

## **Evaluating the Impacts of the Ba Lai Dam**

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### **Abstract**

Vietnam's Mekong Delta is facing an increasing and alarming rate of saltwater intrusion. Among the most affected are farmers, who rely on the region's natural resources for a living. In response, in 2002, the Communist Party of Vietnam constructed the Ba Lai dam—an irrigation scheme in Ben Tre Province—to prevent saltwater intrusion. Our research seeks to find out: How has the Ba Lai Irrigation Scheme affected Vietnam's Ben Tre province in the eyes of academics, local authorities, and farmers? Our research adopts the theoretical framework of political ecology, which seeks to analyze human-environment relationships through power dynamics. We found that the Ba Lai dam has effectively mitigated saltwater intrusion, albeit at the expense of surrounding ecological systems as well as farmers' livelihoods downstream of the dam. While recognizing the Vietnamese national government's gradual shift from hard engineering measures towards nature-based climate adaptation solutions instead, this paper argues that there remains a myopic focus on mitigating saltwater intrusion and increasing agriculture production at a provincial level in Ben Tre, generating further socioeconomic disparities.

## Introduction

The Mekong Delta, stretched across Cambodia and the southern end of Vietnam, is home to 13 provinces and over 21 million people, or roughly 20% of Vietnam's total population. The delta serves as a critical agricultural production hub for Vietnam's economy, accounting for 95% of the country's rice exports and 60% of fish exports<sup>1</sup>. However, parts of the delta have been facing increased saltwater intrusion over the last few decades.

Saltwater intrusion, which refers to the movement of seawater into freshwater aquifers, is a naturally occurring phenomenon in the Mekong Delta. While intrusion typically peaks during the dry season from November to April, recent years have seen both intensified and extended salinity periods. This is partly driven by the Mekong Delta's natural lowland topography, as well as anthropogenic drivers like large-scale groundwater extraction, which is causing subsidence in the delta at a rate of 1-3 cm per year.<sup>2</sup> Climate change, through sea level rise and changes in precipitation and evaporation, further exacerbates saltwater intrusion. The Mekong Delta is among the most vulnerable deltas to climate change globally, given estimated increases of 2-3°C in mean temperature and 75 cm to 1m in sea level rise compared to the 1980-1999 period.<sup>3</sup> In worst-case scenarios, scientific models predict that saltwater intrusion in the delta could increase 36% by 2050.<sup>4</sup>

Against this backdrop, the Vietnamese government launched the 'freshening of the coastal zones' policy in the 1990s to accelerate rice production and increase freshwater access.

This led to intensified construction of large-scale water infrastructure to mitigate saltwater

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<sup>1</sup> Tuổi Trẻ News, "Vietnam's Mekong Delta Braces for This Year's Saltwater Intrusion," *Tuoi Tre News*, February 19, 2022.

<sup>2</sup> Le Thu Mach, Hoang Long Cao, and Vu The Cuong, "Floods and Migrants of Vietnam's Mekong Delta: 25 Lessons from the Data | Earth Journalism Network," *Earth Journalism Network*, February 9, 2022.

<sup>3</sup> Prime Minister of the Socialist Republic of Vietnam, *National Strategy on Climate Change: Decision of the Prime Minister No. 2139*, Nguyen Tan Dung, Vietnam: ESCAP Policy Documents Management, 2011.

<sup>4</sup> Sepehr Eslami et al., "Projections of Salt Intrusion in a Mega-Delta under Climatic and Anthropogenic Stressors," *Communications Earth & Environment* 2, no. 1 (July 15, 2021): 1–11.

intrusion. One of these projects is the Ba Lai dam in Ben Tre province, which sits on the Ba Lai river, serving four districts in Ben Tre: Ba Tri, Binh Dai, Giong Trom, and Chau Thanh.<sup>5</sup>

Constructed in 2000, the dam began operations in 2002 with the aim of preventing saltwater intrusion, guaranteeing freshwater for domestic use, and increasing agricultural production.<sup>6</sup>

Given that the dam has operated for two decades, it is vital to evaluate its performance thus far and how it has shaped the landscape of Ben Tre, including the livelihoods of farmers upstream and downstream of the dam. For instance, recent news articles explain that the dam has aided rice farmers in Binh Dai district but negatively impacted shrimp farmers who require saltwater for their endeavors.<sup>7</sup> Our research, therefore, seeks to find out: How has the Ba Lai Irrigation Scheme affected Vietnam's Ben Tre province in the eyes of academics, local authorities, and farmers?

Our project is part of a partnership between Dartmouth College and Fulbright University Vietnam, with qualitative field research completed in Ben Tre province, Vietnam. Our research focuses specifically on the Tan My commune and Tan Xuan commune in Ba Tri district, which lie upstream and downstream of the dam, respectively. Therefore, this paper serves as a case study of the impacts of the Ba Lai dam in a specific localized area and is not an evaluation of the dam's overall performance. Nevertheless, we hope our findings will support policymakers in

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<sup>5</sup> Ngo Thi Thu Trang, Nguyen Quang Viet Ngan, and Chau Thi Thu Thuy, "Conflict of Water Using Resources under the Impacts of Ba Lai Sluice Dam in Ben Tre Province," *VNUHCM Journal of Social Sciences and Humanities* 3, no. 2 (December 25, 2019): 89–98.

<sup>6</sup> Thong Anh Tran et al., "Political Ecology of Freshening the Mekong's Coastal Delta: Narratives of Place-Based Land-Use Dynamics," *Journal of Land Use Science* 17, no. 1 (January 2, 2022): 471–86..

<sup>7</sup> VietNamNet, "Ba Lai Dam Now Causing More Problems Ben Tre Province than It Solves," December 12, 2018; VNA (Vietnam News), "Mekong Delta Authorities Take Measures to Secure Freshwater in Upcoming Dry Season," vietnamnews.vn, January 8, 2022; Tuổi Trẻ News, "Vietnam's Mekong Delta Braces for This Year's Saltwater Intrusion."

Vietnam in assessing the present costs and benefits of the dam and whether similar irrigation projects should be employed in other parts of the Mekong Delta.

## **Methodology**

Our research adopted a primarily qualitative approach, drawing from primary sources and existing secondary literature. We aimed to conduct our research through the lens of actor-oriented political ecology to analyze how power structures between different stakeholders affect environmental governance and the implementation of structures like the Ba Lai dam. Thus, we sought to interview as many people from varying degrees of power concerning the dam as possible. In sum, we conducted interviews with the following 13 stakeholders:

- Two farmers in Tan My commune (Ba Tri district), upstream of the Ba Lai dam
- Three farmers in Tan Xuan commune (Ba Tri district), downstream of the Ba Lai dam
- One local authority from the Ben Tre province Department of Agriculture and Rural Development
- One representative from Ben Tre Irrigation Works Exploitation One-Member Limited Liability Company, a state-owned corporation that currently manages the Ba Lai dam
- One representative from Luong Quói Coconut Processing Co. Ltd, a large agriculture corporation based in Ben Tre Province
- Five academics familiar with dam construction and/or salt intrusion in Southeast Asia, with 3 of those being Vietnamese scholars

The farmers we interviewed were selected by the Department of Agriculture and Rural Development of Ben Tre province prior to our arrival in Ben Tre. At least one local government official was present at each farmer interview. Interviews were conducted with the heads of



households in Vietnamese and later translated to English through a professional translator for the purposes of this paper. We asked questions pertaining to their personal histories and the land use history of their property, their proximity to the Ba Lai river, their knowledge of the Ba Lai dam, the economic conditions of their immediate community, the functioning of the agricultural system they participated in, and about their knowledge of saltwater intrusion and how it was impacting them.

### **Political Ecology in Vietnam**

Political ecology analyzes the power relations, injustices, and harms associated with human environmental intervention.<sup>8</sup> In this paper, we apply the framework to study the increasingly interconnected nature of livelihoods in the Mekong Delta, embedded within complex globalization and industrialization patterns and changing ecological systems.<sup>9</sup> We will also examine the negotiations between the people's and the state's power in Ben Tre province.

### **Vietnam's Colonial Legacy**

Livelihoods in the Mekong Delta are inextricably linked to market economies—making a living in the region often requires commercializing natural resources to sell in the national or international market.<sup>10</sup> This needs to be seen within a larger context of Vietnamese history, shaped by multiple legacies of colonialism and imperialism. According to Miller, it was during the French colonial period in the 19th and early 20th centuries that livelihoods in the delta first shifted “towards production for local and international markets rather than subsistence

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<sup>8</sup> Chris Sneddon, Interview with authors, December 6, 2022.

<sup>9</sup> Fiona Miller, “Constructing Risk: Multi-Scale Change, Livelihoods and Vulnerability in the Mekong Delta, Vietnam,” *Australian Geographer* 45, no. 3 (July 3, 2014): 309–24.

<sup>10</sup> Miller, “Constructing Risk,” 309-24.

production alone.”<sup>11</sup> In the 1960s, agricultural production in the delta further intensified as American imperialism introduced high-technology agricultural equipment, leading to the decline of traditional farming systems and ways of relating to the land.<sup>12</sup> And in 1986, plagued by widespread poverty exacerbated by the U.S. trade embargo since 1975, the Communist Party of Vietnam shifted from a centrally planned economy to a market-oriented socialist economy. Guided by the *Đổi Mới* reforms of the 1990s, this process has anchored Vietnam’s national economy into the global markets, albeit at high social and environmental costs (Fortier 2010). Therefore, through the lens of political ecology, it is notable that Vietnam’s history continues to shape its market-oriented approach of development in the Mekong Delta.<sup>13</sup>

### **Water Governance in Vietnam**

Another critical aspect of the political ecology framework is recognizing the multiplicity of actors involved in human-environment relations and considering how many have access to decision-making.<sup>14</sup> In general, environmental governance in Vietnam is heavily top-down. Water resources are primarily overseen by the Ministry of Natural Resources and Environment (MONRE) and the Ministry of Agriculture and Rural Development (MARD). MONRE is responsible for water planning, monitoring, and protection, while MARD oversees irrigation schemes, rural water supply, and sanitation.<sup>15</sup> The ministries are further broken down across four levels of governance: national, provincial, district and commune. However, at the latter three levels, local authorities generally manage state-owned water resources “in accordance with terms

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<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

<sup>13</sup> François Fortier, “Taking a Climate Chance: A Procedural Critique of Vietnam’s Climate Change Strategy,” *Asia Pacific Viewpoint* 51, no. 3 (2010): 229–47.

<sup>14</sup> Chris Sneddon, Interview with authors, December 6, 2022.

<sup>15</sup> Tien Du et al., “Water Governance in a Changing Era: Perspectives on Vietnam,” 2016, 241–78.

determined by higher levels of governance.”<sup>16</sup> State-led large-scale water control and irrigation infrastructure, such as dykes, are common in the Mekong Delta.<sup>17</sup>

Bottom-up power is gradually growing in both formal and informal capacities. For example, the 2012 Law on Water Resources requires public and stakeholder engagement in drafting water-related policies and laws. Water User Groups (WUGs) have been established at the district and commune levels, a sign of growing community participation. Nonetheless, Tien et al. find that implementation remains subpar: “there remains significant scope for improving the willingness and responsiveness of communities in interacting with such processes.”<sup>18</sup> We explore these power dynamics in our interviews with local farmers.

The ‘freshening of the coastal zones’ policy has been a critical environmental governance approach in the Mekong Delta.<sup>19</sup> First launched in the 1990s, the campaign's first stage attempted to “expand rice-cultivating areas into rural coastal zones” by converting large swampy, wetland areas into permanent freshwater zones to enable rice production.<sup>20</sup> The second stage of the campaign, under which the construction of the Ba Lai dam falls, aimed to “prevent saltwater intrusion while storing the significant amount of freshwater necessary for agricultural production at a greater scale.”<sup>21</sup> However, the Vietnamese government’s prioritization of freshwater resources has disadvantaged livelihoods which rely on saltwater, such as shrimp farming. This approach is slowly evolving on a national level: in November 2017, the Prime Minister’s office launched Resolution No. 120/NQ-CP, a policy roadmap to ensure climate-resilient development of the Mekong Delta. The resolution emphasized an ‘actively living with nature’ governance

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<sup>16</sup> Du et al., “Water Governance in a Changing Era.”

<sup>17</sup> Simon Benedikter and Gabi Waibel, “The Formation of Water User Groups in a Nexus of Central Directives and Local Administration in the Mekong Delta, Vietnam,” *ZEF Working Papers (No. 112)*, Bonn: Center for Development Research, May 5, 2013.

<sup>18</sup> Du et al., “Water Governance in a Changing Era.”

<sup>19</sup> Tran et al., “Political Ecology of Freshening the Mekong’s Coastal Delta.”

<sup>20</sup>Ibid.

<sup>21</sup>Ibid.

approach and marked a shift away from large-scale infrastructural solutions such as dams to address climate impacts.<sup>22</sup> However, as we will see in the Ba Tri district case study, the paradigm shift has not yet trickled down to all parts of the delta. With this context in mind, we will examine how Vietnam’s history, prevalent top-down approach, and shifting environmental governance norms have shaped the Ba Lai dam and its surroundings.

## **Findings**

### **Farmers living in Tan My commune, upstream of the Ba Lai dam**

We interviewed two farmers living in the Tan My commune, Ba Tri district, located upstream of the Ba Lai dam. Mr. Chu Tuấn has been living in Tan My since 2000, while Mr. Huỳnh Văn Mai has been cultivating crops in the area since 1975. Tuấn used to grow rice but has now transitioned to growing coconuts and raising cows, citing income reasons. Huỳnh’s family practiced single rice cropping in the late 1970s before switching to sugarcane. As the Ba Lai dam’s operations alkalinized the surrounding soil composition, Huỳnh then switched to growing coconuts as they can withstand a soil pH of up to eight, which is exceptionally high compared with most other crops.

Huỳnh also noted that he is transitioning to growing coconut organically, with support from a company that “will invest, support and equip us with science and technology.”<sup>23</sup> He mentioned two benefits: organic fertilizer makes crops “very resistant to salt” compared to inorganic fertilizers, and secondly, “if we switch to organic, we can export to Europe.” In regards to the organic transition, Huỳnh then stated that “we must follow the guidelines of the government”—likely a reference to the provincial government’s plans to have 30% of coconut

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<sup>22</sup> Carolyn Turk, The Mekong Delta Conference 2021: Contributions from Development Partners, March 13, 2021.

<sup>23</sup> Huỳnh Văn Mai, Interview with authors, December 4, 2022.

grown to organic standards by 2030.<sup>24</sup> This suggests a top-down approach towards agriculture in Ben Tre province, as discussed below.

Both farmers expressed strong support for the Ba Lai dam, with Tuấn saying that it has had a “significantly positive impact” on the residents of the Ba Tri district. Both farmers cited the dam’s freshwater storage for domestic and agricultural use. Tuấn said that “generally speaking, saltwater intrusion does not happen anymore,” citing 2016, a year of great drought in the Mekong Delta, as the only exception. In 2016, due to a combination of environmental factors, including a strong El Niño, extreme weather events led to a drastic increase of saltwater intrusion in Vietnam.

The farmers also acknowledged the dam's negative implications. Tuấn noted that “the Ba Lai dam, Ba Lai river, and freshwater reservoir are not, in general, closed-loop systems. [...] On the other side, there are certain locations where the sea level rises.”<sup>25</sup> He was likely referring to farmers downstream of the dam who have experienced regular flooding when water from the dam is released.

Based on our observations, both upstream farmers seem to live comfortable lives and are satisfied with their current income from coconut farming. Both of them had large, well-maintained, and easily accessible houses.

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<sup>24</sup> VietnamPlus, “Ben Tre Expands Organic Coconut Farming | Society | Vietnam+ (VietnamPlus),” *VietnamPlus*, October 19, 2022, sec. Society.

<sup>25</sup> Chu Tuấn, Interview with authors, December 4, 2022.



House of Mr. Huỳnh. Picture taken by the authors.



Outside gate of Mr. Huỳnh's house. Picture taken by the authors.



Outside of Mr. Tuấn's house. Picture taken by the authors.



Cattle herd in Mr. Tuan's house. Picture taken by the authors.

### **Farmers living in Tan Xuan commune, downstream of the Ba Lai dam**

Next, we interviewed three farmers living in the Tan Xuan commune, Ba Tri district, located downstream of the Ba Lai dam. Mr. Trần Văn Nghiệp, aged 72, has lived in the area for 40 years. He is currently semi-retired due to his age and raises cows. Mr. Huỳnh Văn Phú, aged 48, has lived in the area for 24 years—before the Ba Lai dam was constructed—and practices fish and shrimp farming. Võ Văn Pha, aged 52, moved to Tan My 20 years ago, shortly after the dam was constructed, and also practices aquaculture.

Our conversations with Trần, Huỳnh, and Võ contrasted that with farmers living upstream of the dam. While all the farmers we interviewed described a need for self-reliance to adapt to their situations, the downstream farmers seemed more vulnerable for multiple reasons. The three farmers repeatedly expressed their concerns about poor access to freshwater. Trần said, "the domestic water supply is [...] poor and insufficient for daily needs; therefore, we must carry water by truck from other locations." This represents a financial burden for them as "water costs 60,000 VND per cubic meter," according to Huỳnh.<sup>26</sup>

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<sup>26</sup> Huỳnh Văn Phú, Interview with authors, December 4, 2022.

Further, induced flooding from the Ba Lai dam negatively affects the local aquaculture in Tan Xuan commune, causing the decline of shrimp farming for the past 14 years, according to Huỳnh. This flooding is highly detrimental if the farmers cannot prepare in time: “Sometimes when [the dam] floods, the shrimps, crabs, and fishes get carried away.”<sup>27</sup> As the dam operators release water more regularly to match the impacts of climate change in the region, floods have increased. As Võ explained, “previously, the dam was drained four days per month, but today it is drained six to eight days each month.”<sup>28</sup> Moreover, flooding now happens more frequently, not only on the 15th and 30th day of every month in the Lunar calendar, and it has become more unsustainable. Consequently, downstream farmers face more disruptions to their domestic and agricultural activities.

Despite this challenging scenario, there is no government support for shrimp farmers. All three farmers said that only upstream coconut farmers receive support. This is due to the ‘freshening of the coastal zones’ national strategy to prioritize freshwater agriculture and guarantee food security. These challenges further harden their financial ability to invest in costly aquaculture infrastructure—drilling wells and installing pipes “cost tens of millions of VND,” an unaffordable amount for their realities.<sup>29</sup> In this context, shrimp farmers are forced to “just adapt,” leaving them with no other options, as echoed in our interview with shrimp farmer Võ, who states, “What else could I do?”<sup>30</sup>

These farmers showed a strong sense of resignation, having accepted their difficult conditions. They acknowledge that the Ba Lai dam benefits other communities, mainly upstream

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<sup>27</sup> Võ Văn Pha, Interview with authors, December 4, 2022.

<sup>28</sup> Ibid.

<sup>29</sup> Huỳnh Văn Phú, Interview with authors, December 4, 2022.

<sup>30</sup> Ibid.



ones, and feel that they are in the minority of people who are suffering its costs. Therefore, the farmers feel “unable to offer any suggestions” to the government.<sup>31</sup>

The livelihoods of these farmers were sharply different from Mr. Huỳnh Văn Mai and Mr. Tuấn's. The house we interviewed them in was small, had no cement roof, and was harder to access. They also practiced other subsistence farming activities, including raising chickens or rearing cows. Further, Huỳnh mentioned increasing inter-province migration trends in seeking freshwater availability to grow crops and raise livestock.



Outside a farmer's house in Tan Xuan commune, downstream of the dam.  
Picture taken by the authors.

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<sup>31</sup> Trần Văn Nghiệp, Interview with authors, December 4, 2022.



Inside a farmer's house in Tan Xuan commune, downstream of the dam.  
Picture taken by the authors.



Aquaculture pond in Tan Xuan commune. Picture taken by the authors.

### **Interview with Mr. Ngô Tuấn Hưng, Technical Manager of Ben Tre Irrigation Works Exploitation One-Member Limited Liability Company**

The Ben Tre Irrigation Works Exploitation One-Member Limited Liability Company, a state-owned enterprise established by the People's Committee of Ben Tre province, is responsible for overseeing, managing, and reporting on the dam's operation.

According to Ngô, the dam has been effective in its technical purpose of controlling the flow of saltwater and freshwater, leading to significant economic development in the region by extending the agriculture time and seasons for sugar cane, coconut, and rice. He emphasized the company's goal of “prolonging freshwater and limiting saltwater to develop crops and livestock in the region.”<sup>32</sup>

While he acknowledged the adverse effects the dam has had on the local community's livelihoods, he reported that his department “[does] not have direct contact with [local farmers]” and, therefore, “cannot evaluate the [dam’s] effects on them.” “That is not our responsibility,” Ngô said, pointing out that managing changes in livelihoods caused by the dam falls under the purview of the People's Committee.<sup>33</sup>

Ngô mentioned a shift towards “developing based on natural conditions, instead of going against them.”<sup>34</sup> In the past, the company used to separate saltwater and freshwater, but now they allow for mixed systems, such as brackish water. When asked for a vision for the 3 or 5 years ahead, Ngô said, “that cannot be predicted” due to climate changes and upstream hydropower plants.<sup>35</sup>

## **Discussion**

Our findings reveal that while the Ba Lai dam is an effective stopgap measure to mitigate saltwater intrusion, the project has significant negative externalities on people’s livelihoods and the environment. We identify three layers of power dynamics: firstly, between the upstream Tan My commune and downstream Tan Xuan commune, with the former mainly benefitting from the

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<sup>32</sup> Ngô Tuấn Hưng, Interview with authors, December 5, 2022.

<sup>33</sup> Ibid.

<sup>34</sup> Ibid.

<sup>35</sup> Ibid.

dam and the latter bearing the burden of the dam's costs. Secondly, the Vietnamese government holds significant power over farmers' livelihoods and agricultural practices, forcing them to adapt to top-down changes. Finally, while the central Vietnamese government is moving away from hard engineering measures and towards 'soft' adaptation measures with Resolution 120, this shift is not being implemented on the ground due to the influence of local officials and international actors. Overall, we argue that the Ba Lai dam itself is a symptom of the broader power dynamics behind the dam. Specifically, it is a myopic focus on mitigating saltwater intrusion and increasing agriculture production which has widened socioeconomic disparities in Ben Tre.

### **Social and Environmental Impacts of the Ba Lai Dam**

We found that farmers living upstream of the dam have more resilience, financial security, and state-driven incentive to adapt to the dam and climate-induced environmental impacts. While they still struggle with extreme weather occurrences, such as major droughts in 2016 and 2019, the Ba Lai dam's mitigation of saltwater intrusion has afforded them stability in coconut farming and even provided the means to explore new farming methods. For example, Huỳnh talked about previous 'trial plantings' and his current transition to organic coconut farming; Tuấn was able to transition from growing rice to rearing cows. There is a sense of advancement, with new approaches to generate profits.

On the other hand, downstream farmers seem caught in a 'choiceless choice'—a lose-lose situation. They can either cope with the negative impacts of the dam, or move elsewhere entirely. Here, the community is simply trying to stay afloat. This is particularly so for small-scale farmers who find it challenging to upgrade or expand their aquaculture systems, as this requires a certain amount of capital in the first place. Nevertheless, they feel that the dam has overall

benefitted the Ba Tri district. Ironically, this reduces their bargaining power to raise their concerns regarding the Ba Lai dam.

The Ba Lai dam has also had a significant environmental impact on the surrounding area. For instance, with the addition of consistent fresh floodwater from the dam, the pH of surrounding soils rose over time.<sup>36</sup> Thus, after the dam's construction, both upstream farmers we spoke to switched to growing coconut, a more alkaline-stable crop. These changes to soil pH may not be directly detrimental to the soil, but represent a way in which farmers have had choice taken away from them, as soil pH is one of the most important determining factors of what can be grown.

Additionally, the dam has negatively affected the micro and macro biota of the Ba Lai river. The local authorities acknowledged that since the introduction of the Ba Lai dam, there have been observed changes in biodiversity, such as the loss of “mangroves growing on the Ba Lai riverbank” and the disappearance of other species such as “shrimp or lanceolate goby.”<sup>37</sup> The authorities attributed these changes to “climate change,” however, the work of professor Le Anh Tuan disputes this explanation. Professor Tuan stated that the dam blocked both freshwater and sediment flow downstream of the dam, thus eroding the riverbanks and depriving the mangroves of necessary nutrients, causing them to die off. These mangroves, he argues, are crucial in preventing further erosion, as “when the forest dies, there is nothing to stop the water from eroding the banks, and the downstream landslides will increase.”<sup>38</sup>

Furthermore, when the dam's gates are closed for too long, according to Professor Nguyen Huu Thien, the river becomes stagnant, depriving the water of oxygen while

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<sup>36</sup> Nguyen Huu Thien, Interview with authors, December 13, 2022.

<sup>37</sup>Ngô Tuấn Hưng, Interview with authors, December 5, 2022.

<sup>38</sup> Le Anh Tuan, Interview with authors, December 12, 2022.

simultaneously accumulating pollution from wastes dumped upstream of the dam.<sup>39</sup> The loss of oxygen means that bacteria in the river that require it to break down wastes are no longer able to function, causing the river to lose its “self-purification capacity,” meaning that the organic and inorganic matters dumped into the river are not broken down and instead pollute the river.<sup>40</sup> Multiple studies have also found an unnatural accumulation of nutrients surrounding the dam due to agricultural wastes such as excess fertilizer that are unable to break down when the gates remain closed, particularly organic carbon, nitrogen, and phosphorus, as well as high concentrations of heavy metals in the water.<sup>41</sup> This nutrient and heavy metal accumulation, combined with low oxygen levels, led to a decrease in the overall abundance of microorganisms and macro-organisms such as fish.<sup>42</sup> Additionally, with no oxygen in the river, carbon from organic matter in oxygen-poor water will produce methane, which is “21 times more potent” than carbon dioxide as a greenhouse gas.<sup>43</sup>

The environmental impacts caused by the Ba Lai irrigation scheme cannot be separated from farmers’ livelihoods, representing how, historically, farmers have not been the primary decision-makers of their production. What farmers grow is ultimately dictated by soil conditions, such as pH, microbiota, nutrients, and water availability – all of which have been altered by the dam.

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<sup>39</sup> Nguyen Huu Thien, Interview with authors, December 13, 2022.

<sup>40</sup> Ibid.

<sup>41</sup> Nguyen Thi My Yen et al., “The Effect of a Dam Construction on Subtidal Nematode Communities in the Ba Lai Estuary, Vietnam,” *Diversity* 12, no. 4 (April 2020): 137; Thanh Thai Tran et al., “Ecological Impact Assessment of Irrigation Dam in the Mekong Delta Using Intertidal Nematode Communities as Bioindicators,” *Environmental Science and Pollution Research* 29, no. 60 (December 1, 2022): 90752–67.

<sup>42</sup> Nguyen Huu Thien, Interview with authors, December 13, 2022.

<sup>43</sup> Ibid.

## State Influence

Despite the impacts of the Ba Lai dam on farmers, both groups are ultimately tightly constrained by state power. As reflected in the state's preferential support for coconut farming in Tan My commune—and most recently, organic coconuts—the Vietnamese government's national and provincial land use plans dictate what farmers can grow. All five farmers we interviewed mentioned that they simply have to adapt or follow government guidelines, reflecting their lack of political power relative to the state, whether real or perceived. While shrimp farming goes “against the political will as well as the [coastal freshening] policy of the local government” and can be seen as “soft political dissent,” our interviews reflect that farmers in Tan Xuan commune are not deliberately using shrimp farming as a way of pushing back against the system. Instead, they are merely trying to adapt to environmental changes and get by.<sup>44</sup>

In fact, the construction of the Ba Lai dam itself was a top-down decision that fundamentally changed the landscape of Ben Tre Province. Before 2002, the Ba Tri district was not heavily populated; it was the Ba Lai dam's construction that enabled livelihoods to develop rapidly in the region.<sup>45</sup> Ben Tre is hence embedded in the Vietnamese government's efforts to position the Mekong Delta as a site of economic development and growth. Our interviews with local authorities and secondary articles often pointed to food security as the primary reason given for the construction of the Ba Lai dam. However, we must question who benefits from this security. Though the delta produces 25 million tons of rice each year, over half of this is exported. As Professor Nguyen Huu Thien argues, “frankly speaking, the exported half is not for national food security but for income, and there are other ways to earn income than trying to maximize rice production by building structures that handicap the natural systems of the delta.”<sup>46</sup>

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<sup>44</sup> Thong Anh Tran, Interview with authors, December 3, 2022.

<sup>45</sup> Tran et al., “Political Ecology of Freshening the Mekong's Coastal Delta.”

<sup>46</sup> Nguyen Huu Thien, Interview with authors, December 13, 2022.

Further, many of the recent decisions on farming seem to be financially motivated; as Huỳnh from Tan My commune highlighted, the local government's push for organic coconut farming is for “[exporting] to Europe” to achieve a higher price.<sup>47</sup>

Despite the sheer production of the Mekong Delta region, Vietnam ranks 46th in terms of food security for 2022.<sup>48</sup> This brings into question whether increasing production in the Ben Tre region truly aids in improving food security or if it continues an exportation trend initiated by French colonial rule and incentivized by American high-tech strategies.

### **Evolving Approach to Climate Adaptation**

On a national level, the Vietnamese government’s perception of climate adaptation appears to be evolving. Measures like the Ba Lai dam are gradually becoming de-emphasized in favor of nature-based approaches, as seen with the national government’s implementation of Resolution 120. Some of this change in perspective can be seen at the local level: while the provincial government in Ben Tre previously sought to draw a clear separation between saltwater and freshwater zones as part of the ‘freshening the coastal zone’ policy, Ngô said authorities are increasingly allowing for mixed systems like brackish water.<sup>49</sup>

In Ben Tre province, however, dams continue to be viewed by some stakeholders—both domestic and foreign—as a path towards development and livelihood security. The local government appears to continue to resist criticism of the dam; though there was a third-party report on the dam’s effectiveness completed in 2019, we were told that file of the report does not exist anymore, as it “[went] missing after being changed and mixed up several times, and the computer broke down so [the file] is gone.”<sup>50</sup> Additionally, the provincial authorities have

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<sup>47</sup> Huỳnh Văn Mai, Interview with authors, December 4, 2022.

<sup>48</sup> Economist Group, “Global Food Security Index 2022” (Corteva Agriscience), accessed December 15, 2022.

<sup>49</sup> Ngô Tuấn Hưng, Interview with authors, December 5, 2022.

<sup>50</sup> Ibid.



continued their involvement in dam-building despite the national government's aim to move away from hard engineering projects. International investment company Japan International Cooperation Agency (JICA) announced plans in June 2022 to fund two dam projects in collaboration with MARD further upstream in Ben Tre.<sup>51</sup> This appears to be in direct contradiction to Resolution 120 and makes it clear that local power structures may have their own goals which differ from the national government's. With Vietnam's top-down political structure, it may take time for the new paradigm shift to trickle down to local areas like Ba Tri district.

## **Conclusion**

The Ba Lai dam has been successful in its initial aim of minimizing saltwater intrusion. In operation for two decades, it has allowed for the development of freshwater agriculture and alleviated some of the local impacts of climate change. However, the changes in local ecosystems and livelihoods provoked by the dam—including water pollution and monthly flooding for downstream farmers—involve more nuanced implications. When seen as a whole with policies like coastal freshening and selective farmer aid, we argue that the Ba Lai dam itself is not the main issue. Rather, it is a myopic focus on mitigating saltwater intrusion and increasing rice production—with the goal of export and development of the Ben Tre region—that continues to generate disparities in the province. While the national government has recently demonstrated a willingness to change its climate adaptation approach and shift away from hard engineering measures, outdated notions of fighting against nature continue to be perpetuated by provincial authorities in Ben Tre and international actors like JICA. It remains to be seen how this

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<sup>51</sup> Quang Huy Hoang et al., "Operation of the Ba Lai Irrigation System in the Mekong Delta, Vietnam," *Paddy and Water Environment* 7, no. 2 (June 1, 2009).

disconnect will be resolved moving forward. Overall, our research highlights the need for more equitable and sustainable approaches to mitigating saltwater intrusion in Vietnam. In the face of a climate crisis driven by market-oriented development, any solutions, we argue, must reconsider ways of relating to nature and its finite resources.

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