
Navigating Water Challenges in the Vietnamese Mekong Delta: How Can a Shift in Water Management Help?

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ABSTRACT

The Vietnamese Mekong Delta (VMD) is currently grappling with multiple water challenges. These challenges stem from the alteration of the Mekong River's natural flows caused by upstream hydropower development, unpredictable rainfall patterns, and local policies that prioritize agricultural production. This article examines how these combined stressors have prompted a shift in water management strategies—from focusing on water expulsion to water retention—to tackle water scarcity and achieve long-term water security in the VMD. Case studies from An Giang and Ben Tre showcase evolving water management approaches, revealing how state-led expansions of water infrastructure have contributed to water scarcity and increased the vulnerability of rural inhabitants. Achieving sustainable water security requires integrating empirical research with policy insights by considering the complex dynamics of local and transboundary water conditions, as well as the contestations between state-driven water management strategies and livelihood preferences of local farmers. We advocate for a balanced approach that recognizes and utilizes diverse water resources for rural livelihood development, particularly in coastal zones. While freshwater remains essential for agriculture and household needs, incorporating brackish and saline water into local development strategies can better align with farmers' aspirations for sustainable and profitable livelihoods.

Keywords: Climate change; hydropower development; policy learning; Vietnamese Mekong Delta; water security; water management

Water Scarcity as a New Challenge

The Anthropocene era has witnessed increasing climate change risks globally, particularly in countries of the Global South.¹ This is notably evident in the Mekong region, where water infrastructure development has been pursued to support agriculture-driven national economic growth. These efforts, combined with the rapid development of upstream hydropower dams and climate change events (e.g., El Niño and droughts), have created critical challenges to the Mekong water systems. The storage of vast quantities of water in hydropower dam reservoirs in China,² for example, has disrupted downstream water flows and the transport of sediment essential for sustaining riverine deltas.³ Located in the southernmost region of the Lower Mekong Basin (LMB), the Vietnamese Mekong Delta (VMD) is heavily affected by these complexities.

Water scarcity has become a critical issue in the LMB in recent years.⁴ The VMD, for example, has seen the recurring disruption of water flows over the past few decades.^{5,8} This unprecedented phenomenon places increasing pressure on agrarian communities and their livelihoods.⁶ It is, therefore, crucial to understand how water scarcity has precipitated a paradigm shift in water management to achieve water security while safeguarding agriculture-based livelihoods for the agrarian communities across the delta.

Evidence presented in this paper was drawn from the case studies conducted in two provinces within two distinct ecological zones of the VMD: An Giang Province in the floodplains (upper delta) and Ben Tre Province in the coastal zone (lower delta). An Giang has faced severe impacts from the

upstream climate and infrastructure development dynamics, illustrated by the recurring disruptions of Mekong river systems. Meanwhile, Ben Tre grapples with the increasing intensity and complexity of saline intrusion.⁷ These evolving ecological challenges in both localities have jeopardized the freshwater supply essential for the water-dependent livelihoods of agrarian communities.

Water scarcity in the VMD can be attributed to several factors. At the regional level, climate change and upstream hydropower development have presented critical challenges, such as fluctuating water flows, to the delta. Additionally, the 180-kilometer-long Funan Techno Canal, which aims to create a navigation route between Cambodia's coastline and the Mekong River near Phnom Penh, is likely to exacerbate issues of saline intrusion in the Mekong Delta by altering river flows.⁸ Water loss from this large-scale project is likely to exacerbate existing water scarcity issues in the delta. At the delta scale, it is also important to mention the sustained efforts of the Vietnamese government to invest in water infrastructure across the delta. Following the state-led "rice everywhere" campaign,⁹ an extensive network of infrastructure, including low and high dykes, canals, and sluices, has been constructed. While these efforts aimed to promote national and regional economic growth, drive rural modernization, and boost household income in rural areas, they have inadvertently intensified pressure on the delta's water regimes and rural livelihoods.

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Drying-out conditions in a flooding zone of An Giang Province (left) and in a canal in Ben Tre Province (right).

issue in the delta. The transformation of waterscapes and associated livelihood systems in the VMD can be attributed to water infrastructure development policies. This traces back to the flood-expulsion policy of the late 1990s, during which a network of lateral canals was constructed to channel the excessive volumes of floodwaters from the floodplains to the West Sea (Gulf of Thailand).¹⁰ The primary aim of this policy was to eliminate flooding in the region and to create “safe” zones for intensified rice production in the floodplains.

Similar efforts were undertaken in the coastal zones through the construction of large-scale water infrastructure. This underscores the state-led “freshening coastal zones” policies that were conducted in two phases.¹¹ The first phase took place in the Ca Mau Peninsula, demonstrating the national government’s initiative to transform brackish coastal zones into permanent freshwater zones for rice production, supported by extensive dike systems.¹² The second phase involved a more ambitious transformation of the coastal zones, including the conversion of rivers into reservoirs, as exemplified by the Ba Lai system in Ben Tre Province.¹³ This “highly modernist” approach to water management aimed to ensure year-round water availability to meet growing demands of agricultural production and domestic use, while addressing the incremental rate of saline intrusion during the dry season. However, in some areas, rural communities lack necessary resources, knowledge, or capacity to adapt to changing water conditions. While securing a sufficient water supply in the coastal zones remains a significant challenge,¹⁴ livelihoods are expected to become increasingly vulnerable to environmental impacts.¹⁵

Water governance under the conventional “command and control” framework in the VMD presents significant challenges in achieving effective water management. There is insufficient participation by relevant stakeholders in water management decisions. This top-down and technocratic approach often results in institutional inertia, leading to delayed responses to the evolving water dynamics of the Mekong River.¹⁶ Additionally, the heavy reliance on water engineering systems can contribute to the overuse and mismanagement of water resources.¹⁷ However, acknowledging these

institutional limitations provides an opportunity to develop new pathways for learning and adapting to the delta’s changing waterscapes.¹⁸

Shift in Water Management Towards Water Security

Insights from our case studies in An Giang and Ben Tre Provinces suggest that conventional “grey” infrastructure systems, such as dikes and sluices, remain central to local water management strategies. Despite their widespread implementation, there are concerns among environmental experts about their ability to address emerging water challenges, such as water scarcity, and to ensure sustainable water security in the delta. These cases highlight the paradoxical outcomes of decades-long water control policies. While these policies aimed to manage water resources to support rural communities’ livelihoods, the unintended environmental repercussions of disrupting natural flood patterns have put livelihood systems under pressure. On a broader scale, the national government’s sustained efforts to transform the VMD into a highly productive agricultural frontier have drastically reshaped its waterscapes, turning it from a water-abundant to a water-scarce delta.

The recurring complexities arising from anthropogenic changes to the Mekong River’s water regime in recent years have thus prompted broader policy learning and adaptation efforts at the government level. This has led to the implementation of an adaptive management approach, which is defined as a structured cycle of knowledge accumulation through conceptualizing, monitoring, reflecting, learning, and adapting.¹⁹ From an adaptive management perspective, the shift in water management in the VMD first became evident with the redirection of policy focus from the floodplains to coastal zones, driven by the heightened environmental risks of saline intrusion and its associated impacts on the environment and farmers.²⁰ In the VMD, water scarcity compounds livelihood challenges already intensified by land subsidence, sand mining, and rising sea levels in the coastal zones,^{21,22} creating additional hardships for local communities.²³ At the household level, a significant transition has already taken place—

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from “living with floods” to “living with saline intrusion”—reflected in the innovative agricultural practices rural farmers have adopted to adapt to changing environmental conditions.²⁴

These adaptive efforts are reflected in a corresponding shift in the local government’s mindset and priorities, emphasizing water retention as a pivotal strategy to support local economic development. This transition highlights the evolution of water management—from expelling water to retaining it—under the compounded challenges of climate change and upstream infrastructure development. The previous policy of expelling excessive floodwaters to the West Sea has failed to address emerging water challenges, such as water scarcity and saline intrusion, which is now a critical issue. This approach revealed significant shortcomings in water management by underestimating the economic benefits that floodwaters could bring to local communities.

The paradigm shift from water expulsion to water retention presents evidence of learning and adaptive policy actions in tackling the drawbacks associated with the former. Water scarcity has become a driving force that prompts a paradigm shift towards achieving water security in the VMD. In alignment with the Vietnamese government’s climate-resilient and sustainable development strategies stipulated by Resolution 120 on “Climate Resilience and Sustainable Development of the Mekong Delta Region,”²⁵ ensuring a consistent, year-round water supply to sustain agriculture-based livelihoods has emerged as a new priority. Within this context, water retention plays a crucial role in addressing emerging water challenges at both local and transboundary levels. This strategic emphasis on water security marks a significant shift from the long-standing national policy focus on food security, which has dominated the VMD’s development agenda for many decades.

Water Retention as a Pre-Emptive Management Practice: Quantity Over Quality

The water retention approach prioritizes water quantity over quality to tackle water scarcity. Given the severe impacts of water shortages

on farming communities in recent years, this approach is perceived as a practical solution to secure water availability for agricultural production and household consumption during the dry season. In particular, it supports the adoption of diverse water management strategies, including the construction of freshwater reservoirs and the use of natural wetland systems in peripheral areas of the delta to retain water.²⁶ This reflects a policy shift towards integrating grey and green infrastructure solutions in water management.²⁷ In An Giang Province, for example, water retentions are achieved through household ditches, dike compartments, canals, and natural wetlands such as Bung Binh Thien Lake. In Ben Tre Province, schemes like the Ba Lai Reservoir enable the storage of significant freshwater volumes to support crop production and household needs. However, concerns remain about the efficiency of such large-scale reservoirs due to high construction costs, space requirements, location suitability, and high evaporation rates.²⁸

Various eco-friendly water retention approaches have been widely adopted to secure freshwater availability. Traditional water retention practices in the VMD demonstrate that rural inhabitants have extensive experience in harvesting rainwater during the rainy season and storing it for household use during the dry season.²⁹ These methods include using cisterns, cement tanks, and other storage tools, as well as large plastic bags for convenient freshwater storage. These approaches help minimize reliance on groundwater pumping, which is common among coastal residents. Excessive groundwater extraction is a major contributor to land subsidence and associated environmental issues, including salinization and coastal erosion.³⁰

To secure the sustainable future of the VMD, we should not await the outcomes from negotiating with upstream Mekong countries; we need to store water at hand. While considerable emphasis is placed on retaining freshwater through water retention approaches to ensure long-term water security in the VMD, water quality has received comparatively less attention. This is particularly critical in intensive rice production areas, where rural farmers heavily rely on agrochemicals and synthetic fertilizers to boost rice productivity. Although local agricultural institutions promote



Freshwater stored in a canal in An Giang Province (left) and in the Ba Lai scheme in Ben Tre Province (right).

“To secure the sustainable future of the VMD, we should not await the outcomes from negotiating with upstream Mekong countries; we need to store water at hand.”

the application of innovative farming models, such as “3 Reductions, 3 Gains” or “1 Must Do, 5 Reductions,” which seek to reduce the application of water, fertilizer, and pesticides while sustaining rice yields,³¹ hidden competition among rice farmers persists. Many farmers continue to believe that increased application of agrochemicals and fertilizers would result in higher crop yields. These conventional practices, as a result, have induced the widespread application of these agricultural inputs on rice fields, causing the substantial contamination of both surface and groundwater resources.³²

Referring to the concept of water security defined by Grey and Sadoff (2007, p. 545) as “the availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems, and production, coupled with an acceptable level of water-related risks to people, environments, and economies,”³³ this paper argues that the persistent reliance on these conventional farming practices, coupled with the quantity-oriented water management policy in the VMD, has overlooked the operational role of water quality, which is equally vital to the livelihoods and well-being of rural communities. Consequently, this approach fails to ensure the long-term water security of the delta.

Recognizing the Multiple Dimensions and Values of Water

From a water security perspective, it is also crucial to recognize the multidimensional nature of water security and the economic values of different types of water—freshwater, brackish, and saline. Effective management of these resources should be based on a fair recognition of how they can be

used for various livelihood activities, especially in the coastal zones. This approach facilitates the reconciliation of state-led water management with farmer-led livelihood strategies, contributing to ongoing efforts towards achieving sustainable water security. Recent evidence highlights the potential of sustainable farming systems, such as rice-shrimp farming and organic farming, as viable alternatives to mitigate environmental impacts.³⁴ These systems not only help sustain household income but also reduce carbon emissions associated with conventional agricultural practices. In the longer term, this opens pathways for the commercialization of organic and clean agricultural products in the delta.³⁵

An adaptive learning approach in water management emphasizes the need for local governments to change their perception of water resources and acknowledge the equal contribution of freshwater, brackish, and saline water to ensuring sustainable livelihood strategies in the new environmental context. This was exemplified in Ben Tre Province, where freshwater was prioritized to support the local economy.³⁶ While the essential role of freshwater is recognized, considerations should also be given to brackish and saline water. These resources have remained undervalued and marginalized in rural development policies.³⁷

The case of Ben Tre Province highlights the critical role of freshwater in local economic development. In freshwater zones, shrimp farming is prohibited due to concerns that wastewater from shrimp ponds may negatively affect neighboring areas where freshwater-based crops are grown. However, the local government’s prioritization of freshwater over brackish and saline water over-

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looks the interests of shrimp farmers. From the perspective of the latter, shrimp farming offers significantly higher incomes compared to freshwater-based commodities, such as fruits and bananas, which are often susceptible to recurring market volatility. In response to the government’s ban, shrimp farmers have engaged in forms of “everyday politics” to assert their rights and advocate for their interests in shrimp farming as a sustainable livelihood option.³⁸

We often encounter the market instability of agro-commodities. Crop investment is costly. Cultivated in the saline and acid sulphate soil conditions, coconut trees, for example, cannot grow well—unlike other areas, here it takes about six or seven years for a coconut tree to produce fruit. Recognizing the values of brackish and saline water is essential for diversifying and enhancing the livelihoods of coastal communities and boosting local economies, particularly in the face of increasing water challenges in the VMD. This calls for greater attention to resolving the competition between the local government and farming communities, as exemplified in the case of Ben Tre Province. It is therefore essential to underscore the importance of incorporating the economic values of all water resources into local development agendas, grounded by the shared understanding between these actors. This policy reframing will enable local governments to address farmers’ livelihood aspirations while simultaneously attaining agreed-upon strategies for effectively managing the water complexities.

Conclusions and Policy Recommendations

This article highlights a paradigm shift in water management in the VMD to address the compounding effects of climate change, upstream hydropower dam operations, and local water infrastructure development. Emerging water challenges, such as water scarcity and saline intrusion as highlighted by the case studies, have incrementally aggravated the challenges faced by rural households in responding to changing water conditions and sustaining water-based livelihoods. This shift—from water expulsion to water retention,

and more broadly, from a focus on food security to water security—holds critical policy significance for tackling long-term climate and development challenges in the VMD.

The reframing of water policy towards water security in the VMD needs to focus on the following key areas: First, from a water security perspective, it is essential to integrate water quality into local water management policies, which have traditionally prioritized water quantity. Second, while freshwater takes precedence in local government’s water management policies, particularly in relation to agricultural production, the importance of brackish and saline water should not be overlooked. Instead, these resources must be recognized as essential contributors to coastal livelihood systems. It is equally essential to include local level water development policies within the broader institutional efforts for achieving sustainable development in the VMD in the long term. This necessitates improved spatial and sectoral coordination as stipulated in the Prime Minister’s decisions³⁹ on regional and provincial integrated planning of the delta in the periods of 2021–2030, with a vision towards 2050.

It is widely acknowledged that coastal communities are in the best position to understand local ecosystems and utilize their capacity to support their livelihoods. These communities possess a wealth of valuable experiential knowledge gained from generations of living with saline water in coastal zones. Local institutions need to adopt a more open, flexible, and participatory approach that facilitates the inclusion of community-held knowledge into local water management and adaptation policies, and coordinates the co-development of governance arrangements to deal with environmental complexities. This collaborative approach can create space for local governments and agrarian communities to engage in meaningful dialogue, enabling them to articulate and recognize their respective interests and values. It also fosters a shared understanding of how water management can maximize economic benefits for local communities while promoting sustainable water use and protecting aquatic environments.

On the regional scale, local governments in the VMD need to engage more proactively in dialogues with key stakeholders, including the

Vietnam National Mekong Committee, Mekong member countries, International Non-Governmental Organizations (INGOs), as well as other international agencies. This collaboration is vital for coordinating regional efforts to address challenges posed by climate change and infrastructure development, which have transboundary water implications, and for articulating these issues to a broader public. This endeavor aligns with the principles of the 1995 Mekong Agreement, which encourages compliance with guidelines for

the reasonable and equitable use of the Mekong River's waters by the countries in the LMB. Moving forwards, the Mekong River Commission should also play a proactive role as a platform through which Vietnam and upstream countries can collaboratively work to diagnose and mitigate the transboundary environmental impacts of water resources infrastructural development in the LMB while simultaneously advancing more pre-emptive strategies to ensure long-term water security in the VMD.

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