the geopolitical implications were a little different from other cases. In the context of changing cross-strait

relations, the infrastructure deployment in Kinmen carries specific purposes of *bordering* and *debordering*. In the Cold War, the water infrastructure on Kinmen served to strengthen the border between the Communist and the 'Free World' coalition by showcasing the islands' progress towards modernisation in contrast with Communist China. Conversely, in the current cross-strait relations, the undersea freshwater pipeline functions as a means of debordering between the islands and the mainland by demonstrating the benefits the PRC offers Kinmen.

Before I discuss how water infrastructure functions in (de)bordering practices, it is important to recognise the particularity of both *islands* and *water infrastructure* in this case study. First, islands are often sites of territorial contestation (Grydehøj et al. 2020; Mountz 2015), and in some instances, they are considered as territorial infrastructure (Gugganig and Klimburg-Witjes 2021). Kinmen is a notable case where the islands have been seen as borderland, borderscape, and bordering infrastructure since they became a frontline in the Cold War (see Chu and Hsu 2024; Lee, Huang, and Grydehøj 2017; Woon and Zhang 2019). This paper builds upon these explorations of bordering practices on and of the Kinmen Islands, with a specific focus on the role of water infrastructure in such processes. Second, existing critical studies on island infrastructure often centre around transportation, due to the significant spatial and socio-economic transformation they generate (e.g., Baldacchino 2007; Lee, Huang, and Grydehøj 2017, Grydehøj and Casagrande 2020; Scanlon 2024). Compared to the obvious territorial function of transportation infrastructure, water supply infrastructure often remains 'invisible' – it operates quietly in the background, and most people would not notice it or understand how services are provided through infrastructure until it breaks down (Star 1999). This is partly why water infrastructure has not been the focus of political studies on islands or is only regarded as a backdrop (for exceptions, see Feng, Loopmans, and Tondeur 2023; Mason 2020; Usher 2019).

In this paper, I look into how water infrastructure is deployed in (de) bordering practices on the Islands of Kinmen. The idea of bordering implies that border is not static but constantly being reworked and practiced (Brambilla 2015; Newman 2006). Kinmen's water infrastructure becomes a crucial part of these (de)bordering processes for three features mentioned earlier – that it enables movements, serves to perform, and functions as vital systems. First and most importantly, infrastructure enables flows and movements, whether it be people, things, information, or matters. New flows signify the breaking of containment and the passing of borders. As such, the cross-border freshwater flow supports the idea that people from both sides of the borders share the same water source, thus symbolically weakening the border. Second, infrastructure allows the state to promise modern living and perform care for its population. Water

infrastructure as a service provided by the state can help dissolve the internal border between islands and the main(is)land states, while strengthening the border of the state or a larger imagined collective such as the 'Free World' coalition. It does so by distinguishing between the populations served by the infrastructure and those who are not. This act of differentiation is essentially the process of bordering (Newman 2006; Van Houtum and Van Naerssen 2002). Finally, as water infrastructure enables centralised public water provision, it becomes a critical and vital system to sustain populations. In this way, the vulnerability of the systems becomes a security problem (Collier and Lakoff 2008). Having infrastructure to be controlled from an extraterritorial state poses risks to the vital system, threatening the security of the border. The water infrastructure in Kinmen illustrates how these three aspects of water infrastructure render it to be at the same time (de)bordering infrastructure.

Yet, infrastructure projects are never smooth and are often situated in heterogeneous environments with constraining socio-material factors and multiple interests embedded. It is thus crucial not to assume the necessary achievement of infrastructure and their geopolitical purposes, nor to treat islands as passively receiving influence through infrastructure from the big powers. In the examples of the BRI projects, research has called to better contextualise or view the BRI from the ground (Oliveira et al. 2020; Sidaway et al. 2020). Many show that the BRI infrastructure projects are entangled in the interests of multiple actors at different scales, as well as complex socio-economic and material conditions (Apostolopoulou and Pant 2022; Han and Webber 2020; Murton and Lord 2020). Davis, Munger, and Legacy (2020) problematise the view of seeing islands as falling into the influence of China or the US and emphasise islands' agencies in navigating these superpowers.

In Kinmen's case, several factors warrant specific attention – the distinct conditions of militarisation and island environments, the shifting cross-strait geopolitics tied to Taiwan's party politics, and the islands' attitude towards China. The water infrastructure built during the Cold War was established with US financial and technical assistance but faced constraints from militarisation and the islands' social and material conditions. These challenges resulted in some failing infrastructure projects, which undermined the 'modernised' lives that the infrastructure had initially promised and provided an opportunity for later infrastructure intervention by the PRC. The freshwater pipeline, on the other hand, was planned and executed amid the complex island-states/cross-strait politics, where the islands and the KMT-led central government were more willing to collaborate with the PRC government while the pro-independence DPP-led government was concerned about security. The shifting party politics and security concerns led to prolonged processes of planning and negotiations, navigating through different expectations, regulations, and languages with multiple governmental departments on both sides of

the strait. These conditions collectively contribute to the ways in which the infrastructures materialised.

## Infrastructure Development in Cold War Kinmen

The majority of Kinmen's existing water infrastructure was established from the 1950s to the 1980s under very particular circumstances – during wartime and influenced by Cold War geopolitics and militarisation. In this context, I examine how the water infrastructure in Kinmen serves to strengthen the border between the Communist and the 'Free World', the role of the Joint Commission on Rural Reconstruction (JCRR) in modernising Kinmen's water infrastructure and the limitations on the islands, and the influence of militarisation on the construction of water infrastructure.

### *Infrastructure as a Bordering Practice Against Communist China*

After the Nationalist regime (the ROC) retreated from mainland China at the end of the Chinese Civil War in 1949, the Kinmen and Matsu islands became the battlefront of Nationalist China and, symbolically, a frontline against communism within the Cold War. As such, developing Kinmen became critical not just to sustain the frontline, but also performative. This case was stronger as the failure of the Great Leap Forward on the mainland created great propaganda opportunities (Szonyi 2016, 1045). For the Nationalist Government, improving the living and economic conditions of Kinmen's populations would make them 'less vulnerable to Communist penetration' and 'serve as an example for Chinese in nearby areas under Communist rule' (Yager 1988, 231).

One can find this type of counter-communist messages being stressed not only in political propaganda but also in agricultural and infrastructural development programmes. In the 'Economic Construction Program for Kinmen and Matsu', the purposes of economic construction were to 'bolster economic operations against communist bandits and disrupt production in the bandit areas' and 'to win the hearts of mainland and overseas people' (General Political Department of the Ministry of Defense, ed 1960, jingjian-1). The Sino-American Joint Commission on Rural Construction (JCRR), which offered significant financial and technical assistance to Kinmen, considered that the propaganda opportunity was crucial in considering their assistance to Kinmen. In a field trip to Kinmen in 1953, a JCRR inspector argued the need to make plans and expand their support to Kinmen immediately instead of waiting for requests, because they would 'make headlines to counterattack effectively the communist propaganda to the oversea Chinese in the South Seas and America, and in no time the news will filter into the mainland' (Hsu 1953, 64). Even during the


**Figure 2.** Infrastructure development advertised in *Kinmen Today*, which was published to 'provide our allies with a better understanding of this model county'. Source: (Kinmen Political Affairs Commission 1966, 3, 23–24).

establishment of the first water treatment plant in Kinmen, the significance of political propaganda was considered more important than its economic value because 'water and electricity are fundamental necessities for a modernized society' (Kinmen Political Affairs Commission 1965). In all, building infrastructure allowed the islands and the 'Free World' they represent, to achieve a 'modernized society' distinct from Communist China. This differentiating and othering practice made the water infrastructure also function as a bordering infrastructure.

During this period, many development programmes did indeed yield tangible improvements in the living conditions and agricultural production in Kinmen. In the 1950s, prior to the implementation of these programmes, the islands were characterised as 'windswept, infertile, and deficient in water resources for personal and agricultural requirements' (Davenport 1955). Arable land was scarce, and the productivity was low (N/A 1952). By the 1970s, the islands had achieved self-sufficiency in food production and did not have to import vegetables from Taiwan like in the 1950s (Wu and Chiao 1978, 185). However, some initiatives were more performative than practical. One obvious case is the land reform programme. It was observed that the need for land reform in Kinmen was relatively weak, as only 10% of the land was cultivated by tenants, and the reform merely increased the proportion of owner-cultivated land from 89 to 92% (Yager 1988, 234). Nevertheless, the programme was still considered desirable as 'it may serve as a show window displaying to the Chinese Communists the economic reform that Free China is undertaking' (Joint Commission on Rural Reconstruction 1955a, 162), in contrast to the Communist Party, which 'conducted liquidation in the name of land reform, created hatred, killed landlords, and confiscated the land' (Lin and Lin 1958, 6). These developmental programmes, whether practical or not, were advertised in publications like the one shown in Figure 2.

### *The Support from JCRR and the Limitations on the Islands*

Under the anti-communist Cold War structure, the US-funded JCRR played a substantial role in funding and assisting Kinmen's development. The JCRR was a bilateral agency established in 1948 in Nanking, China, and moved to Taiwan with the Nationalist Government to assist in agriculture and economic development by directing financial and technical resources into various development programmes, such as crop and livestock production, forestry and soil conservation, water and irrigation, land reform, fisheries, and public health (Shen 1970).

In Kinmen, the JCRR began its support as early as 1952, initially focusing on plague control and reforestation. At the time, these projects were already carried out by the garrisons but failed – only less than 3% of the 1.3 million seedlings survived the first year of the reforestation programme (Yager 1988, 232). Consequently, the JCRR was requested to assist in training soldiers and technicians and setting up tree nurseries on the island, successfully supplying 3 million seedlings annually (Wu and Chiao 1978, 187). Though the primary purpose of the reforestation programme was for camouflage and wind protection, it also contributed to stabilising soils and improving the islands' overall hydrological and farming conditions (Hsu et al. 1998, 10).

In terms of water infrastructure, during the 1950s to 1980s, the JCRR supported the construction of 4,242 shallow wells, 31 deep wells, 130 diversion dams, 445 farm ponds, 13 reservoirs, and two waterworks in Kinmen (Shen 1970, 224; Wu and Chiao 1978, 191; Yager 1988, 236), leading to the modernisation and centralisation of water resources extraction. Before the troops were stationed in Kinmen, the islanders had long relied on village wells for drinking water, and there were no irrigation facilities in the field (Huang 2001; N/A 1952). In the 1950s, the JCRR funded a series of irrigation and domestic shallow well programmes (see Figure 3). Different from the earlier village wells that were made from red bricks, stones and white lime, the wells dug during this period utilised surplus cement from the military. Cement bricks, cement rings, and cement well railings were used, making the wells easier to build and

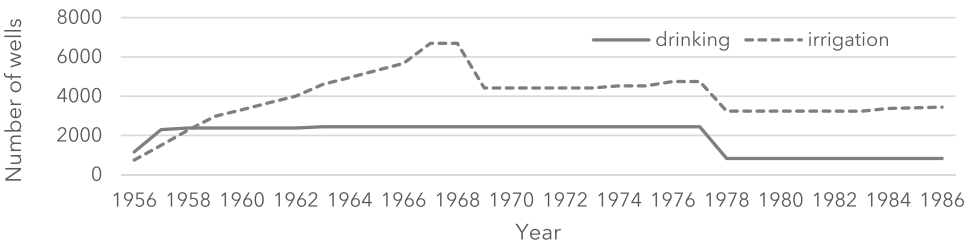


**Figure 3.** Number of wells in Kinmen (1956–1986). The JCRR funded a domestic well project from 1956 to 1958 and a series of irrigation shallow well projects from 1954 to 1975. Figure made by the author, raw data from Li (2009), 331–32).

more durable (Joint Commission on Rural Reconstruction 1955b; Interview with resident, April 6, 2022). The design and drawings of the wells were made by the engineers from the JCRR due to a lack of 'competent engineers' in the local government (Joint Commission on Rural Reconstruction 1956, 118–119).

In the late 1960s, the JCRR expanded its efforts to construct irrigation ponds, reservoirs, deep wells, and water supply systems. The one-million cubic metre Taihu Reservoir built in 1967 was considered the first large-scale project to enable 'full use of the limited water resources on the offshore islands' (Shen 1970, 224). Before 1970, two other reservoirs were built, twelve deep wells were dug, and multiple water supply systems were established (Hoh 1968; Joint Commission on Rural Reconstruction 1968). Along with new water extraction and supply facilities, fields were reorganised into uniform plots (Shen 1970, 224), and sprinkling irrigation systems (1971) were adopted to allow more efficient irrigation management (Joint Commission on Rural Reconstruction 1971a). These new technologies and facilities have resulted in more centralised and modernised ways of utilising water on the island, enabling relatively larger-scale crop production and a more organised landscape, as shown in Figure 4. In recent years, however, some have argued that concretisation of streams, over-withdraw of groundwater, and use of sprinkling systems are harmful to preserving water on the islands (Interview with resident, November 22, 2021; researchers, February 19, 2022, and July 11, 2023; public servant, March 28, 2022).

**Figure 4.** Jinsha region (1964 v.S.1974). One can observed the 'modernized' landscape, in which natural water bodies were dammed and fields were reorganised into uniform plots. Original data from the U.S. Geological Survey (1995), georeferenced by Hsu Chun-Yi.

While most of these new facilities had worked and improved the overall water supply in Kinmen, some programmes failed due to the lack of professional personnel and data on the islands. In 1964, there was a plan to develop infiltration galleries to improve irrigation efficiency. However, the project was later cancelled because the local contractor 'has poor ability and does not know how to use the equipment'(Joint Commission on Rural Reconstruction 1964). Another failing example was the Chin Sha Chi Irrigation Project (Wu-yee Dam) in 1953. The dam was constructed but failed to function as planned. According to the JCRR's opinion, 'the location was not well selected', 'the construction was also poor', and 'all the proposed projects have not enough hydrological data as basis for planning' (Joint Commission on Rural Reconstruction 1957).

The lack of professional personnel and environmental data was a recurring issue in Kinmen. Projects in the 1950s had to refer to weather data recorded in Xiamen (the island across the strait controlled by the PRC) due to the absence of weather data in Kinmen (Joint Commission on Rural Reconstruction 1957; Technical Committee 1954). There was no wind, tidal, and discharge data in the 1960s (Kinmen Technical Committee of Ministry of Economic Affairs 1963, 13). Requests were frequently made to the JCRR for water resources investigation and professional personnel training (Joint Commission on Rural Reconstruction 1965). In 1973, when the JCRR assisted in the establishment of the very first hydrologic surveying station in Kinmen, their opinion was expressed as below:

> Engineers are greatly embarrassed by the lack of fundamental hydrologic data which are necessary in planning the projects. We were confronted with this problem many years ago, but didn't try to solve it because the local government could not provide qualified engineers to fulfill this technical requirement in hydrology. (Joint Commission on Rural Reconstruction 1973)

Without supporting local conditions, some infrastructure programmes did not turn out as expected. The absence of data and technical expertise on the islands was critical in the failure of some infrastructure programmes in Kinmen. However, besides the JCRR's assistance and the limitations originating from island conditions, another crucial factor influenced the implementation and outcomes of these projects – the militarisation of infrastructure construction.

## Militarization of Infrastructure Construction

Kinmen was declared as a war zone in 1949. The islands were militarised, and the impact of militarisation was evident in Kinmen's infrastructure programmes. First, the governance structure was under the control of the military. In 1956, the Experimental War Zone Administration was implemented in Kinmen to integrate military and political forces and stabilise local

administration and security. The Kinmen Political Affairs Commission (KPAC), composed of military personnel operating under the Kinmen Defence Department, was established as the highest authority governing the local administration (see Figure 5). Within this governance structure, civilian affairs, encompassing economic and infrastructure development, were overseen by the military.

In practice, the militarisation of infrastructure can be observed from three characteristics – increased demand for infrastructure, involvement of military resources in infrastructure projects, and restriction of infrastructure due to military reasons. As the population in Kinmen doubled from about 40,000 to over 100,000 after troops were stationed on the islands, there was an urgent demand for water and food production (Hsu 1953, 12, 62). Although there had always been a scarcity of water resources in Kinmen, the issue became serious after the influx of military personnel (Joint Commission on Rural Reconstruction 1955b). In addition, some wells were destroyed by bomb shells or 'filled up with dead commies', and others were unable to function because the stone structures were taken away to build defence work (Hsu 1953, 60). Groundwater in these wells was of poor quality, some had high turbidity, and many were saline (N/A 1952; Technical Committee 1954, 174).

The construction of reservoirs in Kinmen was carried out by troops, and materials for these reservoirs were also sourced from military inventory. Take Taihu Reservoir for example, approximately 1,800 military personnel were mobilised every day, including two engineer battalions, four infantry companies, and many logisticians to construct the reservoir (Duan 1967). Beyond human resources, military vehicles and construction equipment, tax-free military materials, fuel acquired at military pricing, and construction materials transported via military vessels were utilised and contributed to the extremely low construction cost for the project (Joint Commission on Rural Reconstruction 1967). The Taihu Reservoir was not the only case. In

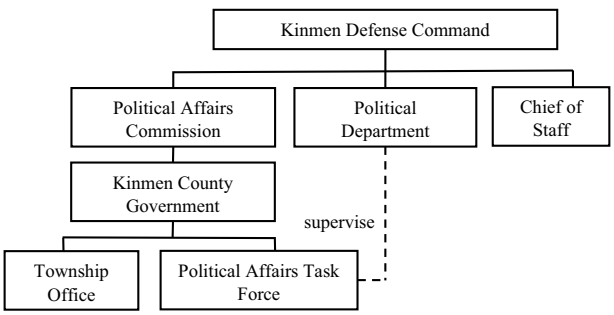


**Figure 5.** The organizational structure of the experimental war zone administration. Figure simplified and remade by the author, originally from the General Political Department of the Ministry of Defense, ed (1960).

Kinmen, one can find memorials situated near reservoirs, indicating which specific military units were responsible for constructing the reservoir.

The reforestation programme was also led by the military. At the time, each soldier was tasked with planting trees and nurturing the trees they grew. Making sure the trees survived was important for the soldiers not to get punished, as suggested in a saying: 'Soldiers love his tree just as his gun' (Hsu et al. 1998, 19). Certain military officers were specifically designated to oversee reforestation efforts, collaborating with the County government and the Forestry Bureau to formulate reforestation plans. While the actual work was carried out by a combination of military troops, the Forestry Bureau, local villages, and schools, it was the military units that achieved particularly noteworthy success due to their stricter demands (ibid, 22).

While the garrisons made significant contributions to the construction of infrastructure in Kinmen, the military situation also imposed notable limitations. Construction and repair works were occasionally delayed or halted due to bombardment or military requirements (Joint Commission on Rural Reconstruction 1957, 1964). Additionally, the scarcity of resources, qualified personnel, and restrictions in investigation resulted in inferior quality of infrastructure. The JCRR once reported to the US Embassy in Taipei that the military situation and the lack of trained personnel 'impose serious limitations on its ability to implement assistance programmes analogous to those in Taiwan' (Davenport 1955). There were instances where reservoir locations could not be altered due to military requirements, even though the engineers suggested unfavourable geophysical conditions for construction (Joint Commission on Rural Reconstruction 1971b).

Despite the fact that infrastructure development was often advertised during the War Zone Administration as a symbol of progress (such as in Figure 2), it was by no means a full success. A report analysing Kinmen's hydraulic challenges concluded that, apart from the islands' environmental constraints, the lack of data and financial resources, the restrictions from militarisation, and conflicting opinions among different departments all contributed to the difficulties of advancing hydraulic engineering on the islands (Kinmen Technical Committee of Ministry of Economic Affairs 1963, 44). It is therefore unsurprising that water infrastructure began to fail, and the demand for water persisted even after the withdrawal of hundreds of thousands of troops from Kinmen. This persisting water demand eventually led to the construction of a cross-strait freshwater pipeline.

## Infrastructure After the Mini-Three-Link

The War Zone Administration was lifted in 1992. Subsequently, in 2001, the Mini-Three-Links (小三通) policy was implemented, enabling direct shipping and exchanges between the islands of Kinmen and Matsu and mainland

China. After 40 year of militarisation and restricted access, Kinmen gradually opened up to Taiwanese tourists in 1993 and Chinese tourists in 2011. As tourist numbers and population continued to grow, the level of water stress in Kinmen intensified, and the existing water infrastructure in Kinmen proved insufficient to meet the rising demand for clean water. The reservoirs constructed during the militarised period had all become eutrophicated and had to rely on advanced treatment. The groundwater levels had declined, and certain groundwater areas became saline.

The failure of previous water infrastructure created an opportunity for Chinese infrastructure intervention, which eventually resulted in the cross-strait undersea pipeline between Quanzhou City (of Fujian Province) and Kinmen. In what follows, I examine how this water infrastructure serves as a debordering tool, the complex cross-strait and mainlands-islands politics that influenced the planning of the project, and the negotiations and materialisation of infrastructure.

## *Infrastructure as a Tool of Cross-Strait Debordering*

In August 2018, following the completion of the freshwater transfer pipeline, authorities from both Kinmen and mainland China were celebrating this milestone. The project not only alleviated Kinmen's water stress but also held historical significance as a symbol of cross-strait collaboration. Similar to the infrastructures built during the Cold War, the pipeline infrastructure serves as a territorial practice, albeit with an opposite purpose – that is, debordering between the mainland and the islands, and potentially between China and Taiwan. The new water flows enabled by the infrastructure carry symbolic meaning for border crossing, allowing the Chinese state to demonstrate its care to the population.

The pipeline's significance for cross-strait relations was emphasised by politicians in China and Kinmen. Chinese leaders, from the village committee director to the head of the Taiwan Affairs Office (of the State Council of PRC), stressed mainland China's contribution to the well-being of Taiwan and emphasised that people on both sides of the strait are like 'family' and 'drink from the same source of water' (Plus/Cctv 2018). Kinmen magistrates highlighted the islands' role as a 'bridge of peaceful cross-strait relations' (Xu and Chen 2019) and stated that 'When Kinmen is good, both sides [of the strait] will be good; when both sides are good, Taiwan will be good' (F.-H. Chen 2018). On the project's fifth anniversary, former magistrate Lee Chu-Feng praised the PRC government's efforts, suggesting that the leaders of Taiwan should 'feel embarrassed about themselves' (Lin and Zhao 2023). For the islanders, the cross-strait pipeline transfers not only water but also care from mainland China, enabling an image of border-crossing between the islands and the mainland while widening the distance with Taiwan.

The central government of Taiwan, however, expressed concerns about over-relying on China. An analysis by the Legal Affairs Bureau of the Legislative Yuan warned that given the uncertain cross-strait relations, depending too much on China without improving the island's own water supply capabilities would threaten national security (H.-M. Chen 2018). To Taiwan's central government, water supply infrastructure is part of the vital systems for the islands, and reliance on extraterritorial power becomes a security concern. In Chu and Hsu (2024)'s words, cross-border activities could 'blur the distinction between friends and enemies', threatening the externality of the border (15).

Indeed, some Chinese leaders did not conceal their intention of reunification behind this project. The governor of Fujian mentioned that 'the project carried the hope of people from both sides of the Taiwan Strait for peaceful reunification and a common aspiration for a better life' (Xinhua 2018). The spokesperson of the Taiwan Affairs Office stated that they would continue to 'unite our fellow compatriots in Taiwan' and 'advance the process of peaceful unification of our motherland' (People's Daily 2019). Since the pipeline is somewhat invisible, the 'care' that mainland China aims to perform needs to be demonstrated through the installation of memorial stones and exhibitions. In Kinmen and Quanzhou, memorials inscribed 'people from both sides of the Strait are drinking the same river of water', as shown in Figure 6, were set up near the facilities managing the pipeline water. In Quanzhou city, a series of exhibition halls located near the upstream, midstream, and downstream of the pipeline water source were designated as one of the 'Fujian-Taiwan exchange bases (福建省对台交流基地)' (China News 2021). The primary goal of these


**Figure 6.** A memorial with 'people from both sides (of the strait) are drinking the same river of water' in Kinmen. Photo taken by the author.

bases is to foster unification through cultural and social exchanges (Wang 2018).

The water transfer project has also sparked expectations for other cross-strait infrastructure projects. The magistrate of Kinmen County, Chen Fu-Hai (2014–2018, 2023-), brought up the possibility of 'New-Three-Links (新三通)', which involves transferring water, electricity, and building a bridge between China and Kinmen (F.-H. Chen 2018). This idea was later expanded upon by Chinese President Xi Jinping to 'New-Four-Links (新四通)', with natural gas being added as the fourth potential cross-strait infrastructure connection project. In his speech, Xi suggested that 'both sides of the strait should facilitate all connections [of trade and economic activities, infrastructure, energy, and resources,. . .]' and proposed that the islands of Kinmen and Matsu should be the pioneers for these projects as 'new paths of integrated development of both sides of the strait'(Chang 2019). For the islands, infrastructure promises development offered by the state, and for the PRC, infrastructure facilitates the imagination of a unified state.

Following Xi's speech, authorities in Kinmen and Fujian initiated active communications and evaluation of the possibilities for promoting the 'New Four Links'. The former Kinmen County magistrate, Yang Cheng-Wu, responded that 'Kinmen has the necessary conditions to serve as the bridge for cross-strait development and is willing to be the forefront of cross-strait peaceful exchanges' (Li 2019), and visited Xiamen City of Fujian to discuss cooperation matters (S.-C. Tsai 2019). A conference was held to explore the idea of a connecting bridge (Huang 2019). The Fujian government even claimed that they had begun planning the bridge and constructing the necessary infrastructure for electricity transfer on the Fujian side (Wang, Liu, and Chen 2022; I.-C. Tsai 2019). However, in contrast to the enthusiasm in Kinmen and China, the central government of Taiwan expressed concerns about the 'New-Four-Links', emphasising that it involves not just development but also national security and sovereignty issues. The central government stressed that this is a matter of national importance and that there is no urgent need for electricity, gas, or a bridge on the islands (Chen and Chang 2019; J.-C. Tsai 2019).

The differing perspectives on cross-strait infrastructure between the central and the local governments reflect the intricate relationships of the islands with the main island of Taiwan and mainland China. Along with other proposed cross-strait projects, the freshwater pipeline embodies the Kinmen residents' desire for development and amicable engagement with mainland China, even as it aligns with the Chinese mainland's objective of extending its influence over Kinmen. As for Taiwan's central government, the entity responsible for determining the necessity of this project, its stance was not static but was closely tied to changes in the ruling party and cross-strait relations.

### *The Shifting Cross-Strait Relations and Mainland-Islands Politics of Infrastructure*

The freshwater pipeline took twenty-three years to be realised since it was first conceptualised in 1995. The development of this project was facilitated by the islands and mainland China but was largely affected by the fluctuating cross-strait relations and the ruling parties in Taiwan. To simplify Taiwan's party politics, the two major parties are the Kuomintang (KMT) – which advocates closer ties with China, and the Democratic Progressive Party (DPP) – which champions Taiwan's sovereignty. The cross-strait relation tended to be more tense when the DPP held power and smoother when the KMT was in office. Moreover, Kinmen County has always been a KMT-leaning county, where the DPP has never even nominated a magistrate candidate. As such, substantial progress was only made during the KMT's tenure at the central government.

The idea of transferring water from mainland China to Kinmen was first proposed by the Fujian Provincial Department of Water Resources in 1995. They formed the 'Kinmen Matsu Water Supply Task Force', comprising experts and academics, and put forth three potential water transfer routes along with a couple of evaluation reports in the following years (County Waterworks 2018, 2). As for the Taiwan side, although there had been local voices calling for water transfer (County Council 1995, 1997), it was not until the early 2000s that the first two preliminary plans were published – one conducted in 2000 by the Water Resources Agency (WRA), the central administrative agency for water water-related affairs, and another in 2003 by the Kinmen Waterworks. However, the project remained unofficial due to limited communications between the PRC and Taiwan during the DDP's term in office. During this time, local actors played an important role in facilitating the project. The Kinmen Waterworks continued to conduct preliminary planning and environmental surveys, while communications with the Chinese side had to rely on non-governmental organisations and academics, given that public servants in Taiwan were prohibited from visiting China at the time (County Waterworks 2018, 17, 20). These unofficial communications can be seen as debordering work that supported the progress of the pipeline project.

In 2008, the WRA finally resumed its evaluation, suggesting that 'the tension across the Taiwan Strait has been gradually easing in recent years, which has opened up the possibility of acquiring new water sources from mainland China' (University 2008, 1). This coincided with the year when the KMT took power after the DPP's eight-year term. During the KMT's term from 2008 to 2016, 'the cross-strait climate has been more friendly' (Interview with technocrats, November 30, 2021, and January 3, 2022), leading to further evaluations and preliminary planning for the project. As conditions matured around

2013, a national security meeting suggested that this project should be directed by central agencies rather than the local ones (Weng 2019, 385). Subsequently, the Mainland Affairs Council (MAC) took the lead in the project. The project was officially approved by the Executive Yuan, and a cross-strait agreement was reached between two semi-governmental organisations from both China and Taiwan that deal with cross-strait affairs. As a technocrat recalled, 'the project finally started being top-down; previously, it was bottom-up and essentially not feasible' (Interview with technocrat, November 30, 2021).

The water deal was inked in 2015, following the Ma-Xi meeting – the first meeting between the political leaders of the ROC and the PRC since the nationalist government retreated to Taiwan. Subsequently, the project continued to move forward. Despite a proposal from the pro-independence party Taiwan Solidarity Union to cancel the budget, stating that: 'Kinmen is our frontline for national security, holding a critical strategic position. If the public water supply in Kinmen is controlled by China, it is an extreme risk for national security, and not a responsible thing to do . . . . . ', this opposition did not receive other parties' support (Yuan 2015, 362). The budget for the pipeline project was approved by the Legislative Yuan with a condition proposed by the DPP that the construction work should not be contracted to Chinese companies or employ Chinese workers (ibid, 364).

The DPP retook the presidential election in 2016, and another episode during the DPP's term highlighted the differing opinions between the islands and the central government of Taiwan. In 2018, the Kinmen County Government carried out the inauguration ceremony of the cross-strait pipeline despite guidance from the central government to cancel the ceremony. The decision to cancel the ceremony was due to the growing anti-China sentiment in Taiwan, triggered by the East Asian Olympic Committee's revocation of Taichung City's right to host the East Asian Youth Games, which was believed to be influenced by Beijing's pressure (Hioe 2018). In response to the public's anti-China sentiment, Taiwan's Mainland Affairs Council (MAC) decided to postpone the ceremony and suggested that Kinmen should 'look at the big picture' (Hsu 2018). Nonetheless, this decision did not halt the Kinmen County Government from holding the ceremony as planned. The only difference was that personnel from Taiwan's central government agencies, such as technocrats from the WRA, were instructed not to participate in the ceremony or publish relevant articles (Interview with technocrat, January 3, 2022; scholar, January 13, 2022). This episode not only suggests the contrasting attitudes between Kinmen and Taiwan but also reflects the need for this project and the benefits from the Chinese government to be made known to the people in Kinmen, as the ceremony was the perfect occasion to express such messages.

### Negotiation and Materialization of Infrastructure

As the first cross-strait water infrastructure project in Taiwan, various administrative and technical complexities arose during the planning process that required numerous negotiations with multiple government agencies domestically and across the strait. The first major question was regarding the pipeline's construction – should it be contracted to a Taiwanese company, a Chinese company, or both? In 2008, the proposed approach was for the pipeline to be constructed by the Chinese side (University 2008). This option was favoured by the Kinmen Waterworks because it would mean simply buying water from China without having to worry about construction and maintenance work (Interview with technocrat, November 30, 2021). However, as mentioned earlier, the project was later agreed upon at the Legislative Yuan that it could not be contracted to Chinese companies. This left two options: either Taiwan and China each constructed half of the pipeline, or Taiwan constructed the entire pipeline. Yet, dividing the pipeline into two sections could lead to issues with pipeline connection, quality control, and unclear responsibility for maintenance (Water Resources Agency 2014, 27). Therefore, it was concluded that the entire pipeline must be contracted to a Taiwanese company.

In practice, however, most Taiwanese companies lacked the technical capacity to conduct offshore engineering work. The offshore construction market in Taiwan was so small that no companies had their engineering ships (Interview with technocrat, January 3, 2021). As a result, the Taiwanese company that contracted the project had to subcontract the offshore construction to a Chinese company. This arrangement faced initial scrutiny and led to a suspension for almost a year (Interview with technocrat, November 30, 2021). It required the Kinmen Waterworks to seek assistance from officials at the national level to 'communicate with the opposing legislators' to address their concerns (Interview with public servant, June 30, 2023).

The construction process also encountered challenges originating from the islands and its surrounding ocean environment. The high tidal range, strong currents, and thick fogs constrained the available construction seasons, which led to several suspensions (Liaw 2021; Water Resources Agency 2018). Concerns arose about Chinese sand mining activities in the area, which could potentially affect the undersea environment and disrupt the pipeline (Liaw 2021). However, what really bothered the technocrats was not technical challenges but politics and the resultant negotiations and bureaucratic work (Interview with technocrats, January 3, 2022). For the central government of Taiwan, the cross-strait pipeline is a matter of security. As such, the Ministry of National Defence had to form a national security group to ensure the Chinese construction ship passed the security checks. Meanwhile, the Food and Drug Administration,

Customs Administration, and the Bureau of Foreign Trade had to create a specific custom number for the freshwater to be imported because raw water did not fall under existing food product categories. Even the drafting of the contract demanded specific work. Despite the shared use of the Chinese language in Taiwan and China, 'it took several rounds of translation to arrive at phrasing and wording that were agreeable to both parties' (Interview with technocrat, November 30, 2021). Moreover, the contract's signing had to align with Taiwan's central government's perspective on 'parallel institutions'. The Fujian Provincial Government was positioned as a 'local' entity within China. Given that the WRA was considered a 'central' agency in Taiwan, the MAC requested that the water contract should not be signed by the WRA but by the Kinmen County Government so that it was signed between two 'local' entities (Interview with technocrat, November 30, 2021. This approach avoided positioning the WRA as a 'local' entity, thereby implying that Taiwan was not a province but a political entity on the same level as China. Unlike typical hydraulic projects directed by the WRA, this project involved 'a lot of bureaucratic processes that we've never experienced in the past' (Interview with technocrat, January 3, 2022).

Negotiations are still ongoing due to the overestimation of water demand. The project costs were TWD $13.5 billion for Taiwan's side and TWD $5.5 billion for the Chinese' side of the construction (Water Resources Agency 2014, 39). To cover the Chinese construction cost, the water deal stipulated that Kinmen Waterworks would purchase water at the price of TWD $9.86 per cubic metre, with a fixed volume of 15,000 cubic metres per day (CMD) in the first year and an increasing 5,000 increment until a maximum of 34,000 CMD is reached, over a total of thirty years (County Waterworks 2018, 28). However, the quantity of freshwater purchased turned out to be much more than needed. By 2023, the pipeline water accounted for over 70% of Kinmen's public water supply (County Waterworks 2023), far exceeding the WRA's suggested 25% percent of non-local water supply sources. The demand did not meet supply partly due to an overly optimistic projection of population and tourist growth, which reflects residents' expectations for development (Interview with technocrat, November 30, 2021). To avoid wasting the excessive water, the Kinmen Waterworks directed it into local reservoirs in Kinmen to recharge the aquifers. Though benefiting the aquifers and farmers, this has led to the introduction of non-native species through the cross-border infrastructure. A fish survey conducted in 2022 indicates that at least four new non-native species may have been introduced to Kinmen through the pipeline, posing a threat to the island's relatively vulnerable local species (Chen 2022). Meanwhile, the Kinmen Waterworks is still negotiating with the Chinese counterparts to revise the contracted volume downwards.

## Conclusion

The examination of Kinmen's water infrastructure offers several insights. First, similar to transportation infrastructure, water infrastructure can serve territorial practices. Kinmen's water infrastructure once worked as part of the bordering practices for the ROC and the 'Free world' coalition led by the US, by symbolising their advancements in modernisation and civilisation in contrast to the communist regime across the strait. Conversely, the recent pipeline infrastructure became a debordering tool for Communist China to convey to the islanders that mainland China will always support the island because they were 'originally from the same root'. Infrastructure has the capacity to do so as it allows circulation of things, functions as vital systems, and represents progress, modern life, and state care. However, the absence of infrastructure or its failure also acts as a marker of state negligence and provides opportunities for other state's intervention. The existing water infrastructure in Kinmen gradually failed to provide clean water, generating the perception of a lack of care from Taiwan's central government and offering space for the PRC's support through the water transfer pipeline. The case of Kinmen underscores the need to reflect critically on the role of infrastructure in serving political agendas and performing states' care. This is particularly relevant in understanding China's growing global influence through infrastructure interventions. Yet, while Kinmen's water pipeline project shares some political implications with other BRI projects, its primary focus seems to diverge. Rather than extending China's geoeconomic power, in the context of cross-strait relations, Kinmen's water pipeline functions as a tool for debordering between the PRC and the ROC (Chu and Hsu 2024). As such, it provides another example of geopolitical infrastructure and enriches our understanding of infrastructure's political capacity.

On the other hand, this paper also illustrates how the construction and planning of infrastructure can be influenced by shifting geopolitics and other socio-material factors. During the Cold War, the establishment of water infrastructure in Kinmen was carried out under the operation of the military government and was supported by technical and financial resources from the US. The water infrastructure built at the time utilised military resources and reflected a 'modernized' vision of water usage and development influenced by the US. However, such vision was undermined by limitations due to factors such as a lack of technical data and personnel, restrictions imposed by military conditions, and the environmental constraints of the islands. As for the more recently built freshwater pipeline, the project timeline was prolonged by shifting party politics in Taiwan and the resultant changes in cross-strait relations. The project also involved negotiations among multiple institutions at local and central levels and across the strait to align with

different rules and ideologies. This attention to how infrastructure projects materialise on the ground serves as an important reminder to understand infrastructure and its embedded political interests as a contested process, subjecting to changing geopolitics and local conditions (Oliveira et al. 2020; Sidaway et al. 2020).

Of particular importance in Kinmen's case is that the islands' specific social and material environment and their relations to the main island of Taiwan and mainland China have contributed to the conditions for infrastructure intervention, as well as impacted the outcome of the infrastructure. First, Kinmen was in need of new water sources, while simultaneously holding a critical position for cross-strait relations due to its geographical proximity to China. This provides the case of constructing a cross-strait pipeline. Second, the challenges encountered during certain infrastructure projects, resulting from factors such as a lack of data, materials, and technical expertise, are a recurring theme for islands (Cashman 2014; Foley 2018). The failure of infrastructure also in part stems from the material constraints of islands, such as their small land area and material influences from the ocean (Kumar, Gopalakrishnan, and Jayasinghe 2020). Lastly, the political dynamics between Kinmen, Taiwan, and China affected the trajectory of infrastructure development. Prior to the Chinese civil war, the Kinmen Islands were in fact offshore islands of mainland China and had a distant relationship with Taiwan. It was after the Chinese Civil War that Kinmen became integrated into the ROC regime (Taiwan). Yet a sense of marginalisation has persisted among many Kinmen residents in relation to the central government of Taiwan. The pipeline from mainland China has accentuated this sentiment, and the pipeline's initial progress was also facilitated by informal communications between Kinmen and China rather than from the central government of Taiwan. In this sense, the intricate relationships between the Kinmen Islands, mainland Taiwan, and mainland China have influenced and been influenced by the infrastructure.

Without a doubt, the cross-strait pipeline has alleviated the water stress in Kinmen. During my fieldwork, numerous individuals expressed that if it had not been for the water from China, Kinmen would have suffered a severe drought in 2020. However, it is important to be cautious about how the increasingly intense cross-strait relations may impact the pipeline infrastructure and the water supply on the islands. In the event of a cross-strait conflict, the pipeline water supply could potentially be disrupted, and Kinmen would have to find alternative water sources to sustain supply.

## Note

1. The term 'Free China' was commonly used during the Cold War to refer to Nationalist China (Taiwan), which positioned it as part of the 'Free World' coalition in contrast to communist China. For example, a 1965 progress report was titled 'Agricultural Development in Free China' (Shen 1965).

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## ORCID

Mei-Huan Chen http://orcid.org/0009-0009-4785-4031

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