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The Dilemmas and Solutions in Ecological Management of Open Public Pond Resources: A Case Study of Weishan Lake

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Abstract: Ecological civilization construction, as the bedrock of sustainable development for the Chinese nation, holds profound and significant strategic importance. Located at the junction of Shandong and Jiangsu provinces, Weishan Lake serves not only as an indispensable key regulating reservoir for the South-to-North Water Diversion Project but also harbors exceptionally rich fishery and water resources. However, owing to its unique geographical position and the significant economic value of its resources, it has long been a focal point of contention between the two provinces. This has led to a stalemate in bilateral relations, posing severe challenges to the balance and stability of the ecosystem. It systematically examines how the lake has achieved a virtuous cycle of ecological and economic coexistence through optimized inter-governmental coordination and innovative multi-center governance practices.

Keywords: Public pond resources; Tragedy of the commons; Intergovernmental relations; Multi-center governance; SES framework

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1. Problem statement

Current academic research on the governance of common-pool resources (CPRs) predominantly focuses on relatively well-defined, enclosed scenarios, while exploration of governance mechanisms for open CPRs (such as transboundary lakes and rivers) remains insufficient. The uniqueness of the Weishan Lake case lies in its simultaneous confrontation with a structural conflict between “natural boundary fluidity” and “administrative boundary rigidity”, alongside a pronounced tension between “the heightened economic value of resources” and “urgent ecological conservation demands.” This composite characteristic renders it an ideal testing ground for the applicability of existing governance theories. This study aims to address two core questions by analyzing the deep-seated causes and operational mechanisms of Weishan Lake’s governance challenges: What are the fundamental obstacles confronting the management of open public pond resources? How can a transboundary collaborative

governance mechanism be constructed that aligns with China's institutional context?

2. Literature review and theoretical framework

2.1. Research on public pond resource governance

The collective action logic in public affairs governance broadly unfolds across three phases:

The Idealistic Phase: Characterized by optimism towards collective action. Scholars such as Bentley and Truman posited collective endeavors as central to social life, asserting that individuals voluntarily engage in collective action to advance shared interests [1–2].

Empiricist Phase: Characterized by pessimism towards collective action. Scholars such as Olson and Hardin contend that "rational individuals produce an irrational collective" [3–4]. The pursuit of individual interests often plunges the collective into the "tragedy of the commons", generating free-rider phenomena that undermine overall efficiency.

Institutionalism Phase: An active stance towards collective action. Scholars such as Ostrom contend that in non-centralized states, small-scale public affairs can be autonomously governed through self-financing and autonomous contracts, thereby effectively circumventing opportunistic behavior.

Regarding the classification of common-pool pond resources, research indicates significant variations in non-exclusivity and competitiveness. Based on these characteristics, such resources can be categorized as open or closed common-pool pond resources according to ownership entities and user identities [5]. Open common-pool pond resources lack clear boundaries, exhibit shallow resource endowment, feature high user mobility, and possess ambiguous property rights [6]. In contrast, closed common-pool pond resources are characterized by fixed and familiar users, explicit rules, and greater ease in achieving concerted action.

Regarding the practical application of common-pool resources, Ostrom proposed a self-governance model emphasizing that resource users establish shared rules through self-management and cooperation to achieve sustainable utilization. However, this model has limited applicability to large-scale common-pool resources with blurred boundaries [7]. Consequently, scholars have proposed diverse perspectives. In China, the application of common-pool resource theory extends beyond autonomous governance within theoretical frameworks, incorporating adjustments and refinements tailored to national conditions. For enclosed common-pool resources, the focus lies in enhancing multi-tiered governance structures while emphasizing the value of moral incentives in mobilizing council members' effectiveness [8]. On the other hand, for open-access common-pool resources, the foundation lies in clarifying property rights ownership and establishing effective institutional frameworks [9]. Secondly, introducing a polycentric governance model is essential. In the Chinese context, polycentric governance manifests as an "embedded self-governance" framework. Within this governance structure, while each participating entity possesses a degree of autonomous execution capability, they remain embedded within bureaucratic organizations and their respective task environments [7]. Furthermore, cultivate autonomous governance organizations with Chinese characteristics. These emerge through the integration of top-down governmental impetus and bottom-up innovations in traditional resource governance systems, thereby facilitating institutional transformation [10].

While these studies provide in-depth analyses of the theoretical characteristics and operational logic of common-pool resources, revealing the intrinsic mechanisms underpinning their practical functioning, they fail to address the institutional frameworks for ecological governance of pond resources spanning administrative

boundaries. Specifically, current research predominantly focuses on comprehensive policies for managing large-scale river ecosystems. Large ecosystems such as rivers, characterized by extensive catchment areas and multiple stakeholder interests, have indeed attracted substantial research attention. However, relatively smaller ecological environments like lakes, forests, and floodplains have received scant consideration and in-depth investigation. Secondly, the expansion and adaptation of multi-centered governance theories to China's specific national context have been limited, neglecting discussions on the compatibility of institutions with resources in real-world scenarios. The effectiveness of institutions depends not only on the rationality of their design but also on their alignment with the characteristics, distribution, and utilization patterns of specific resources.

3. Case overview and analysis

3.1. Case introduction

Historically, since the Qing Dynasty, Jiangsu and Shandong have engaged in fierce contention over the ownership and utilization of lake fields, aquatic products, and water resources. Following the founding of the People's Republic of China, the State Council intervened to delineate the lake boundary, yet the two provinces failed to reach a consensus, leading to escalating conflicts. Subsequently, the two provinces engaged in multiple rounds of negotiations and consultations over the ownership of Weishan Lake, reaching a preliminary agreement that the "boundary would essentially follow the lake-field demarcation." However, as lake-fields fluctuate with water levels and no subsequent joint survey was conducted to establish precise boundaries, an accurate demarcation line for Weishan Lake remained elusive, sowing the seeds for enduring boundary disputes. Over time, this issue gradually accumulated, intensifying tensions between the provinces and triggering frequent conflicts in the lake area.

Amidst fierce competition, both local governments neglected long-term planning for Weishan Lake. The economic significance of pond resources—including water, fishery resources, sediment resources, and floodplain resources—possesses relative scarcity in economic terms and spatial heterogeneity in distribution. This objectively incentivized all stakeholders towards the predatory extraction and utilization of resources [7]. Compounded by the absence of clear rules and institutional frameworks, both provinces prioritized the maximization of individual interests. This disorderly competition led to the overexploitation of the lake's resources, triggering a cascade of problems. Industrial pollution, indiscriminate discharge of industrial and domestic waste, and the unrestrained expansion of aquaculture have severely damaged the lake's ecological environment. Issues such as deteriorating water quality, reduced biodiversity, and ecosystem imbalance have arisen in succession, plunging Weishan Lake into the predicament of a public pond resource.

3.2. Case analysis

3.2.1. Resource system dysfunction: Ambiguous boundaries and allocation imbalances

From a horizontal perspective, this inequitable resource distribution has precipitated a series of severe consequences. Firstly, spatial heterogeneity in resources (such as coal-rich areas in the east and high-yield fishery zones in the west) incites competitive exploitation between the two provinces. Between 2010 and 2015, coal extraction on the Shandong side grew by an average of 12% annually, while cage farming areas on the Jiangsu side surged to 35% of the lake's total surface area, causing the lake's resource stock to plummet by 40% over the same period. Secondly, the scramble for resources has led to their irrational exploitation and utilization. In the competition, people often resorted to overexploitation in pursuit of greater resources, neglecting sustainable

utilization practices. This resulted in resource wastage and environmental degradation.

3.2.2. Governance system failure: Absence of cross-regional coordination mechanisms

As an open-access common pool resource with blurred boundaries, it differs significantly from enclosed common pool resources. In enclosed systems, resource users harbor deep emotional attachments to the resource, members are familiar with one another, and mutual oversight is feasible, making collective action for mutual benefit more likely through contractual agreements [6]. Participants in open common-pool resources, however, are often unspecified and largely unfamiliar with one another, lacking emotional attachment to resource extraction activities. Consequently, achieving collective action necessitates active government intervention, providing robust support and guidance. Yet the strong government, which should play a pivotal role in resource management and conservation, has been conspicuously absent amidst the two provinces' vicious competition [7].

4. Pathways to resolving the public pond dilemma in Weishan Lake

4.1. Provincial collaboration to establish a vertical collaborative governance community

The four provinces of Jiangsu, Anhui, Shandong, and Henan have transcended the rigid constraints of traditional administrative boundaries. Guided by regional public governance principles and united by the shared value of Weishan Lake's ecological conservation, they have achieved cross-regional collaborative cooperation. Within this framework, the Ministry of Ecology and Environment, leveraging its professional authority and macro-coordination functions in environmental governance, spearheaded the formulation of a unified comprehensive discharge standard for water pollutants across the four provinces. As a legally binding and broadly applicable institutional norm, this standard provides a robust regulatory foundation and technical reference framework for coordinated basin-wide governance from a macro-strategic perspective. It effectively guides and constrains pollution control actions across regions towards homogenization and synergy. Secondly, Jining and Xuzhou established a regular joint conference mechanism to conduct in-depth discussions and information sharing on key regional governance issues. They formalized this collaboration through contractual agreements, including the Framework Agreement on Modernizing Social Governance in the Weishan Lake Region along the Shandong-Jiangsu Border. This enabled extensive and substantive cooperation across multiple domains: joint prevention and control of criminal offences, diversified resolution of social conflicts, dissemination of rule-of-law culture, and joint construction and sharing of secure border areas. Moreover, counties and districts surrounding Weishan Lake actively practice regional ecological co-governance principles. Targeting the protection of the Weishan Lake ecosystem, they explore establishing cross-county joint governance mechanisms.

4.2. Establishment of familiar resource co-management zones

Government coordination and planning are pivotal to ecological governance. In policy design, the remediation area is divided into three zones: the core and buffer zones implement comprehensive aquaculture withdrawal to restore ecosystems, while the experimental zone retains autonomous development space to balance ecological functions with villagers' rights [11]. To address conflicts between regional development and responsibility allocation, an ecological compensation mechanism was established. Compensation payments, determined by net wastewater increase, are transferred to source areas, compelling upstream localities to share responsibility. This facilitates communication with lake residents, supports livelihood improvements, and implements the principle of "beneficiary compensates, polluter pays", achieving "shared costs, shared benefits, and collaborative governance" across the

lake basin. To address free-riding, an integrated command and dispatch center was established to develop a smart environmental supervision system. This system links online and offline operations to create a grid-based oversight framework, enhancing regulatory efficiency and laying a robust foundation for ecological governance.

4.3. Promoting green development to foster an ecologically friendly economic model

In fisheries: The vigorous implementation of the "returning ponds to lakes" initiative has dismantled 120,000 mu of enclosed net farming, compelling traditional fisheries towards ecological and high-value transformation. By promoting ecological aquaculture techniques, efforts have focused on cultivating geographically protected products such as "Weishan Lake Four-nose Carp" and "Weishan Lake Hairy Crab", alongside establishing a full-chain traceability certification system, achieving a 30% product premium rate. In 2023, the fishery output value in the lake area increased significantly by 45% compared to 2015, the initial phase of governance.

5. Conclusions

Firstly, public pool resources such as flowing water resources (lakes, rivers, etc.) and fishery resources present complex governance dilemmas due to their inherent natural characteristics. Their vast scale, lack of clear boundaries, and uneven spatio-temporal distribution mean resource users often incur minimal opportunistic costs when exploiting them. Possessing both open and closed attributes, these resources defy effective governance by a single administrative region, necessitating inter-regional collaborative action that transcends territorial boundaries.

Finally, within the context of China's unique national conditions, the governance of public pool resources exhibits a distinctive multi-stakeholder logic. Firstly, the government occupies a core, leading position within this multi-stakeholder governance framework. Given China's governance context and institutional logic, the government plays an irreplaceable, pivotal role within this multi-stakeholder system. It remains the sole actor capable of assuming ultimate responsibility for the governance landscape as a whole and providing a safety net for governance outcomes [12]. Secondly, while the government's dominant position is significant, it must be recognized that achieving complex public pool resource governance objectives through governmental efforts alone is unfeasible. Therefore, the government must skillfully employ delegation mechanisms to fully stimulate the autonomy and initiative of all governance actors, striving to guide rather than intervene or disrupt.

Disclosure statement

The author declares no conflict of interest.

References

[1] Bentley A, 1949, The Process of Government. Principia Press, Evanston.

[2] Truman DB, 1951, The Governmental Process: Political Interests and Public Opinion. Alfred Knopf, New York.

[3] Olson M, 2004, The Logic of Collective Action. Translated by Chen Yu, Guo Yufeng, and Li Chongxin. Shanghai Sanlian Bookstore, Shanghai.

[4] Hardin G, 1968, The Tragedy of the Commons. Science, 162(3859): 1243–1248.

[5] Ciriacy-Wantrup SV, Bishop RC, 1975, "Common Property" as a Concept in National Resource Policy. Natural Resource Journal, 1975(15): 713–727.

[6] Guo JM, 2009, Collective Action Mechanisms in the Governance of Open Public Pond Resources: A Comparative Study of Three Contracting Systems for Fishery Resources in Nanxi River, Yongjia County, Zhejiang Province. Chinese Public Administration, 2009(3): 109–114.

[7] Hu NY, Su YQ, Zhu YC, 2022, How a Multi-Center Governance Structure Emerged for Village-Level River Management under the River Chief System: A Case Study of Village S in the Hanjiang River Basin. Agricultural Economic Issues, 2022(3): 60–72.

[8] Yuan FC, Jin YG, 2020, Multi-level Governance of Enclosed Public Pond Resources: A Scenario-extended IAD Framework. Public Administration Review, 13(1): 116–139 + 198–199.

[9] Sun X, Huang QR, Dong ZF, 2025, Governance Dilemmas and Institutional Innovation in Marine Aquaculture Public Resources: The Case of Qinzhou Bay, China's Largest Natural Oyster Seed Breeding Base. Ecological Economics, 41(2): 195–202.

[10] Tan JT, Cai JJ, Zhang M, 2018, A Study on Multi-Center Governance Reform of Open Public Pond Resources: The Case of Nanxi River in China's First Baojiang Case. Journal of Public Administration, 15(3): 102–116 + 158–159.

[11] Lü BB, Zhao W, 2022, Ecological Fisheries Development Along the Shores of Lake Weishan. Farmers' Daily, 4.

[12] Ren H, 2017, The Role of Government in the Governance Process of Public Pond Resources: An Analysis Based on Elinor Ostrom's Theory of Self-Governance. Journal of the Party School of the CPC Fujian Provincial Committee, 2017(11): 66–71.