



Governing Water, Ordering Society: An Ecological–Historical Study of Colonial and Postcolonial Lakes and Wetlands in India

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Abstract: India's lakes and wetlands have been accompanied by changing regimes of power, knowledge and institutional control for centuries, which have shaped ecological futures and social relations. Using an ecological–historical framework, this article investigates the historical and contemporary governance of wetlands in India, from colonial land interventions to postcolonial state developmentalism and more recent regulatory and judicial regimes. Through archival sources and secondary literature, and contextualized through comparative case analysis, this study highlights the increasing differentiation, engineering, and regulation of wetlands—processes that too often sacrificed ecological integrity and community subsistence. This article synthesizes a conceptual reading of wetland governance with two important contemporary case studies — Vembanad Lake in Kerala and the Sundarbans delta in eastern India — to show how the legacies of past governance continue to shape current patterns of degradation, institutional response and community engagement. These cases illustrate common structural tensions between state-cantered ecological governance priorities, environmental conservation, and the decisions, practices and rights of land-users with differing ecological contexts. These findings illustrate those contemporary regulatory and conservation regimes, which portray themselves as responsive to the ecological crisis, nevertheless perpetuate legacies of institutional logics that disparage local knowledge and local practices. Placing the contemporary woes of wetlands in deeper histories, this article speaks to conversations in environmental history and Asian studies about wetlands as crucibles for nature–society–risk governance in modern India.

Keywords: Water Governance; Lakes and Wetlands; Ecological History; Colonial India; Postcolonial State; Environmental History; Commons and Regulation; Asian Perspectives

Received : 10 September 2025

Revised : 16 October 2025

Accepted : 24 October 2025

Published : 30 December 2025

TO CITE THIS ARTICLE:

Pratheesh P. (2025). Governing Water, Ordering Society: An Ecological–Historical Study of Colonial and Postcolonial Lakes and Wetlands in India. *Journal of History and Archaeology*, 1: 2, pp. 99-115.

1. INTRODUCTION

The Indian subcontinent has a long history of lakes and wetlands in their ecological, economic and social history. Instead, these water resources formed part of locally crafted regimes of governance, which integrated ecological, social and customary knowledge and processes long before centralized hydraulic governance took root. But tanks, backwaters, floodplain wetlands and shallow lakes did not just serve as sources of irrigation or receiving locations for fish, they also played an organising role in creating patterns of settlement, agrarian production, and ritual life. In many places they governed the commons, doing so in a decentralized manner, influenced by local institutions of communities and specific ecological and biophysical conditions. The complex social-natural history of this relation was thus intricately reshuffled at colonial times when lakes and wetlands became part of different historical regimes of bureaucratic and extractive control.

Colonial interventions in the management of water were thus a decisive epistemic and institutional break. Lakes, wetlands and floodplains were redefined by British administrators in the frames of hydraulic rationality, revenue extraction and engineering efficiency. Studies of colonial irrigation and water control have shown how water was converted from a socially embedded commons to a resource that could be governed, made legible to the state through surveys, cadastral mapping and technical classification (Bolding et al. Lakes were subsumed into canal systems, flood-control infrastructures, and urban sanitation schemes, while wetlands increasingly came to be portrayed as “wastelands” ripe for drainage, regulation, or conversion. They were not simply technical interventions; they were social processes that rearranged relations of power by displacing traditional authorities, marginalizing local users, and concentrating state power over access and regulation.

This new ordering produced a new political economy of colonial water governance. The construction of large-scale irrigation and flood-control projects favored agricultural productivity and financial sustainability but marginalized ecological and local livelihood systems. Historical analyses suggest colonial water regimes systematically discounted the ecological services provided by wetlands—such as flood storage, nutrient cycling, and fisheries—at the expense of rain-fed monocrop agriculture and other land uses that oriented land use towards generation of revenue (Mollinga, 2003; Morrison, 2015). Lakes and wetlands were now administratively peripheral and ecologically dispensable. Degradation and institutional neglect patterns were set that would outlive the colonial era.

Although colonial water governance bequeathed more than just the physical infrastructures of colonial rule to post-independence India, these assumptive legacies yielded powerful reflections of unchallenged water governance assumptions. Postcolonial water control, while couched in the rhetoric of national development, modernization, and food security, continued to be shaped by governance frameworks that were both technocratic and highly centralized in their planning logics. Consequently, for water policy, lakes and wetlands have remained, at best, in a grey area that leaves them somewhere between irrigation departments, revenue administrations, fisheries authorities, and agencies for urban development. Postcolonial studies of water governance in India have documented how this institutional fragmentation has deeper historical continuities in the compartmentalization of water as a technical and administrative object, instead of a socio-ecological system (Mollinga, 2003; Prakash, 2014).

Recent scholarship from Kerala’s coastal and wetland regions further demonstrates how climate change impacts are experienced through locally embedded ecological and social processes rather than abstract environmental indicators alone. Studies examining shoreline erosion, sea-level rise, and

community-led adaptive practices along the Alappuzha coast highlight the effectiveness of nature-based interventions such as mangrove restoration and *Casuarina equisetifolia* plantations in mitigating erosion, storm surges, and livelihood risks (Pratheesh & Florence, 2025). These findings underscore how localized ecological knowledge and adaptive responses operate as practical counterweights to large-scale climatic pressures. Complementary historical and socio-ecological analyses of Alappuzha's coastal and wetland systems have further shown that environmental vulnerability in the region is inseparable from longer trajectories of industrialization, settlement, and governance, particularly in relation to fisheries, coir production, and shoreline transformation (Author, 2024; Author, 2025). Together, these studies provide an important regional backdrop for the present analysis by situating contemporary flood-related disruptions within a continuum of environmental change, institutional response, and community adaptation. Building on this growing body of place-based research, the present study extends the discussion inland, focusing on flood-mediated ecological change and livelihood vulnerability in the Vembanad Lake system.

Ecological crises such as wetland loss, dwindling fisheries, worsening floods, and aquatic contamination have prompted renewed scholarly interest in lakes and wetlands in recent decades. As a result, although much of this work is either environmentally descriptive or policy oriented, it engages little with the historical processes by which governance regimes were constructed and made common-sense. Yet a major lacuna persists in historically grounded analyses that follow the historical processes whereby colonial configurations of water control transformed bodies of water from sites of knowledge and practice into objects of regulatory expertise, and how such legacies continue to shape the postcolonial governance of lakes and wetlands.

This article fills that gap by investigating lakes and wetlands in India as carved historical sites of governance and social ordering across colonial and postcolonial times. Even though in their speculative analysis of water bodies, the authors classify them as mere geometries, the study talks about water bodies as landscapes influenced by regulatory frameworks and contestation of use and access claims, rather than as just ecological units. Situating the contemporary challenges facing Asia's wetlands within a longer genealogy of colonial interventions and the postcolonial continuities of these influences, this article contributes to ongoing debates within Asian environmental history about how ecological governance is entangled with state formation and societal transformation.

The study employs an ecological–historical perspective to show how contemporary crises over lakes and wetlands will be inadequately addressed if tackled without an appreciation of the institutional architectures and epistemic configurations set in place during the colonial period. It furthers the argument for re-historicising water governance in India and for Asia at large where lakes and wetlands have not been seen as marginal environments but rather as major arenas where nature, power, and society have historically been co-constituted.

2. COLONIAL REGIMES OF LAKE AND WETLAND GOVERNANCE IN INDIA

The colonial management of water in India was based on a particular epistemology— where lakes and wetlands were viewed as inert technical objects divorced from their ecological and social context. Two interwoven threads have formed the history of how British administrators approached water: the necessity to generate revenue, the need to exert continuing territorial control, and demand for rationalized infrastructures. This legibility of lakes, marshes, and, floodplains was achieved through

surveys, cadastral mapping, and legal classifications, making them a part of the colonial state (Bolding et al., 1995; Morrison, 2015), allowing them to be mediated by the incipient administrative and fiscal apparatus of the colonial state. The process represented a fundamental shift away from historically deep-rooted forms of water governance rooted in local ecological knowledge and customary regulation.

One of the most decriminalise aspect of colonial water policy was the wetland reclassification. Countless lakes and marshes were labelled as “wastelands,” which meant they could be drained or converted or appropriated by the state. This classificatory logic refracted an instrumentalist epistemology of nature, wherein water bodies were functionally assessed via their value in sustenance provisioning for agriculture or their potential to yield revenues (Mollinga, 2003). Many wetlands were seen as unused land because their ecological functions such as supporting fisheries, seasonal grazing or flood mitigation clashed with the colonial accounting. Consequently, colonial interventions often simplified the ecological complexity of wetland systems whilst disrupting livelihoods reliant on them.

Hydraulic despotism was further entrenched via colonial irrigation and drainage schemes. In regions most vulnerable to floods and droughts, large-scale networks of canals and earthen embankments were built to stabilize agricultural production and thereby buffer social life against climatic fluctuations. Although these infrastructures change state capacity to regulate water flows 40007 and landscape mixing by increasing the hydrological control of states, they in turn transform the hydrological regimes to the detriment of marginal hydrological regimes such as lakes and floodplain wetlands (Morrison, 2015) Long-term ecological simplification was driven by the restrictions on seasonal inundation patterns that had both maintained fisheries and had replenished the soils in floodplains and wetlands. These interventions demonstrate how colonial domination over water acted as a technology of rule: transforming landscapes and societies alike.

Colonial authority over lakes and wetlands was solidified in part through the use of legal frameworks. With land revenue settlements and water laws, access to water bodies was gradually governed through permits, leases and bureaucratic surveillance. In particular, fishing rights were converted into revenue-generating concessions, frequently auctioned to contractors, instead of being allocated per customary practice. As communal control weakened, this also introduced new access hierarchies which favoured those commercial interests, related to the colonial state (Mollinga, 2003). In numerous locations, local constituents morphed from the governed to the governed with the effect of hardening power asymmetries.

Colonial privileging of scientific knowledge reinforced these changes. Indigenous knowledges of water systems were displaced by the purported neutrality and authority of engineering and hydrological science. Lakes and wetlands were quantified, normalized, and processed into technical forms, like turning water into a conditioned resource, a perception in which the source of water is viewed as a controllable resource rather than a living biological system. This epistemic shift, scholars have observed, was key to wider colonial governance, which allowed for state interference with water management but one which could be characterised as rational, progressive intervention (Bolding et al, 1995; Morrison, 2015).

In short, colonial lake and wetland governance regimes transformed water–society relations in India. Colonial policies that subordinated ecological diversity and local institutions to centralized administrative control sowed the seeds of deep-seated patterns of exclusion and ecologic transformations. Not only did these regimes reshape landscapes: they produced social orders structured

around access to water that have laid institutional and conceptual groundwork for postcolonial water governance.

3. CONTINUITIES AND CHANGES IN WETLAND GOVERNANCE IN THE POSTCOLONIAL ERA

The shift from colonial to postcolonial India did not create a break, in terms of rules and governance around lakes and wetlands. In contrast, water management frameworks after independence were conditioned by the tangled legacy of colonial institutions, physical water systems, and epistemic assumptions. Although the nationalist state recontextualized water control in the idioms of development, sovereignty, and modernization, the foundational logics of planned centralization, technocratic expertise, and administrative compartmentalization essentially remained intact. Accordingly, lakes and wetlands continued to be trapped within governance regimes oriented towards large-scale intervention and sectoral control at the expense of ecological integration and local participation.

The postcolonial water governance evolved against large nation-building projects. Mega dams, irrigation projects and flood-control infrastructures were hailed as hallmarks of development and tools of economic conversion. In this vision of development, water bodies were increasingly seen as resources to be exploited to maximise agricultural yield, urban expansion and industrial growth. But lakes and wetlands fell into a grey area within that binary. With multiple jurisdictional claims laid over their lands yet often excluded from the framework of major irrigation planning, these regions were administered through a constellation of institutional arrangements that were at once a product of colonial legacies consolidated by postcolonial impulses to expand the reach of the bureaucracy.

The continued coexistence ensued from the persistence of colonial legal and bureaucratic categories. Laws governing land revenue, fisheries, irrigation etc., made during the colonial period were often retained with little or no change. Consequently, the postcolonial state inherited a governance apparatus that essentially viewed wetlands as residual spaces—neither fully conserved nor systematically incorporated into water planning. Ecological services of lakes and wetlands — its value in flood management, nutrient and material cycling, and its role in supporting people and farming — remained under-valued as compared to their perceived economic functionality.

Meanwhile, this postcolonial governance provided novel justifications for intervention. Environmental conservation, disaster management and urban sanitation, occupy critical and new policy domains, especially from the end of the twentieth century. Such shifts did not push out existing developmental priorities; they added another layer of regulatory frameworks to already fragmented governance structures. This produced a complex mixture of institutions and discourses that aimed to exploit lakes and wetlands, regulate the use of these areas, and protect these environments, frequently creating contradictions and tensions in practice.

3.1. Postcolonialism and the Oxidized Sand of Developmentalism, Hydraulic Modernity and Postcolonial State

The unification of so-called hydraulic modernity, a form of governance driven by large-scale engineering, centralization, and technical expertise, characterised postcolonial water governance in India. Both due to inspiration drawn from colonial precedents and global development paradigms, the state post-independence poured tremendous effort into building dams, barrages, embankments and canal networks. Under the claims of food security, flood management, and national self-sufficiency,

such developmental water projects were legitimized further, exercising the belief that water could and must be engineered to achieve the goals of development 7.

In this framework, lakes and wetlands were seldom regarded as independent ecosystems. Rather, they were integrated into larger hydrological systems as storages, drain fields or bulks for excess water. Wetlands were drained or converted to facilitate the growth of agriculture, urban centers and infrastructure projects in many areas. These interventions were grounded in colonial outlooks that framed wetlands predominantly in terms of their potential for change rather than their function as socio-ecological systems.

Engineering expertise further guided the ideal of postcolonial governance. Central roles in decision-making were filled by hydrologists, irrigation engineers, and planners, and local knowledge systems were peripheral. Such a technocratic orientation further cemented the hierarchical relationship between the state and water users, restricting spaces for participatory governance. As a result, lakes and wetlands were reduced to sites of developmental state power through technical regulation, over custom and other forms of adaptive management strategies.

Significantly, hydraulic modernity also brought different modes of ecological fragility. Modifications of natural drainage networks, loss of wetland buffers and increasing reliance on engineered infrastructure created landscapes more susceptible to the impacts of extreme climatic events. Although these consequences only became visible as the twentieth century progressed into the twenty-first, their roots have postcolonial continuities that privileged control over ecological resilience. Lakes and wetlands, formerly critical components in landscape-level adaptation, became peripheral or disposable parts of developmental planning.

3.2. Fragmentation of Institutions and Subordination of Lakes and Wetlands

Fragmentation of institutional authority over lakes and wetlands has arguably the most persistent feature of postcolonial wetland governance in India. In contrast to major rivers and irrigation canals (which were placed beneath more clearly delineated administrative jurisdictions), lakes and wetlands were governed through overlapping and often competing mandates involving a multitude of institutional entities including irrigation departments, revenue administrations, fisheries authorities, urban local bodies and environmental agencies. Thus, this fragmentation that was History-based postcolonialism-style metaphorical 'agrarian violence and oppression' was not something that had grown organically, but instead a patchwork quilt of bureaucracy, built up over time, that reflected the colonial practice of administration layered by expanding state bureaucracies after independence.

Notably, colonial governance had already atomized water management into separate technical and fiscal realms, with irrigation, navigation, fisheries, and land revenue each occupying a separate administrative space. These divisions were largely retained by postcolonial governments, even as state intervention increased both in scale and scope. When it did, lakes and wetlands often slipped into the cracks of administrative mandates—revenue land, water resource, ecological habitat, public property, all in different institutional contexts. That vagueness undermined accountability and encouraged selective decision-making, causing wetlands to be especially susceptible to encroachment, pollution, and regulatory indifference.

The handling of access and use reveals how the consequences of institutional fragmentation played out in practice. Fishing rights were regulated by Fisheries departments, and as (more insidiously) as a means of effectively charging for the right to fish (typically through licensing and leasing systems)

these departments were as concerned with revenue as with fishing sustainability. Irrigation agencies saw the goals of managing and harvesting water with little thought to ecological impacts further downstream. Lakes were merely seen as channels for drainage, or in the case of urban and municipal bodies, as land for future real estate development activity. And where environmental agencies existed, they usually only acted when damage to the environment had been done. Such differing priorities never aligned into cohesive governance strategies but rather created regulatory conundrums that ultimately hampered long term wetlands viability.

Historically, this fragmentation also changed the way local communities related to water bodies. Traditional systems that had previously interwoven irrigation, fishing, and seasonal use within joint governance frameworks were manipulated out of place and replaced by compartmentalized regulations tackling such activities in isolation. Local users had to wade through different bureaucratic systems, with a great lack of clarity on both sides about rights and obligations. However, in practice, this undermined locally-grounded stewardship and entrenched reliance on formal state authorisation, decoupling governance from experience on the ground.

Institutional fragmentation also conditioned lakes and wetlands' epistemic framing. Wetlands, which were seldom viewed as a socio-ecological system requiring integrated governance, were rarely managed holistically by a single authority (more on this below). Instead, they were viewed through siloed departmental lenses: as hydrological units for irrigation planners, as revenue assets for administrators, or as biological habitats for conservation agencies. Although wetlands have important ecological functions, this reductionist approach maintained their marginal position in national water policy and development planning.

Historically, the marginalization of lakes and wetlands through fragmented governance depicts a core contradiction in postcolonial notions of water management. As the state extended its regulatory ambit and technoscientific capacity they also generated spaces of institutional opacity within which ecological degradation could operate unencumbered. This paradox was emblematised in the case of lakes and wetlands — they are key to both ecological and livelihood stability but remain perennially peripheral within governance hierarchies. This situation highlights the ways in which postcolonial continuities in regime logic—not just scarcities or population growth—have determined the contemporary design space of wetland systems in India.

3.3. From Common-Pool to Controlled Spaces: Livelihoods, Rights and Marginalization

Re-contexts of lakes and wetlands under colonial and postcolonial rule directly impacted lifeways and the control of water-based resources. Traditionally, such water bodies served as commons, maintained through multiple systems of customary rights and responsibilities. Local rooted standards regulating fishing, grazing, reed collecting, and periodical cultivation provided equilibrium in between ecological rhythms and social requirements. Colonial intervention fragilised such arrangements by reframing access as legal right and administrative permission, a reconfiguration largely retained by postcolonial governance.

The commercialization of water-related resources in the colonial era was especially apparent in the regulation of fisheries. Fishing rights were increasingly converted into commodities to be leased or auctioned by the state to contractors, again turning water-based assets into revenue instruments. It dismantled communal access and reorganized livelihoods to facilitate market-based extraction rather than subsistence and reciprocity. Although these sorts of systems were rationalized as being

efficient, history suggests that they disproportionately benefitted large intermediaries at the expense of small users without capital or political clout. So, too, were the ecological implications, as such extraction tended to often disregard longterm sustainability.

These dynamics accordingly were not fundamentally reversed in post-independence governance. Nationalist rhetoric emphasized social justice and rural upliftment, but fishery and wetland management remained under technocracy and paternal bureaucratic control through regimes of licensing. In some areas cooperative institutions were established as a corrective, but these also were superimposed on the inherited system of state regulation than restoring traditional governance. Consequently, access to lakes and wetlands continued to be intermediated by formal institutions which valued the maintenance of administrative order and revenue at the cost of ecological adaptability and social equity.

Turning wetlands into controlled areas changed the diversification of livelihoods as well. And the adaptive responses of communities that traditionally integrated fisheries with agriculture, animal husbandry, and seasonal wage labour were increasingly constrained within inflexible regulatory boundaries. Enclosed wetlands that served agriculture or urban expansion inhibited mobility and seasonal use, heightening susceptibility to ecological oscillations. This constriction of livelihood choices was not just a change in economic behavior but a long-term reconfiguration of social relationships through water over the years, swapping flexibility and resilience for reliance on government-defined access.

Notably, this exclusion from wetlands was not always explicit. Often, this was through incremental erosion of traditional rights, through legal ambiguity, delayed enforcement, and/or selective recognition of claims. Lakes and wetlands remained essential resources for communities to use informally, but were without legal tenure, and therefore at risk of eviction, criminalization or displacement when development or conservation priorities changed. The forms of such “soft dispossession” show how, over time, governance regimes insidiously but continuously transformed the social relations between people.

From an ecological–historical viewpoint, the transition from commons to regulated spaces indicates that water governance has been a tool of creating social order. The state recast, in turn, livelihoods by remaking accessibility to lakes and wetlands: who could go there, under what circumstances and to do what? These transformations highlight that modern problems of wetland degradation and livelihood precarity cannot be explained only as the result of environmental change. Instead, they are the layered outcome of historic processes that reorganised access to, authority over, and ecological relationships with land across numerous regimes of governance.

3.4. Environmentalism and Conservation: the Paradoxes of Protection

Lakes and wetlands in India started becoming visible in debates on the environment and conservation from the late twentieth century onwards. The realignment has been influenced by the international ecological crisis, the consolidation of global treaties, and the strengthened appreciation for wetlands as a vital ecological asset. However, the inclusion of lakes and wetlands in conservation regimes ceased to mitigate the historical conflicts inherent in their governance. Rather, conservation repeated past patterns of imposing top-down regulatory practices that reconfigured access, authority, and ecological values in new ways.

The proclamation of wetlands in protected categories (for example, as wildlife reserves and, even, world heritage sites) represented the salutary symbolic inversion of many earlier depictions of

wetlands as wastelands, as spaces left over. Nonetheless, these designations were often applied as a top-down methods of governing that reflected colonial and early postcolonial practices. The science-based, legally delineated and administratively enforced model that conservation planning largely adhered to, had minimal interaction with historical use patterns and local governance traditions. Thus, protection did not also mean restoring nature or including people.

An age-old paradox of postcolonial conservation is in its selective sense of value. Although wetlands were increasingly recognised for their ecological functions (notably for biodiversity and flood control), livelihoods relating to these ecosystems were often considered ‘secondary’. In the name of conservation, new restrictions, licensing or outright bans were placed on fishing, grazing and the collection of resources. Although these were motivated by environmental sustainability, these measures often displaced, or restrict communities that had previously engaged with these wetland environments in adaptive and tailored ways.

This paradox is symptomatic of a longer history of continuities in regulating nature. Colonial water management has focused on technical control and economic utility, where local ecological knowledge has been marginalized. Even among postcolonial conservation regimes that normatively committed to sustainability, invariably this marginalization was replicated as scientific authority was prioritized over historical experience. Wetlands were reconstituted as ecological entities in need of preservation rather than as socio-ecological systems formed through long-term human interaction. In that sense, conservation was not a reversal of earlier governance logics, but rather a reconfiguration of those logics, translated into a different normative vocabulary.

Institutional complexity was also heightened by the expansion of environmental regulation. The bureaucracy covering lakes and wetlands grew ever more fragmented, with new agencies and legal instruments added but never integrated into existing systems. The regulation of conservation often competed with settlers' priorities on development, fisheries regulation and local governance, resulting in highly contested regulation landscapes. These were more than the policy dilemmas of the moment, but representations of a recycling of historical contradictions of water governance.

In historical context, the emergence of environmentalism thus highlights lakes and wetlands as having a simultaneously privileged yet high-risk status in modern governance. Which is about protection that has made them visible and legitimized them, but at the same time re-enforced centralized control and regulatory exclusion. That these tensions continue to persist implies that the contemporary challenges facing wetlands globally are not simply the by-products of intensifying environmental pressures but the lingering impacts of the historical evolution of water governance across colonial and postcolonial eras.

4. COMPARATIVE WETLAND TRAJECTORIES IN CONTEMPORARY INDIA

Whereas the earlier sections tracked the long-term historical and institutional trajectories of governance of wetlands in India through a synoptic analytical lens, it helps to examine specific contemporary case studies to understand the ‘thick’ of these long-term trajectories play out at more localised ecological and social settings. Here, we use two important wetland systems, Vembanad Lake in the state of Kerala and the Sundarbans delta in eastern India, as comparative approach cases that highlight common structural characteristics of both degradation and governance and context-specific dynamics that enhance or diminish community engagement. Collectively, these cases illustrate the ways that legacies of historical governance condition ecological vulnerability and institutional responses today.

Logging plantations were also planted along the lake and a fishery management plan, which regulated harvest, was implemented and negated historical fishing governance that tranquility to governing indigenous knowledge, culture, and ecological resilience of the lake.

Vembanad Lake, the largest body of freshwater in India and one of the Ramsar wetland sites of the country, forms the nucleus of Kerala environmental history. In the past, the lake was an integral socio-ecological system sustaining fisheries, internal navigation, agriculture, and settlements. Colonial relationships with the lake from the 19th century on were defined by year-round occupation, industrialized fishing, and centralized control of water flows. This set-up provided a relatively stable bracket between ecological rhythms and livelihood demands in the design.

It is colonial intervention that made a decisive rupture in this relationship. British administrative and engineering efforts diverted the lake away from ecological functions towards the values of commercial agriculture, navigation and flood control. Land reclamation for paddy fields, building of bunds and canals, and a focus on hydraulic efficiency changed natural water circulation and sediment processes. Wetlands were beginning to be seen as areas to "improve" or regiment, rather than functioning ecosystems. While these transformations created short-term profits, the ecological stresses they initiated would reverberate long into the future.

On this subject, postcolonial development mainly reproduced these colonial priorities. Notable fragmentation followed with large-scale infrastructure projects, intensified agriculture, urban expansion and industrial activity. Barrages and regulators changed salinity regimes, which altered fish breeding cycles and biodiversity. Deterioration of the ecosystem through the pollution of domestic sewage, agricultural runoff and industrial effluents. By the late twentieth century, Vembanad had come to symbolise one of the paradoxes of development: it was both economically viable and ecologically vulnerable.

By the twenty-first century, the ecological impact of these changes became increasingly evident, most notably with the frequent floods. The diminished buffering capacity of the lake, sedimented channels, and changed hydrology were laid bare at the extreme floods. The catches plummeted, invasive species expanded, and livelihoods collapsed in coastal communities that depended upon fishing. Such developments underscored the ways in which decisions governing history increased the risk of exposure to climate stresses today.

Regulatory and conservation measures followed suit, however, including Ramsar designation, wetland regulations and court orders. Though they sought to halt degradation, they did so unevenly. The problem of institutional fragmentation persisted, with the overlapping jurisdiction of multiple agencies exercising power. Additionally, these conservation projects often reproduced older forms of exclusion, emphasizing ecological protection while sidelining active community participation.

Yet, these limits also demonstrate new pathways of local adaptation, as Vembanad also shows. Fishing cooperatives, community groups and local governments have all undertaken restoration, sustainable fishing, and awareness efforts. While small-scale, these interventions represent opportunities for new governance modes which reintegrate habitat governance with local economic systems, suggesting pathways for a more inclusive future.

4.1. The Sundarbans: Deltaic Marshes, Colonial Legacies and Present-Day Threat

The Sundarbans, a UNESCO World Heritage site and the largest mangrove forest on earth, give a different but complementary example. The Sundarbans do not evolve like an inland lake system but are

molded by deltaic processes, tidal flows and cyclonic activity. Nonetheless, the historical governance path of the area displays sharp similarities with inland wetland

Forest reservation, extraction of logistical and ecological revenue, and settlement planning under colonial rule radically re-order the Sundarbans. Mangroves have in great part been classified, mapped, and governed as resources or obstacles to agriculture. Wide swathes were cleared for agriculture and revenue, and forest laws prohibited customary use. By transforming ecological relationships and reconfiguring human–environment relations, these interventions rooted the region in a centralized administrative state.

Many of these frameworks were sustained by postcolonial governance. Development planning focused on embankments, land reclamation, and stabilisation of the population (of which humans are the more visible part) which adversely affected biophysical resilience. Agricultural embankments piled up soil, blocking deposition, and disrupting tidal flushing caused by heavy salinity that hampers mangrove regeneration. These structural interventions led to a gradual increase in vulnerability to cyclones, storm surges and sea-level rise.

Governance history is therefore intimately linked to environmental degradation in the Sundarbans. Climate change has compounded pre-existing vulnerabilities to loss of land, saline intrusion and the wearing away of livelihood options. Fishing and forest-dwelling communities will be subjected to increasing uncertainty, requirements to shift residence, and likelihood to disasters. Here, like in Vembanad, ecological stress translates to social precarity.

Well, the Sundarbans have seen lots of conservation programs like the establishment of protected areas, wildlife management, climate change mitigation. But these measures oftentimes simply reproduce some of the very tensions between protection and access that the digital commons seek to alleviate. For example, stringent conservation practices curtail local livelihoods, but have offered inadequate socioeconomic alternatives, which has resulted in conflict and disregard for rules. Despite the importance of community participation that is celebrated in policy agendas, community participation itself is patchy.

The Sundarbans, meanwhile, have seen new community-based responses. There have been activities such as mangrove restoration, adaptive livelihood strategies and disaster preparedness led by local groups. However, this and similar initiatives exemplify how local knowledge and participation can build resilience, even when institutional frameworks are tightly bound.

4.2. Vembanad Lake: Historical Governance, Degradation, and Adaptive Responses

Vembanad Lake, the largest freshwater lake system in India and a Ramsar-designated wetland, occupies a critical position in the environmental and socio-economic history of Kerala. Stretching across multiple districts and supporting extensive inland fisheries, agriculture, and inland navigation, the lake has historically functioned as an integrated socio-ecological system. Its contemporary ecological vulnerability cannot be understood without situating it within the longer trajectory of governance interventions that have reshaped hydrology, access, and institutional control over time.

Prior to colonial intervention, the Vembanad wetland system was governed through locally embedded practices that aligned seasonal water flows with livelihood needs. Fishing, paddy cultivation, clam collection, and inland transport were regulated through customary arrangements that accommodated monsoon-driven fluctuations in salinity and water levels. These practices enabled a dynamic equilibrium between ecological processes and social use, allowing the lake to function as a buffer against floods while sustaining diverse livelihoods.

Colonial rule marked a decisive transformation in the governance of Vembanad. British administrative priorities emphasized land reclamation, revenue extraction, and hydraulic control. Large tracts of wetlands were converted into paddy fields, canals were realigned, and embankments were constructed to stabilize agriculture and facilitate transport. These interventions disrupted natural circulation patterns and sediment flows, reducing the lake's capacity to absorb floodwaters and regenerate aquatic habitats. Wetlands increasingly came to be treated as spaces requiring technical "improvement," rather than as ecologically adaptive systems.

Post-independence development largely extended these colonial trajectories. State-led modernization prioritized agricultural intensification, urban expansion, and infrastructural growth around the lake. The construction of hydraulic structures such as barrages altered salinity gradients, with significant consequences for fish breeding cycles and species composition. Industrial effluents, domestic sewage, and agricultural runoff further degraded water quality, accelerating eutrophication and biodiversity loss. Over time, Vembanad became emblematic of the contradictions of development-led water governance—economically productive yet ecologically fragile.

The ecological consequences of these interventions became particularly visible during the extreme flood events of the late 2010s. Floods exposed the lake's diminished buffering capacity, silted channels, and constrained drainage, leading to prolonged inundation and severe disruption of fishing activities. Fishers reported sharp declines in commercially valuable species, proliferation of invasive taxa, and reduced fishing days. These impacts underscored how historical governance decisions amplified contemporary climate-related risks rather than mitigating them.

In response to mounting ecological stress, regulatory and conservation frameworks were introduced, including wetland protection rules, Ramsar recognition, and judicial oversight. While these measures signalled growing institutional acknowledgment of the lake's ecological importance, their implementation has been uneven. Governance remains fragmented across multiple agencies, with overlapping mandates and limited coordination. Conservation initiatives have often emphasized restriction and regulation without fully integrating the livelihood concerns of fishing-dependent communities.

Nevertheless, Vembanad also illustrates emerging adaptive responses rooted in local participation. Fishing cooperatives, community organizations, and local governments have initiated efforts aimed at sustainable fishing practices, habitat restoration, and awareness-building. These initiatives, though constrained by broader institutional structures, demonstrate the potential of locally grounded governance when ecological knowledge and historical relationships with the lake are recognized rather than marginalized.

Viewed through an ecological–historical lens, Vembanad Lake exemplifies how wetland degradation is not merely the outcome of recent environmental pressures but the cumulative product of governance regimes that privileged control, productivity, and technical management over ecological integration. The lake's current vulnerability thus reflects a long history of intervention that reordered both landscapes and livelihoods. As such, Vembanad serves as a critical inland case through which to understand the broader challenges of wetland governance in contemporary India.

4.3. Comparative Perspectives: Governance, Degradation, and Participation

In some understanding, Vembanad Lake and the Sundarbans as wetland were not only diverse towards its socio-ecological characteristics but were also shaped by similar governance history. In the two

decades since, colonial and postcolonial interventions have 'privileged' (Blomley 2008, 45) control, productivity, and technical management of ecological complexity and social embeddedness. Such priorities created a path of biodiversity loss and greater susceptibility to the climatic stresses of our own time.

Interventions by regulators and judges to mitigate these trends are present in each region. Nevertheless, they are hindered by institutional fragmentation, top-down politics, and poor local community integration. Conservation, when separated from the link of livelihoods through history, reproduces exclusion rather than sustainability.

In both cases, community participation turns out to be an overlooked, albeit essential aspect. Ecological restoration and livelihood security benefit from integration of local knowledge and collective action. These experiences indicate that wetlands may need governance beyond legal protection, which also recognizes wetlands as socio-ecological systems, and historically grounded approaches to governance.

The formal comparison—contextualizing these cases according to a common analytic frame—serves to augment the article's main contention: it is not possible to address—and not possible to understand—current wetland crises in India without reference to the historical legacies that enabled them. Different ecological contexts, present and past governance regimes, create distinct legacies across lakes and wetlands interacting in ways that shape contemporary opportunities for protection, participation, and resilience.

5. THE REGULATORY AND JUDICIAL TURN IN WETLAND GOVERNANCE

In modern India, the governance of lakes and wetlands has progressively moved to regulatory and judicial mechanisms. Such a shift signals a larger acceptance that earlier strategies of managing and building development lost sight of the need for ecological protection and preservation of the water commons. When wetlands were lost under urban sprawl, infrastructural giants and incursions, regulation arose not only as an environmental reaction but also as an institutional corrective against a colonial and postcolonial regime of governance deficiencies.

This change is evidenced by the rise of environmental regulations around water bodies. Legal instruments on environmental protection, biodiversity conservation, wetland regulation aimed to formalise protections that administrative governance had historically overlooked. Functional frameworks were developed to restrict land conversion, manage uses that take place within wetland boundaries, and define institutional responsibility for protection. Crucially, these regulations did not materialise in a vacuum; instead they were a response to decades of ecological degradation and rising public alarm over floods, drought and contamination all of which are intimately related to the historical repression of wetlands.

This regulatory turn was in many ways characterized by the intervention of judicial actors. Judicial activism has played an increasingly wider role in interpreting environmental necessities in India, responding to public interest litigation, and commanding state agencies to protect lakes and wetlands. The contemporary judicialization of environmental governance is symbolic of the strengths and weaknesses of the regulatory system Pro-ecological impacts: On one hand, courts offered a venue where environmental interests could be expressed and enforced. Or, if we look at it another way, their expanding role highlights the failures of executive institutions to effectively carry out the laws on the books.

Judicial supervision — a key component of a democratic society — is made necessary by the very presence of institutional fragmentation. The division of lakes and wetlands into the jurisdiction of different departments meant that regulation was often inconsistent, or even selective. Court orders are meant to fill in these gaps by requiring that coordination take place, that accountability be enforced, and that administrative action be taken. Yet these interventions also solidified centralized forms of governance, restricting the space for locally-routed, community-cantered management practices.

This regulatory turn has uneven environmental impacts. In other settings, legal safeguards have both stemmed the tide of encroachment, revived aquatic systems and enhanced ecological supervision. In other cases, enforcement has been largely symbolic, limited by political interests, bureaucratic inertia, or competing development priorities. Regulation has therefore served more as a form of constraint than as an overarching system of ecological rehabilitation.

The social impacts have been just as complicated. Past regulatory protections tended to limit traditional use types such as fishing, grazing, and resource collection on lakes and wetlands. Although justified to be essential for conservation, these limitations occasionally replicated previous practices of exclusion, including disregarding that communities relied on wetland ecosystems historically. In common with colonial and postcolonial governance regimes, regulation was thus both tipped in favour of the legal and scientific, closing down alternatives of lived ecological knowledge, and by extension, Actualizing asymmetries between the state and local users.

Historically, the ascendance of civic regulation and its judicial intervention is neither a clean break from prior governance nor a straightforward corrective to that prior governance. Rather, it is a new period in the protracted history of water governance, one driven by ecological crisis, institutional dysfunction and an increasing reach of law. Lakes and wetlands were regulated through customary systems, and later through administrative and developmental frameworks, but now these systems are rapidly becoming subject to legal and judicial regulation. This evolution points to the fact that while the governance continues to adapt to the pressing need of large-scale ecological pressures, it is still made to function within the bounds of historical legacies of command and control and often decentralized authority.

Taken together, the colonial reconfiguration of wetlands, the postcolonial consolidation of developmental governance, the emergence of conservation frameworks, and the more recent regulatory and judicial interventions reveal a long and layered trajectory of water governance in India. Across these phases, lakes and wetlands have remained subject to shifting institutional priorities, yet consistently governed through centralized frameworks that privilege administrative and technical authority over historically embedded practices. The increasing reliance on legal regulation and judicial oversight underscores both the recognition of ecological crisis and the limitations of earlier governance regimes. At the same time, it highlights how contemporary interventions continue to operate within institutional and epistemic structures shaped by colonial and postcolonial legacies. Understanding this historical continuum is essential for interpreting the present condition of lakes and wetlands, as well as the persistent tensions between ecological protection, administrative control, and social use. It is within this context that the concluding section reflects on the broader implications of historical wetland governance for environmental history and the study of water–society relations in Asia.

6. CONCLUSION

Through the example of lakes and wetlands in India as historically governed landscapes, this article has highlighted the ways in which present-day ecological vulnerabilities must be understood as

cumulative outcomes of colonial, postcolonial and contemporary regulatory interventions. Tracing this evolution from early administrative rationalization to development-led hydraulic control and, in more recent times, conservation and judicial oversight, the study argues that wetlands have been important yet overlooked spaces within the state-nature nexus across the decades. Their present crises cannot be explained by traditional historicity perceptions as either singular events or new conditions but are longstanding conditions that have been historically produced, deeply embedded in modes of institutional practice and modes of operative thought and knowledge.

A close analysis of Vembanad Lake, particularly, shows how an inland wetland system was slowly convoluted through land reclamation, infrastructural modification, and fragmented governance. Attempts to control water flows and increase agrarian production during the colonial period transformed the hydrology and regimes of access at the lake, while pollution, salinity regulation, and urban expansion by postcolonial development added ecological pressure. Recent years of extraordinary flood events laid bare the limits of these interventions and showcase how past governance decisions entrenched, rather than reduced, vulnerability. While Vembanad now might receive considerable attention through regulatory and conservation frameworks for its ecological relevance, these efforts are limited due to institutional fragmentation and the low uptake of community-based practices.

When studying another deltaic setting with a very different ecological environment—the Sundarbans—we find similar dynamics at this comparative dissimilar deltaic case. Collectively, colonial forestry regimes, embankment reconstruction, and postcolonial settlement directives transformed a mangrove dominated wetland into a tightly controlled landscape. These measures reduced ecological buffers and exposed humans to cyclones, salinity intrusion, and sea level rise. Today, dozens of national and international commitments for conservation and climate adaptation have been made, but their responses continue to struggle with the dichotomy between protection and use, frequently leading to the marginalization of forest- and fish-dependent communities, echoing past histories. Similar to Vembanad, governance responses in the Sundarbans are still influenced by legacy institutional logics that prioritise control and technical expertise in management functions that are detached from historically grounded socio-ecological relationships.

Taken together, the two case studies help to illustrate the main argument of the article: that the governance of wetlands in India has always been about ordering nature and society. Despite the ecological differences and the scale of the intervention they both represent, Vembanad Lake and the Sundarbans have been shaped by similar historical legibility of these wetlands and similar state interventions embedding dense bureaucratic control over ecosystems, that increasingly dissociate ecosystems from the practices that used to maintain desired signalling functions. Recent developments in regulation and adjudication, while symbolizing a notable normative change, are still conditioned by the legacies of divided sovereignty and technocratic governance.

Both cases speak to the importance of community engagement as a hidden, yet under-utilized aspect of wetland governance. Indeed, local initiatives in fisheries management, habitat restoration, and adaptive livelihoods showcase the possibility of more inclusive and ecologically sensitive practices. Yet these endeavours still function in quite limited institutional spaces, betraying the persistent tension between top-down governance mechanisms and ecologically rooted forms of local knowledge.

This study seeks to contribute to environmental history and Asian studies by foregrounding wetlands as landscapes of governance, ecology, and social life by situating contemporary challenges posed to wetlands within a long ecological-historical time frame. Degradation, regulatory paradoxes, and social

vulnerability that stubbornly continues over time bears witness not to a failure to intervene, but rather to the cumulative legacies of governance regimes oriented to specific historical priorities. Acknowledging these continuities is important for understanding the limitations of existing conservation initiatives and for preparing higher history-sensitive strategies in wetland governance in India and Asia.

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