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# The Living Legacies of Mega Water-Development Projects: Power, Politics, and the Afterlives of Sri Lanka's Mahaweli Development Project

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ABSTRACT

While the uneven consequences of mega water-development projects are well documented, less is known about how their legacies continue to evolve over time. This paper offers new theoretical and empirical insights into water governance through a critical analysis of the *afterlives* of Sri Lanka's Mahaweli Development Project (MDP). Drawing on critical development studies, hydrosocial literature, and research on infrastructure politics, we illustrate how the living legacies of the MDP continue to evolve, emerge, and influence change well beyond the project's life-cycle and intended scope. Based on qualitative research conducted between 2017 and 2023, our study reveals how the afterlives of the MDP have become intertwined with present-day socio-ecological challenges, water governance, and climate politics in Sri Lanka. We develop a longitudinal analysis showing how the MDP has produced an evolving series of socio-ecological issues that are difficult to detect, as they manifest intergenerationally. Additionally, we demonstrate how contemporary water, development, and climate interventions in Sri Lanka are shaped by a socio-ecological and political-institutional landscape still heavily influenced by the MDP's afterlife. We conclude by stressing the need for greater attention to how the afterlives of mega water-development projects continue to evolve, particularly as they increasingly intersect with the effects and politics of climate change, both in Sri Lanka and globally.

## 1. Introduction

Large-scale water infrastructure projects are closely associated with the histories of modernist development that unfolded during the latter half of the twentieth century (Scott, 2009, Molle et al., 2009, Mehta, 2013, Akhter, 2022). These mega water-development projects, which combined technological progress with modernist development ideals, garnered widespread attention for their ambitions of achieving agricultural modernisation (Duarte-Abadía and Boelens, 2019; Paranage, 2019; Wickramasekera, 1985), hydropower development (Isaacman and Isaacman, 2013, Warner et al., 2019, Huber, 2019), and nation-state building (Menga, 2015, Akhter, 2015, Menga and Swyngedouw, 2018, Rusca et al., 2019, Nygren, 2021). Studies have illustrated the socio-cultural, ecological, and economic consequences of mega 'water-development' projects (Salinas et al., 2019, Dukpa et al., 2019, Huber and Joshi, 2015, Ahlers et al., 2014, Dissanayake et al., 2016); however, we argue there is a need to better understand how the histories and legacies of such projects continue to influence water politics and socio-ecological relations far beyond their 'completion' (Lord et al., 2020, Drapier et al., 2024).

In this paper, we contribute new theoretical and empirical insights to the critical water governance and hydrosocial literature through an investigation into the afterlives of Sri Lanka's Mahaweli Development Project (MDP).[1] Drawing on findings from two interrelated research projects conducted in Sri Lanka between 2017 and 2023, we present a longitudinal analysis focusing on the socio-ecological and political-institutional legacies of the MDP and their ongoing influence on environmental and development politics. Our investigation reveals, first, that the MDP has created a range of intractable socio-ecological problems in Sri Lanka's hydrosocial landscape—issues that are difficult to

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[1] Designed and implemented between 1963 and 2010, the MDP remains the largest water management and development project ever to be carried out in Sri Lanka. The project involved a comprehensive resettlement programme estimated to have affected approximately 1 million people (Dissanayake et al., 2016) and the implementation of irrigation and hydropower infrastructure affecting close to 40 percent of the total land area of the country (Zubair 2005).

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detect because they manifest across generations. Second, we find that most, if not all, current and future water-related projects in Sri Lanka, particularly those designed in response to climate change-induced droughts and flooding (Quealy and Yates, 2021), must now operate within an ecological, material-infrastructural, and political context deeply shaped by the MDP. While prevailing critical literature has predominantly focused on the politics of mega water-development projects during their life-cycles, our research shows that their afterlives are equally significant, yet less explored.

By focusing on the afterlives of the MDP, we respond to recent calls in the critical water governance literature for greater attention to the long-term implications and evolving socio-material and political legacies of 'completed' large-scale water projects (Lord et al., 2020, Birkenholtz, 2023). Drawing on insights from hydrosocial literature, critical development studies, and work on infrastructure politics, we conceptualise the afterlives of mega water-development projects as *the long-term "implications, resonance and reverberation" that "overflow the projects' official timelines and life-cycles"* (Gez, 2021: 1511, emphasis added). Examining the afterlives extends beyond merely identifying the 'effects' and unintended consequences of these projects. Instead, it involves a nuanced temporal analysis of how these effects themselves evolve, interact with broader socio-material and political realities, and produce new socio-ecological relations and political dynamics over time. We argue that such an approach adds important temporal depth to the analysis of mega water-development projects, highlighting how officially completed projects *continue* to shape present-day environmental politics and socio-ecological relations in ways that surpass their initial effects and originally planned scope and timelines We contend that following such analytical routes foregrounds important political concerns while also revealing new possibilities for addressing the inequities and injustices tied to the evolving legacies of mega water-development projects. These insights are particularly crucial as the afterlives of projects like the MDP become increasingly entangled with both the effects of, and planned responses to, climate change (Lord et al., 2020, Randle and Barnes, 2018).

We begin by conceptualising our analytical approach for understanding the afterlives of mega water-development projects (Section 2), and then contextualising the MDP and our methodological approach (Section 3). We develop our analysis across Sections 4-6 by firstly, demonstrating how the MDP's implementation triggered a sequence of socio-ecological problems that continue to emerge after the project concluded. Secondly, we explore how the political-institutional legacies of the MDP continue to influence contemporary water and climate change governance across Sri Lanka. Thirdly, we consider the implications as the effects and planned responses to climate change in Sri Lanka become entangled with the MDP's afterlives. Finally, we conclude with reflections on how focusing on the afterlives of mega water-development projects can generate new insights into the enduring legacies of such projects.

## 2. Conceptualising the Afterlives of Mid-20th Century Mega Water-Development Projects

### 2.1. The Political Ecology of Mega Water-Development Projects

Throughout the mid-twentieth century, a big dam regime of development emerged, symbolising a "top-down, state-led, economic growth focused and technocratic development vision" (Khagram, 2004: 33, Boelens et al., 2019). Mega water-development projects were widely embraced as a means to "engineer ideal societies by dominating 'wild waters' and simultaneously controlling humans and natures" (Boelens et al., 2022: 5, D'Souza, 2006). However, as the uneven socio-cultural, environmental, and economic repercussions became more apparent, support for the extensive dam-centric development approach began to decline by the late twentieth century. (Crow-Miller et al., 2017, Flaminio, 2021). More recently, large-scale water infrastructure projects have experienced a resurgence, driven by growing concerns over climate change. These projects are increasingly positioned as potential solutions to water scarcities and significant sources of renewable energy (Duarte-Abadia et al., 2015, Hommes and Boelens, 2017, Dukpa et al., 2019, Käkönen and Nygren, 2022, Birkenholtz, 2023). Consequently, there is a renewed urgency to critically address both the implementation of new large-scale water-infrastructure projects and to understand how the legacies of officially 'completed' mega water-development projects continue to evolve.

In attempting to engineer ideal societies through the control of water, mega water-development projects are conceptually built upon the separation of nature/water from society (Hommes and Boelens, 2018, Domínguez-Guzmán et al., 2021). Notwithstanding sustained critique from political ecologists and those in cognate fields, the nature-society binary is deeply embedded within dominant water (and environmental) discourse (Swyngedouw, 1999, Linton, 2014, Götz and Middleton, 2020, Tozzi et al., 2022, Yates et al., 2022). One of the main "virtues" of this modernist binary is that water is no longer "easily complicated by ecological, cultural, or social factors," which makes it ostensibly easier to "manage" (Linton, 2010: 8). However, as the case of the MDP illustrates, the reduction and abstraction of water works to conceal the ways in which water shapes and is shaped by socio-political power relations that continue to evolve over time.

Contrasting the reductionism that characterises modern water, we understand water as neither purely natural nor social, but simultaneously and inseparably both (Schmidt, 2014, Rogers and Crow-Miller, 2017, Delay and Linton, 2019, Jackson and Head, 2020, Reyes Escate et al., 2022). Conceiving water as a hydrosocial "hybrid flowing thing" helps to analytically reveal the ways in which it "fuses together physical, political, economic and cultural processes" (Swyngedouw, 2015: 19). We draw inspiration from contributions by political ecologists on the hydrosocial cycle, which – as opposed to the hydrological cycle – draws attention towards the uneven processes and outcomes through which "water and society make and remake each other over space and time" (Linton and Budds, 2014: 175, Swyngedouw, 2009, Millington, 2018, Liao and Schmidt, 2023).

By drawing analytically from this line of research, we do not seek to reduce complex hydrosocial relations to a cyclical process that implies repetition, regularity, or an expected equilibrium (see Camargo and Cortesi, 2019). Rather, engaging with this literature helps to illustrate the continuous, new, and unexpected ways in which hydrosocial relations are produced and re-produced across spatial and temporal scales throughout the lives and afterlives of mega water-development projects. In the case of the MDP, this approach shifts our analytical focus from the immediate socio-material effects of the project alone, to reveal how these effects themselves continue to (re-)produce socio-ecological and political relations over time.

By emphasising the spatio-material dimensions of hydrosocial co-production (Flaminio et al., 2022), concepts of territory advance theorisations of the hydrosocial cycle by situating it "more geographically in a concrete, material, inhabited context" (Drapier et al., 2024: 930, Swyngedouw, 2015, Götz and Middleton, 2020). Our analysis is shaped by the concept of hydrosocial territories, which highlights the "socio-environmental materialisation" of spatially bound and power-laden multi-scalar networks where "humans, water flows, ecological relations, hydraulic infrastructure, financial means, legal-administrative arrangements and cultural institutions and practices are interactively defined, aligned and mobilised through epistemological belief systems, political hierarchies and naturalising discourses" (Boelens et al., 2016: 2, Hommes et al., 2022).

Analyses of hydrosocial territories have illustrated the social, economic, political, and environmental costs of mega water-development projects across a range of geographical settings (Hommes et al., 2016, Boelens et al., 2019, Damonte and Boelens, 2019, Rusca et al., 2019). For example, Duarte-Abadia et al. (2015) reveal the uneven social, ecological and political effects of *Hidrosogamoso*, a mega hydropower-

development project in northeast Colombia. Their findings demonstrate the ways in which powerful discourses of clean energy and sustainable development are deployed through the project to breakup existing socio-ecological relationships, while realigning water users, uses, rights, technologies and authorities into new, unequal, and spatially defined "hydro-political networked hierarchies" (Duarte-Abadia et al., 2015: 251). However, as highlighted by Flaminio et al. (2022) and Drapier et al. (2024), while the concept of hydrosocial territories has increasingly been applied to study ongoing changes, there is a need for greater focus on the historical dynamics underpinning these territorial (re-) configurations.

While these studies have provided important and detailed empirical accounts of the political processes and uneven outcomes of mega water-development projects, only few have explicitly examined how these projects continue to exert influence long after their official 'completion.' For instance, Di Baldassarre et al. (2021) provide a large-scale analysis of the legacies of large dams across the USA. They highlight that, by supplying more water, these dams have enabled widespread agricultural, urban and industrial expansion, which in turn has led to unsustainable demands on water. However, there remains a need for more nuanced, contextual understandings of how the living legacies of individual mega water-development projects persist beyond their completion.

### 2.2. The Afterlives of Mega Water-Development Projects

To explore the ongoing influence of the MDP on Sri Lanka's hydrosocial landscape, we centre our analysis on the concept of the *afterlives* of mega water-development projects. This approach shifts away from the dominant scholarly focus on the politics and processes within project life-cycles (Lord et al., 2020, Flaminio et al., 2022). Our investigation into the afterlives of the MDP offers new theoretical and empirical insights to the critical water governance and hydrosocial studies literature. By focusing on the enduring and evolving legacies of mega water-development projects, we highlight how these projects continue to shape socio-ecological relations and political-institutional arrangements long after their formal 'completion'.

We develop our conceptualisation of the afterlives of mega water-development projects by drawing on insights from critical development studies and literature on water-development project planning and infrastructure politics. We refer to the afterlives of mega water-development projects as the long-term "implications, resonance and reverberation" that "overflow the projects' official timelines and life-cycles" (Gez, 2021: 1511). Analysing the afterlives of mega water-development projects challenges mainstream development planning rationalities, which are centred on discrete and plannable 'phases' within a project life-cycle, implying an identifiable beginning and end-point (Sato and Chagas Jr, 2014, Li, 2016, Lord et al., 2020). These life-cycle phases include the conceptualisation and design, financing, implementation and infrastructure construction, closing and evaluation (see Khang and Moe, 2008, Ahsan and Gunawan, 2010). Furthermore, the concept of afterlives reframes projects, such as the MDP, "as living, complex, and non-linear processes" that extend beyond official life-cycles and timelines (Gez, 2021: 1511, Lemay-Hébert and Jerrems, 2024). Analysing the MPD in this light draws our attention to the political processes through which the project's socio-material and political-institutional legacies continue to evolve, reverberate, and cause change over time.

Analysing the afterlives of mega water-development projects, such as the MDP, involves examining what happens after a project is 'officially' completed. However, this approach goes beyond simply identifying the effects and unintended consequences of these projects. Instead, it entails a more nuanced temporal analysis of how these *lively* effects themselves continue to evolve, expand, emerge, and reconfigure socio-ecological and political relations well beyond the 'conclusion' of a project's life-cycle (Ferguson, 1994, Isaacman and Isaacman, 2013, Rudnyckyj and Schwittay, 2014, Schler and Gez, 2018, Gez et al., 2022). Analysing the afterlives of the MDP underlines the limitations of conventional development project evaluation frameworks, which, firstly, primarily reduce project effects to *static* and measurable indicators designed to allow donors to track and assess returns on their investments (Mosse, 2005, Hout, 2012, Mills-Novoa, 2023); and secondly, apply time horizons that are often too narrow to capture the socio-material temporalities of mega water-development projects (Lord et al., 2020).[2] Analysing the afterlives of mega water-development projects, therefore, complements these approaches by adopting a longer-term perspective capable of tracing the lively and evolving nature of project legacies over time.

Despite the best-designed plans, mega water-development projects in many cases do not materialise as planned (Warner et al., 2019, Fung and Lamb, 2023). Large-scale infrastructure projects often overrun budgets, undergo redesigns, are completed beyond original timelines, or continue to exist in a liminal state between "unfinished and unbuilt" (Carse and Kneas, 2019: 9, Lord et al., 2020, Ansar et al., 2014, Flyvbjerg, 2014). In the case of the MDP, as we explore in Section 5, the project was re-designed, individual components were delayed, while others were added to and continue to be extended after the project's completion (also see: Widger and Wickramasinghe, 2020). However, for the MDP, as with the completion of all infrastructure-development projects, planning endures (Lindblad and Anand, 2023, Ferguson, 1994). In our analysis, focusing on how planning endures reveals the political-institutional afterlives of the MDP, which has evolved beyond project planning into a government ministry with a remit that extends well beyond the 'project' itself. It also helps us understand how the project's infrastructure, which remains in operation, continues to be engaged with and managed, how new projects have arisen to extend the MDP's infrastructure, and how the planning legacies of the MDP continue to influence the planning of new water-development projects otherwise unrelated to the MDP.

We complement these insights by drawing on literature on the temporalities of infrastructure, which highlights how infrastructure continually (re)configure socio-ecological and power relations over time (Appel et al., 2018, Carse and Kneas, 2019, Karhunmaa and Käkönen, 2024). This literature draws attention to how the temporalities of infrastructure-development projects are more than just moments in time, but are "predicated upon, and produce, different material conditions, social perceptions, labour dynamics, power structures and politics, and socio-ecological conditions" (Ramakrishnan et al., 2021: 676, Gupta, 2018). Furthermore, it helps us to understand how and why the same technical plans and features of an infrastructure-development project, like the MDP, "can produce different configurations of space and sociality than those designed by planners" when confronted with various social, political, economic and ecological pressures over time (Appel et al., 2018: 18, Harvey, 2018, Millington, 2018, Hurst et al., 2022). Conceptually drawing from this literature grounds our analysis of the MDP by highlighting how water uses continually engage and tinker with the project's infrastructure to better suit their needs (Leonardelli et al., 2022, Kemerink-Seyoum et al., 2019), and also reveals how the MDP's infrastructure is entangled with broader, power-laden processes of ongoing socio-ecological change that continues to occur well-beyond the project's completion (Gupta, 2018, Ramakrishnan et al., 2021, Hommes, 2022).

In bringing insights from development project planning and infrastructure temporalities together with hydrosocial literature, the afterlives provides a conceptual framing for understand how the socio-material and political legacies of the MDP continue to underpin and shape environmental and development politics in Sri Lanka. More broadly, critically analysing the afterlives of mega water-development

[2] As we highlight in Section 6, evaluations and impact assessments of the MDP, and its individual components typically cover a time period of up to 15-years post-implementation and are focused primarily on identifying technical implementation problems, best practices, and lessons learned.

projects helps to both historicise contemporary socio-ecological configurations *and* uncover the discursive, material and political path-dependencies that influence future water-development projects and governance arrangements. In their study on the legacies of plantation irrigation infrastructure in Maui, Hawai'i, Kay et al., 2024: 112) argues "that understanding the future of Maui requires close attention to its past." We argue that tracing the afterlives of mega water-development projects helps to do exactly that; uncovering how the past permeates the present, while revealing possibilities for influencing how the past shapes the future (Lord et al., 2020, Randle and Barnes, 2018). We contend that such lines of analysis are increasingly critical, as the urgency of climate change gives rise to de-politicised and de-historicised technical fixes that replicate shortcomings of earlier techno-managerial development interventions *and* fail to grasp the historical production of socio-ecological vulnerabilities experienced by marginalised social groups threatened by climate change (Eriksen et al., 2021; Heikkinen, 2021; Matthan, 2023; Nightingale et al., 2020; Paprocki, 2021; Quealy and Yates, 2021).

## 3. Researching the MDP and its Afterlives

Carried out between 1963 and 2010, the MDP is the largest water-related project undertaken in Sri Lanka in terms of investment, infrastructure construction, and timescale. The project involved the construction of 11 reservoir-complexes along the Mahaweli River to divert water for the purposes of irrigation and hydropower (see Fig. 1). From these reservoir-complexes, water is further diverted to 13 separate *Irrigation Systems* (A – M) and then to smaller *Irrigation Blocks*, before being sent out to individual irrigation plots. The water infrastructure implemented by the MDP is expansive, covering almost 40 percent of the entire island..

Prior to the implementation of the MDP, Sri Lanka has a long irrigation-centred hydrosocial history based on the construction of approximately 20,000 village tanks (reservoirs), typically organised into interconnected 'tank cascade systems' (Dharmasena, 1994, Gunawardana, 1971). Most prominent across Sri Lanka's dry zone region (see Fig. 1), the tank cascade systems provided a means for addressing the threats of heavy monsoonal rains and prolonged dry periods (Vidanage et al., 2022). By cycling and reusing water through a series of small to large tanks, the tank cascade systems operated on the principles of collected water management and conservation (Geekiyanage and Pushpakumara, 2013; Paranage, 2018b).

Beginning from the period of British Colonisation (1796–1948), the removal of local water management institutions, transferal of management responsibilities from local communities to government bureaucracy, imposition of individual private property rights, and introduction of 'modern' techno-scientific water management principles have all contributed towards the decline of many of the tank cascade systems across the dry zone region (Kekulandala et al., 2021, Abeywardana et al., 2018). Building on the foundations introduced during the period of British Colonisation, the MDP succeeded in broadly transforming Sri Lanka's hydrosocial landscape and development agenda (Zubair, 2005).

Largely reliant on external development funding through the World Bank and the International Monetary Fund, the design management expertise of European management consultants, and the hydro-technological expertise of US engineers, the MDP can be located at the intersection of the 1950′s concomitantly emerging networks of hydro-technical knowledge and development expertise. Following a vision of development through resource manipulation (Khagram, 2004, Boelens et al., 2019), the MDP encompassed a modernist approach to water management, accompanied by an economic policy shift in Sri Lanka from the late 1970 s that sought to transform subsistence farming into commercialized agriculture (Shanmugaratnam, 1984, Gunasinghe, 1996, Paranage and Yang, 2020).

Inspired by globally circulating modernist irrigation models and discourses (including the US' Tennessee Valley Project), the MDP aimed to maximise production in each irrigation plot, creating centralised mathematical models that linked water availability to agricultural productivity. By calculating a system of water balances, the MDP's central planning unit generates an annual forecast of available water quantities and balances its distribution across the 13 major irrigation systems. Over the course of the MDP's design and implementation, the centralised management model grew increasingly more sophisticated, linear, and bureaucratic, with almost every aspect of water management controlled by new modelling technologies, hydro-meteorological forecasting programmes, and bi-model computer systems (Paranage, 2020a).

Despite its completion in 2010, the MDP continues to affect hydro-social relations across Sri Lanka in ways that extend well beyond the intended scope of the project. In this paper, we demonstrate the continued influence of the MDP in two ways: first, by revealing the long-term socio-ecological consequences of which are only made visible and felt over time; and second, by illustrating how the MDP has evolved beyond a 'water project' and subsequently continues to influence ongoing and overlapping water, development, and climate change politics in Sri Lanka.

To achieve this, we draw on findings from two interrelated research projects. The first project (2017——2020) explored the politics shaping the design, development, evolution, and consequences of the MDP. The second project (2021——2023) built on these findings by investigating the political ecologies of water infrastructure and climate change adaptation in Sri Lanka's North-Central dry zone. While the first project concentrated specifically on the MDP, the second primarily examined the rehabilitation of Sri Lanka's tank cascade systems as part of ongoing climate change adaptation programming in the dry zone region. The first project demonstrated how the material and institutional legacies of the MDP continue to shape the socio-ecological conditions in areas affected by the project, highlighting the MDP's enduring influence on environmental governance. The second project expanded this analysis by showing how the MDP's legacies affect water governance and the politics of climate change adaptation, even in regions not directly impacted by its infrastructure. By combining the findings of both projects, we are able to offer a more comprehensive understanding of how these legacies continue to influence water governance and environmental management across a broader range of contexts and levels of government in Sri Lanka.

The findings from both projects are based on qualitative fieldwork undertaken in Sri Lanka over a 12-month period in 2018 (first project) and 8 months in 2023 (second project). During the first project, semi-structured interviews were conducted with 15 current and former managers of the MDP and specialist support officers. This was complemented by in-depth qualitative fieldwork in System-H of the MDP (see Fig. 1), which included intergenerational semi-structured interviews with 18 farmers from 10 families, transect walks, informal conversations and observations. In the second project, 14 semi-structured interviews were conducted with current senior staff employed under the UNDP and Ministry of Irrigation-led Climate Resilient Integrated Water Management Project (CRIWMP) and 10 semi-structured interviews were held with farmers in System-H. These interviews were supplemented by transect walks, observations, and informal discussions along irrigation infrastructure.[3]

Interviews with MDP managers and specialist support officers provided a high-level perspective on the project's design, implementation, and evolution, revealing significant deviations from the original plan and identifying unanticipated challenges that have emerged over time. In contrast, interviews with CRIWMP staff provided insight into the MDP's influence on contemporary climate adaptation programming in

[3] In total across the two projects, our analysis draws from semi-structured interviews with 15 of the MDP's current and former officers and managers, 14 current senior staff at the CRIWMP project, and 28 farmers in System-H of the MDP.

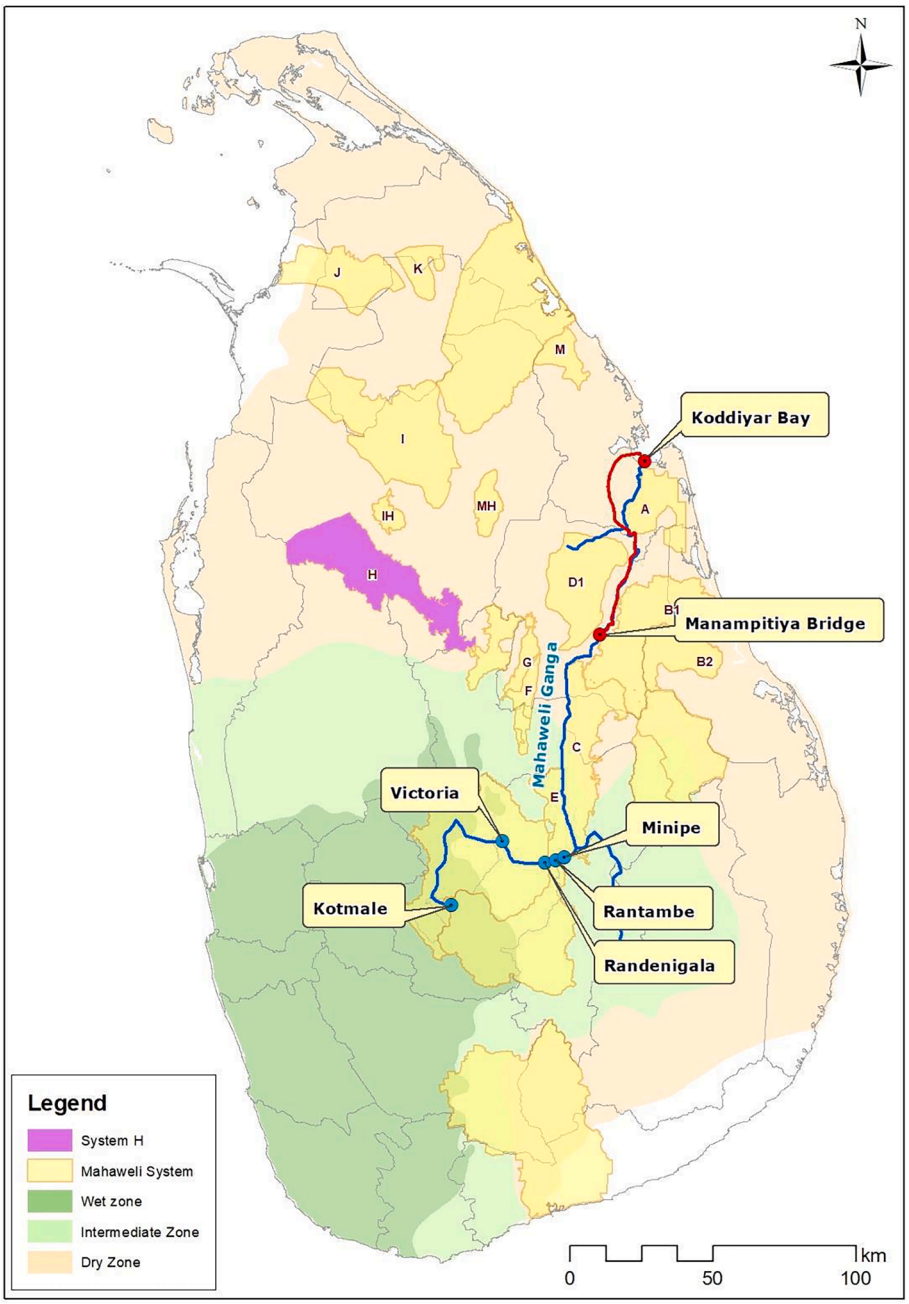


**Fig. 1.** Locating the MDP's reservoir-complexes and agricultural systems within Sri Lanka's dry zone.

Sri Lanka. Both projects drew on archival and grey literature related to the MDP's design, implementation, and evaluation, as well as grey literature concerning ongoing climate change projects and policy in Sri Lanka. This integration of diverse sources allowed for a more nuanced understanding of the project's legacies.

Qualitative fieldwork in System-H, the first fully implemented irrigation system of the MDP, was essential for understanding the long-term impacts of the project. System-H was the first system of the MDP to be fully implemented (1974 – 1980), which provided the longest possible timeframe to study the ongoing effects of the MDP. Interviews with farmers in this region illuminated their place-based experiences and the socio-ecological challenges they face as a result of the MDP's hydraulic infrastructure. Intergenerational interviews conducted during the first project were particularly valuable, as they allowed for the tracing of evolving and emergent effects of the MDP over time. By interviewing first, second, and third-generation farmers, we were able to contrast life in the dry zone before the MDP's implementation with life shaped by the hydraulic grid, highlighting the intergenerational impacts of the project.

Most interviews were conducted in Sinhalese, with a few conducted in English. All interviews were recorded, transcribed into English, and thematically coded. Reflections and observations were documented in a fieldwork diary. The analysis of each project focused on identifying the effects of the MDP and how these evolved over time. Combining the overlapping and complementary themes from both projects provided a broader understanding of the legacies of the MDP in different contexts. For example, while the first project identified the socio-ecological consequences of land restrictions under the MDP, the second project revealed how MDP-based land and water management practices are shaping the design and implementation of climate adaptation projects beyond the immediate geographical reach of the MDP. This integration of findings allows us to demonstrate how the MDP's legacies continue to evolve and influence water governance and climate adaptation in Sri

Lanka.

## 4. Over Generations: The Uneven Socio-Ecological Afterlives of the MDP

Despite its completion in 2010 (with most components completed before 1995), the impacts of the MDP are evolving and far-reaching. Fieldwork in System-H revealed the ways in which the MDP's past continues to produce a range of evolving and uneven socio-ecological consequences that are only now being experienced. Drawing primarily from intergenerational interviews with farmers affected by the project, in this section we demonstrate the temporal evolution of the MDP's afterlives by tracing the long-term socio-ecological effects of the project's restrictions placed on land and water.

Access to water within the MDP is intricately tied to land rights, creating a contrast between farmers inside and outside the MDP. While those outside enjoy broad autonomy over their lands, farmers within the MDP are granted freehold rights with certain constraints (Paranage, 2018a). Firstly, these rights are limited by a prohibition on subdivision, meaning landowners can only pass on their rights (through sale or family succession) without dividing their land. This restriction, rooted in British Colonial concerns from the past, aimed to curb practices like subdividing land during succession, which was perceived as a threat to agricultural productivity and rural economic development (Leach, 1961). Secondly, the MDP restricts landowners from leasing or renting to nonrelatives to ensure the exclusive agricultural use of the land; originally, only agricultural families were granted land rights.

In practice, however, the effects of restricting land and water under the MDP tend to yield dynamic and variegated consequences. Fieldwork in System-H demonstrated how farmers at times resisted and reworked land restrictions from the ground, in diverse and often pragmatic ways. Most notably, restrictions against leasing and subletting to nonrelatives have led to informal tenancy agreements, while restrictions against subdivision have resulted in a growth of land encroachments. While land encroachments are illegal, they are also unevenly policed. In certain cases, encroached lands have become regularised, providing farmers with legal rights over the lands. However, in many other cases, informal tenancy agreements and encroachments have led to the creation of a 'shadow' subclass of land users who find themselves in the precarious position of lacking legally recognised rights to their lands (Paranage, 2018a).

The causes and consequences of the growth of encroachments become clearer when considered over time. For example, our fieldwork in System-H illustrated how land encroachments have largely occurred during the second and third generation of MDP farmers. Over time, as the first generation of MDP farmers have gradually passed on their land rights to one of their children (often the oldest), their siblings are left without any legal claims to the property. Owing to the land tenure restrictions introduced through the MDP which disallow subdivision, newer generations of farmers are increasingly rendered landless. While government representatives commonly identified encroachments as a challenge to the functioning of the MDP, analysing the growth in land encroachments over time reveals the way in which they are in part historically produced by restrictions implemented by the MDP itself (Fig. 2).

Contradicting the project's apparent conceptual separation of water, land, and society (Paranage and Yang, 2020), the MDP's afterlives illustrate their evolving and inseparable entanglements. While the growth of land encroachments has arisen in part as a response to the MDP's land restrictions, encroachments themselves have triggered further socio-ecological consequences. In the absence of allocated access to land, landless farmers described how they felt left with little choice between the uncertainties of daily wage labour, migrating to urban areas or encroaching into forest reservation areas to build makeshift housing and clear space for cultivation.

Human-elephant conflict is widespread throughout System-H and is a significant concern among both government and farming participants in our study. In System-H, progressive deforestation has significantly reduced the natural habitat of the regions elephant population. Sri Lanka has one of the highest levels of human-elephant conflict in the world. On average, approximately 70 humans and 250 elephants lose their lives each year due to conflict in Sri Lanka, while elephant induced crop damage poses a significant threat to the income of farmers across the dry zone (Anuradha et al., 2019, Fernando, 2015, de Silva and Srinivasan, 2019). Illustrating the challenging realities of human-elephant conflict in the region, Thilak,[4] a second-generation farmer under System-H described:

> With jungle clearing and settlements moving forward, herds of elephants are boxed in, and have nowhere to go. When the elephants come into the farms, bypassing, or breaking the electric fencing designed to keep them away, they are chased away by the settlers armed with fireworks and flares. […] When the elephants are continuously chased off and have nowhere to go, they turn around and retaliate. At first the charges and attacks are mild but overtime it can get very dangerous.
>
> [Interview, 2018]

Fieldwork in System-H revealed the interconnectedness of human-elephant conflict, land encroachments, and issues of water access and supply under the MDP. Without access to official water channels, some farmers on encroached lands were reported to access them by creating 'unauthorised' inlets to their farmlands by tinkering with the water turnout gates. Since encroached farmlands are not officially registered, they are largely unaccounted for in the centralised water distribution calculations, risking an undersupply of water across the irrigation block. As a consequence, farmers on both registered and encroached lands expressed frustration with the difficulties of cultivating paddy (as mandated by the MDP) due to inadequate water, especially during droughts, as described by one farmer from Thambuttegama:

> Our cultivation practices are tied to how much water is available in the unit. […] Technically speaking, we are not allowed to cultivate crops that are not approved by the project officers, but some farmers do anyway. Cultivating paddy [in units that receive low amounts of water] is simply not possible in times of drought. It is a very water-intensive crop.
>
> [Interview, 2018]

Adapting to the challenges of inadequate water supply, interviews highlighted how many farmers have diversified their cultivation to include less water-intensive crops such as bananas, maize, and sugarcane. However, these crops have been found to attract elephants, further escalating the frequency of human elephant conflict in the area (also see Ekanayaka et al., 2011, Köpke et al., 2021). The consequences of these changing cultivation practices were highlighted, for example, by Asitha, a second-generation farmer in System-H, who stated:

> There turned out to be quite a few problems when farming different crops. Some farmers in my unit decided to cultivate sugar cane and bananas, and this ended up attracting a lot of wild elephants to the unit.
>
> [Interview, 2018]

The increasing human-elephant conflict, as narrated by farmers like Asitha, represents an urgent threat to both farmers under the MDP and elephant populations in the region. We argue that the increasing human-elephant conflict, along with land encroachments, must be understood as in part historically produced through the implementation of the MDP itself. Following such analytical lines reveal a fundamental contradiction in which the technomanagerial nature of the MDP continues to create a range of socio-ecological problems that undermine the very

[4] All names used in this paper are pseudonyms.

**Fig. 2.** Elephants wandering around village roads are a common sight in the MDP project areas.

functioning of the MDP and the livelihoods of affected farmers. At the same time, it also demonstrates how the socio-ecological afterlives of the MDP continue to evolve and expand across generations, unevenly shaping the lives and livelihoods of those living under the MDP.

## 5. Beyond a Water Project: The Political-Institutional Afterlives of the MDP

Throughout its implementation, the governance structure of the MDP underwent significant changes, transforming into a complex network involving both public and private organisations. The political and institutional impacts of the MDP extend well beyond its implementation, playing a crucial role in shaping Sri Lanka's present-day development and water politics. This influence goes beyond the confines of the MDP, affecting various issues within the country.

In this section, we draw on a combination of fieldwork interviews, archival research and document analysis, to explore the enduring political influence of the MDP and the temporal evolution of its political and institutional arrangements. We emphasise the connections established with international development organizations such as the World Bank and UNDP. We then shift our focus and delve into the ongoing efforts to address climate change in Sri Lanka, shedding light on how the MDP's political and institutional legacies have become deeply intertwined with the country's contemporary climate politics.

Due to the scale of the project, the UNDP-led team of experts who designed the MDP recommended an implementation timeline of over 30-years. While the recommendation was initially adopted by the then government of Sri Lanka, this changed in 1977 when a new government led by the United National Party (UNP) was elected to power in a landslide election. Under the UNP government, and in connection with their new 'open economic policy,' the MDP evolved to be the centrepiece of Sri Lanka's development agenda with the aim of achieving agricultural transformation and hydroelectric self-sufficiency (Wickramasekera, 1985, Widger and Wickramasinghe, 2020). In order to speed up the neoliberal economic development agenda, the UNP sought to rapidly accelerate the project's implementation from the original 30-year plan, down to just 5-years (Zubair, 2005).

The new government sought significant development aid to achieve its goals and intensified its connections with international development organisations and transnational corporations (Shanmugaratnam, 1984, Dissanayake et al., 2016). The new open economic policy was particularly welcomed by the World Bank and the IMF, which continued to strengthen its connections with Sri Lanka, and encouraged its constituting countries to invest heavily in the MDP (for example see: World Bank, 1980). The design and implementation of the MDP forged a number of linkages between Sri Lanka, the UNDP, the UNFAO, and the World Bank. Many of the MDP's senior project staff moved through these connections to pursue careers in international development (through being employed and often holding key positions within either the World Bank or various UN outfits operating within Sri Lanka).

To facilitate the planned rapid acceleration of the MDP, the post-1977 Sri Lankan government turned its attention quickly towards strengthening and expanding the project's institutional apparatus. Notably, in 1978, the new government transformed the MDP into its own centralised government ministry. The new Ministry of Mahaweli Development enabled the MDP's planners to effectively short-cut the bureaucratic red-tape by vesting a variety of legal powers within the boundaries of the project (Zubair, 2005). For example, the administration of all matters pertaining to land development, natural resources management, agricultural/irrigation development, housing construction, etc., within the MDP's project boundaries (each of which were previously carried out by a specialised ministry) now fell under the remit of the Ministry of Mahaweli Development.

While the Ministry of Mahaweli Development was only intended to last until the completion of the MDP under the accelerated timeline, this turned out not to be the case for several reasons. First, the project's implementation was significantly delayed due to issues related to the fragmented nature of the funding for each component; political violence in Sri Lanka during the 1970s-1980s; a brutal civil war from 1983 to 2009; and the expansion of the MDP beyond its original design, buoyed by initially promising results (Paranage, 2020a). Second, during this time, the MDP came to dominate Sri Lanka's entire development

agenda. In other words, irrigation-based development had evolved from being merely a piece of Sri Lanka's development programme, into becoming synonymous with Sri Lanka's entire development agenda (Wickramasekera, 1985, Shanmugaratnam, 1984, Zubair, 2005).

Between 1977 and 2015 the MDP had evolved into a large conglomeration of public and private organisations. These included: the Mahaweli Authority, the Mahaweli Economic Agency, the Mahaweli Engineering and Construction Agency, the Mahaweli Livestock Development Agency, the Mahaweli Consultancy Bureau, the Mahaweli Enterprise Development Project, and the Mahaweli Security Agency. However, the most significant evolution of the MDP arguably occurred in 2015 when the Sri Lankan politician Maithripala Sirisena (who was previously a minister in the Ministry of Mahaweli Development) was elected as the president. The new president restructured the cabinet, combining the Ministry of Mahaweli Development with the Ministry of Environment, thus creating the Ministry of Mahaweli Development and Environment (Ministry of Mahaweli Development and Environment, 2015).

The merger not only provided the Ministry of Mahaweli Development with an extended lease of life, but greatly increased its scope and influence. For example, through the merger, the Climate Change Secretariat (previously part of the Ministry of Environment) fell under the remit of the new Ministry of Mahaweli Development and Environment. As the national focal point for climate change, the Climate Change Secretariat oversees and coordinates Sri Lanka's international climate change commitments, national adaptation plan, domestic climate policy, and knowledge dissemination. The strengthened political-institutional linkages centred the MDP and its legacies within Sri Lanka's climate change governance arrangements. Subsequently, as international climate financing has become available, the majority of recent and ongoing climate change initiatives in Sri Lanka are either connected to aspects of the MDP's infrastructure and/or have been designed and implemented by key-staff and institutions associated with the MDP.[5]

While the Ministry of Mahaweli Development and Environment was dissolved in 2019, the political-institutional afterlives of the MDP has ensured it remains central to Sri Lanka's climate change planning and significant resources are being channelled towards sustaining or extending parts of the MDP.[6] For example, the Climate Resilience Improvement Project – led by the World Bank with support from the Mahaweli Authority – dedicated close to USD100 million towards rehabilitating parts of the MDP's infrastructure damaged by recent floods or deemed at risk to future floods under climate change (World Bank, 2014), while the Asian Development Bank funded Mahaweli Water Security Investment Programme, seeks to extend the MDP's original infrastructure to facilitate water transfers to the water-scarce areas of Sri Lanka's north (Asian Development Bank, 2022).

The MDP's influence on Sri Lanka's climate change planning extends beyond its infrastructural reach in terms of articulating best practices. The UNDP and Ministry of Irrigation-led Climate Resilient Integrated Water Management Project (CRIWMP) incorporates MDP-based land and water management practices for smallholder farmers in tank cascade systems. Despite acknowledging differences, a CRIWMP senior staffer highlighted the potential of adopting MDP practices to enhance water management efficiency and combat water wastefulness in tank cascade systems. The staffer further emphasised the importance of MDP's water allocation timetabling and advocated for curbing land fragmentation, considering it a crucial lesson for improving water management efficiency, particularly in light of climate change (Interview, 2023).

Given its spatial coverage, the centring of the MDP within Sri Lanka's climate change politics should come as little surprise. However, tracing the political-institutional afterlives reveals how the MDP has evolved beyond a spatio-temporally defined water-development 'project' and continues to influence the governance of overlapping water, rural development, and climate change planning in Sri Lanka. As a result, we find that all water-development-climate change interventions in Sri Lanka must now be conducted in a socio-ecological, infrastructural and political-institutional context that continues to be deeply shaped by the afterlives MDP.

## 6. Navigating Climate Change and the Afterlives of the MDP

The preceding two sections have allowed us to illustrate examples of how the MDP has evolved beyond a water-development 'project.' Against this backdrop, we now consider the implications as the afterlives of the MDP become increasingly entangled with the experiences of, and responses to, climate change in Sri Lanka.

The centralised water management structure of the MDP (introduced in Section 3) means that farmers in the system are almost entirely dependent on the state management authority of the MDP (known now as the Mahaweli Authority). By controlling access to water, the Mahaweli Authority has the power to regulate and discipline cultivation practices. The challenges associated with this dynamic were illustrated by one farmer from System-H, who stated:

> we have no say in what to cultivate or when […] farming here is like a day job. All our responsibilities are timetabled, and we have little else to do other than to sit and wait for the water to come.
>
> [Interview 2018]

Although some farmers in System-H disregarded cultivation mandates (as highlighted in Section 4), their practices are still shaped by access to irrigation water, which is controlled by the Mahaweli Authority. This control is particularly salient as the government seeks to rapidly modernise Sri Lanka's agricultural sector through increased private sector involvement, the adoption of new technological inputs (such as less water intensive, high yielding hybrid crop varieties), and the shift towards higher value and export-oriented crops (Government of Sri Lanka, 2019, World Bank, 2016). By controlling water allocation, the Mahaweli Authority, as highlighted in the quote above, holds the power to shape the cultivation practices and decisions of farmers under the MDP. In this sense, it is clear how water control matters politically (cf. Swyngedouw, 2015).

Our research illustrates that the relationship between water access, dependency and the mode of agriculture promoted by the MDP is deeply implicated in the experiences of livelihood vulnerability and precarity expressed by a range of farmers who participated in our study. For example, Asiri, who cultivates under System-H, described in an interview that:

> we often get less water than other farmers [in the next unit]. This has always been the case but in the past ten years, because of the drought, the difference has been more noticeable […] whatever water is issued for us tends to dry up quickly and often does not reach the farmers who live further away from the water source.
>
> [Interview, 2018]

While farmers with more reliable access to water enjoyed higher levels of productivity and profitability, those like Asiri, who experience less reliable water access, highlighted deepened precarity. Such precarity is exacerbated as issues of water access intersect with increasing livelihood costs (such as those related to commercial agricultural inputs), which impact farmers like Asiri in their ability to earn the income

[5] For example, see – the Dam Safety and Water Resources Planning Project; the Climate Resilience Improvement Project; the Climate Resilience Multi-Phase Programme; the Mahaweli Water Security Investment Programme; the Climate Smart Irrigated Agriculture Project; and the Climate Resilient Integrated Water Management Project. The cumulative value of the funding attracted by these programmes exceeds USD1 billion.

[6] The Ministry of Environment was re-established in 2020, overseeing the Climate Change Secretariat, while the Mahaweli Development component was absorbed by the Ministry of Irrigation.

necessary to cover their daily expenses while farming on Mahaweli lands (Interview, 2018).

The material and socio-political power relations produced over time through the MDP have serious and urgent implications for many smallholder farmers as they face and attempt to navigate increasing climate change. On one hand, the binding infrastructure and centralised management structures of the MDP have rendered affected smallholder farmers increasingly vulnerable through a dependency upon critical livelihood resources outside of their control. On the other hand, the centralisation of water allocation through the MDP has reduced the flexibility of many farmers within the system to make cultivation and livelihood decisions based upon their contextually specific needs, experiences, and challenges. However, navigating the 'climates of uncertainty' (cf. Matthan, 2023) narrated by a range of participants within our study demands flexibility. Beyond climate change alone, our examples have illustrated uncertainties that farmers are experiencing related to land restrictions and elephant related crop damage and conflict in Section 4, while complementary studies in Sri Lanka have empirically detailed uncertainties small-scale farmers experience related to gendered household debt (Arambepola and Romeshun, 2019), disease and illness (Senanayake and King, 2021, Senanayake, 2022), agricultural market dynamics (Quealy and Yates, 2021), and daily wage labour (Quealy and Rajaratnam, 2024).

Our findings demonstrate how the vulnerabilities and uncertainties described above are, in part, historically produced by the MDP and the mode of commercial agriculture it enforces. However, we find that contemporary climate change initiatives in Sri Lanka (such as those highlighted in Section 5) are also poorly positioned to account for how the afterlives of the MDP have become entangled with the causes of the uncertainties and vulnerabilities expressed by farmers in our study. First, we contend that these initiatives lack the required historical framing to do so. For example, the World Bank-led Climate Smart Irrigated Agriculture Project targets vulnerability 'hotspot areas' which are determined based upon biophysical indicators related to flood and drought risk and socio-economic indicators that include (potential) crop losses, high poverty rates, housing quality, and limited drinking water sources (World Bank, 2019). While such indicators importantly identify *who* is vulnerable, they do not identify *why* they are vulnerable in the first place (Ribot, 2011; Walsh-Dilley, 2020; Quealy and Yates, 2021). We suggest that historicising these indicators within the context of the MDP may shift analyses towards better understandings of the *why* of these indicators. For example, understanding poor housing quality and increased risk of flood damage within the historical context of the enduring land restrictions associated with the MDP helps to better illuminate *why* farmers in certain areas build informal settlements on encroached lands in flood prone areas, as opposed to just identifying who they are.

Second, we argue that the inability to grasp the afterlives of the MDP within contemporary climate change programming in Sri Lanka stems, in part, from conventional understandings of the MDP as a 'completed' project. Evaluations and assessments of the MDP and its individual components typically cover a time period of up to 15-years post-implementation and primarily focus on identifying technical implementation problems, best practices, and lessons learned (Jayewardene et al., 1983, World Bank, 1988, Tolisano et al., 1993). While useful from a logistical standpoint, we contend that the narrow focus and temporal scope of these evaluations fail to capture the dynamism of the MDP's afterlives that continue to evolve over time. We argue therefore that overcoming the temporal slippage (cf. Lord et al., 2020) that exists between the time horizons of project management and evaluation and the longer-term consequences of the MDP demands an appreciation of the non-linearity of mega water-development projects, while also recognising that the official 'completion' of a project should not signal the end or interest of inquiry (Ramakrishnan et al., 2021, Gupta, 2018). For policy-makers, practitioners, and researchers, there is thus a need for greater engagement with the temporalities of mega water-development projects to better understand their effects as they continue to emerge beyond their conventional timelines. Doing so, we argue, is essential for supporting more historically informed and politically sensitive decision-making processes.

Methodologically, this might mean complementing shorter-term evaluations and impact assessments with new tools more capable of capturing the consequences and encounters with the afterlives of large-scale interventions as they evolve over time. Our ability to understand the afterlives of the MDP was particularly supported by intergenerational interviews with first, second, and third generations of farmers living and cultivating within System-H of the MDP. Conducting interviews across generations allowed us to trace how particular interventions (such as water and land restrictions) contribute towards a range of consequences that have become more prominent over time (such as the growth of land encroachments). Further insights into the afterlives of the MDP and similar interventions could usefully be gained through developing more intergenerational and grounded approaches, allowing those affected to narrate their ongoing experiences with past projects on their own terms (see Mills-Novoa, 2023). Such efforts may not only provide important insights to enduring political concerns related to accountability, responsibility and justice, but also potentially reveal new avenues for addressing inequities and injustices linked to the legacies of the MDP moving forward.

As the afterlives of the MDP become increasingly entangled with the effects of and planned responses to climate change and related development challenges, we call for greater attention to how the living legacies of mega water-development projects continue to evolve across diverse contexts. These afterlives challenge mainstream water-development project planning rationalities, which are centred around a 'plannable' project life-cycle marked by a clear beginning and end (Sato and Chagas Jr, 2014). Instead, the legacies of these projects continue to emerge, evolve, and exert influence over time. The MDP case illustrates how its afterlives shape politics, policymaking, and project planning, becoming interwoven with uneven processes of socio-ecological change, (re)producing geometries of power, and continuously affecting the everyday realities of water users. We therefore call for further engagement with the concept of project afterlives across different contexts, arguing that it offers a valuable conceptual framing for both theory and practice, helping to better understand the longer-term implications of mega water-development projects as they evolve over time. Such engagement is increasingly urgent as the legacies of mid-twentieth-century mega water-development projects become intertwined with the effects and politics of climate change, both in Sri Lanka and elsewhere.

## 7. Conclusion

It is widely recognised that the effects of mega water-development projects are socio-environmentally uneven (Duarte-Abadia et al., 2015, Huber, 2019, Käkönen and Nygren, 2022). It is also well documented that, over time, water-infrastructure projects often deviate from initial plans and designs as they intersect with the socio-political realities on the ground (Leonardelli et al., 2022, Kemerink-Seyoum et al., 2019, Chitata et al., 2021). In this paper, we contribute new theoretical and empirical insights to critical water governance literature concerned with the socio-material and political temporalities of large-scale water-development projects (Hommes and Boelens, 2018, Rusca et al., 2019, Lord et al., 2020, Drapier et al., 2024, Birkenholtz, 2023). Through a critical analysis of the afterlives of Sri Lanka's MDP, we challenge conventional water-development rationalities that centre on plannable 'project phases' with distinct start and end points. Instead, our analysis reveals the significant ways in which the afterlives of mega water-development projects overflow official life-cycles and timelines, continuing to evolve and unevenly shape present-day socio-ecological relations and political dynamics long after their completion.

This study responds to calls for critical examination of the long-term

impacts of large-scale water-infrastructure projects (Lord et al., 2020), specifically focusing on the enduring influence of the MDP on contemporary socio-ecological relations and environmental politics in Sri Lanka. Our analysis reveals two main dimensions of the MDP's afterlives. First, we show that land restrictions imposed by the MDP have led to socio-ecological consequences, causing land encroachments and escalating human-elephant conflicts, jeopardising both the project's functionality and the livelihoods of affected farmers. Second, we trace the political-institutional afterlives of the MDP, highlighting key moments such as the creation of the Ministry of Mahaweli Development in 1978, its subsequent merger with the Ministry of Environment in 2015, and its continued influence across climate change governance in Sri Lanka. This evolution expands the MDP's political influence, emphasising the ongoing socio-ecological and political-institutional context that shapes current and future water-development-climate change interventions in Sri Lanka.

Our investigation into the afterlives of the MDP is timely and we contend that further analyses of the living legacies of other mega water-development projects are urgently required. On one hand, a new wave of (increasingly privatised) large-scale water-infrastructure projects have emerged in recent years, positioned as an important source of clean energy and water security in response to worsening climate change (Käkönen and Nygren, 2022, Hommes et al., 2016, Crow-Miller et al., 2017). Revealing the afterlives of earlier mega water-development projects may provide important new empirical grounds for challenging the discursive foundations of the emerging wave of new large-scale water-projects. On the other hand, the ageing infrastructure of many mid-twentieth century mega water-development projects (including the MDP) have resulted in ongoing discussions regarding their futures, including the possibilities of infrastructural removal (Hommes, 2022, Drapier et al., 2024). However, as we have demonstrated, the lives and afterlives of mega water-development projects do not simply conclude at a pre-determined endpoint and thereon remain suspended in time; rather, they continue to evolve, expand and take new shape over time.

As concerns over climate change grow, we call for further engagement with the afterlives of mega water-development projects to better understand how and with what effects they become entangled with climate change and planned responses. Drawing attention to the afterlives helps to historicise contemporary socio-ecological contexts, revealing the historical underpinnings of present concerns, such as the experiences of livelihood vulnerability that we outline in Section 6. Furthermore, we argue that by revealing how the past permeates the present, greater attention to the afterlives of mega water-development projects can help to identify possibilities for influencing how the past shapes the future (Randle and Barnes, 2018, Drapier et al., 2024). Doing so, we argue, is crucial for confronting the continued injustices of mega water-development projects that risk being compounded and reproduced under climate change.

## CRediT authorship contribution statement

**Harry M. Quealy:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptulization. **Kavindra Paranage:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Conceptualization.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Data availability

Data will be made available on request.

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