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ARTICLE

Law, Colonial-Capitalist Floods, and the Production of Injustices in Eastern India: Insights for Climate Adaptation

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Abstract

Floods are not merely 'natural' disasters; rather, they emerge as socio-natural phenomena shaped by political, social, and economic processes. Law plays a pivotal role in producing and sustaining these processes and contributes to the creation of unjust environments. Drawing on political ecology and environmental history, this article analyzes the role of law and its interactions with colonialism and capitalism in the Damodar river valley in Eastern India. The Damodar river valley is an intensely engineered and hazardous region, a site of multiple interventions and developmental and ecological experiments for over a century. Colonial and post-colonial legacies have left a lasting imprint on legal, policy, and institutional frameworks, establishing a path-dependent trajectory for addressing future climate change adaptation challenges. While focusing on a specific case study, the article's approach and findings have broader significance, especially in the context of climate adaptation. The central argument underscores the need to understand the political and legal dimensions of flooding, and reinforces the need for a shift beyond incremental adjustments that do not tackle the underlying structures that produce the injustices associated with floods. It highlights the importance of 'transformative adaptation' approaches that address the root causes of climate-related disasters, such as restructuring power relations between actors, reconfiguring governance structures, and scrutinizing ideologies that mediate how water is used and distributed.

Keywords: Colonialism; Political ecology; Water grabbing; Climate adaptation; Environmental justice; Damodar river

1. Introduction

In Eastern India, floods are regular occurrences, which bring untold destruction, death, and misery. In 2020, 170,000 people were affected by floods in West Bengal, resulting in 151 deaths.[1] Paradoxically, the very same region also contends with recurring droughts and chronic water shortages throughout the year. Communities oscillate

[1] Scroll Staff, 'Floods Affect Lakhs in West Bengal, Assam, Bihar; CMs Take Stock of Relief Measures', *Scroll In*, 22 July 2020, available at: https://scroll.in/latest/968230/floods-affect-lakhs-in-west-bengal-assam-bihar-cms-take-stock-of-relief-measures.

between 'too much water' and 'too little water'. Climate change exacerbates this situation, with more extreme weather patterns across the subcontinent intensifying concerns amidst India's mounting water crisis.[2]

However, not all floods are created equal in terms of their effects and origins. Economic, legal, political, and ecological processes drive the unjust configurations that determine how disasters are felt, such that some are far more badly affected than others. This is why, in recent years, the role of dams, embankments, and various government bureaucracies have been scrutinized after devastating floods.[3] In this article I argue that law plays a central role in 'producing' such environmental injustices. Drawing on an interdisciplinary understanding of floods, I aim to reveal how law interacts with other processes, especially the ideologies and economic imperatives of colonialism and capitalism, in generating and perpetuating these injustices.

To make this argument, I build on literature from critical political ecology, human geography, and environmental history. Studies within these fields highlight that environmental change – whether through floods, droughts, climate change or resource conflicts – is an intensely political, social, and legal affair. Floods were long understood as ahistorical natural disasters (in other words, simply a consequence of excessive rain). Recent scholarship, however, argues that they are actually a complex socio-natural phenomenon produced from processes of colonialism, capitalism, ecological changes, and communities' livelihood strategies.[4] Political ecologist Danny Marks writes that the uneven way in which floods are experienced by individuals are 'largely due to a combination of socio-economic processes' and actions by powerful actors to protect the lives and interests of the elite, while failing to protect marginalized groups or even increasing the latter's vulnerability.[5] Floods are thus a product of colonialism, unequal power relations, and economic and development decisions as much as they are of material flows of water, hydrology, ecology, and climate change (broadly, 'more rain').[6]

I employ the 'hydro-social' cycle as an analytical framework to underscore the intricate interdependence of water and society. A vast range of scholarship has worked towards making these 'hybrid' processes and entanglements legible.[7] Law plays a crucial role within any hydro-social cycle, permitting certain activities, mediating

[2] J. Srinivasan, 'Impacts of Climate Change on India', in N.K. Dubash (ed.), *India in a Warming World: Integrating Climate Change and Development* (Oxford University Press, 2019), pp. 31–44.

[3] V. Padmanabhan, 'Kerala Floods Highlight India's Poor Dam Management', *Livemint*, 21 Aug. 2018, available at: https://www.livemint.com/Politics/oSkzuw37GHm9u0UvbD0C5H/Kerala-floods-highlight-Indias-poor-dam-management.html.

[4] R. D'Souza, 'Event, Process and Pulse: Resituating Floods in Environmental Histories of South Asia' (2020) 26(1) *Environment and History*, pp. 31–49.

[5] D. Marks, 'Assembling the 2011 Thailand Floods: Protecting Farmers and Inundating High-Value Industrial Estates in a Fragmented Hydro-Social Territory' (2019) 68 *Political Geography*, pp. 66–76, at 66.

[6] A. Wesselink, M. Kooy & J. Warner, 'Socio-Hydrology and Hydrosocial Analysis: Toward Dialogues across Disciplines' (2017) 4(2) *WIREs Water*, pp. 1–14, at 6.

[7] See, e.g., C. Butsch et al., 'Changing Hydrosocial Cycles in Periurban India' (2021) 10(3) *Land*, article 263; R.A. McDonnell, 'Circulations and Transformations of Energy and Water in Abu Dhabi's Hydrosocial Cycle' (2014) 57 *Geoforum*, pp. 225–33; J. Budds, 'Whose Scarcity? The Hydrosocial Cycle and the Changing Waterscape of La Ligua River Basin, Chile', in M.K. Goodman, M.T. Boykoff & K.T. Evered (eds), *Contentious Geographies: Environment, Meaning, Scale* (Ashgate, 2008), pp. 59–68.

relationships, and institutionalizing governance systems. Legal processes, enmeshed with economic, political, and ecological processes, embed ideas and knowledge systems that can drive investment, steer technological and governance decisions, and contribute to the production of hydro-social environments.

In the contemporary legal and policy context, floods are increasingly analyzed through the lens of climate change adaptation. The Paris Agreement marked a milestone by establishing a global goal on adaptation, prompting countries to develop domestic frameworks for its implementation.[8] Although many nations have enacted climate adaptation laws and policies, they often entail incremental adjustments rather than the transformative shifts increasingly recognized to be necessary.[9] Legal scholarship on climate adaptation is still in its early stages, however, with recent work underscoring the importance of incorporating an environmental justice perspective and approaching adaptation and law through a transformational lens.[10] Traditionally viewed as a local issue requiring local action, climate change adaptation has also seen a shift towards transnational perspectives. Today, non-governmental organizations (NGOs), research institutions, businesses, subnational governments, and intergovernmental organizations (IGOs) engage in cross-boundary adaptation initiatives.[11] The transnational dissemination of ideas and knowledge – particularly in developing standards, policies, and legislation – has led some scholars to proclaim a new era in which climate adaptation is governed globally.[12]

Against this backdrop, the 'local' case study of this article carries broader implications. A central argument I present revolves around how specific perspectives on the interplay between water, land, and society have driven technological approaches aimed at 'controlling' rivers and 'managing' floods. I demonstrate how environmental injustices in India's Damodar river valley result from a complex interplay of social and natural processes shaped by law and governance. Considering the escalating risk of climate-related floods, the article provides valuable lessons for the development of climate adaptation law and policy, both locally and globally. Achieving transformative climate adaptation demands a critical examination of the root causes of climate-related disasters, and requires going beyond incremental technical and managerial adjustments.

[8] Paris (France), 12 Dec. 2015, in force 4 Nov. 2016, Art. 7(1), available at: http://unfccc.int/paris_agreement/items/9485.php.

[9] J. McDonald & P.C. McCormack, 'Rethinking the Role of Law in Adapting to Climate Change' (2021) 12(5) *WIREs Climate Change*, article e726.

[10] J. Wenta, J. McDonald & J.S. McGee, 'Enhancing Resilience and Justice in Climate Adaptation Laws' (2019) 8(1) *Transnational Environmental Law*, pp. 89–118; McDonald & McCormack, n. 9 above.; C. Clark & P. Mitchell, 'Avoiding Climate Apartheid: Climate Justice as a Necessary Condition for Equitable Transformational Adaptation', in R.C. Brears (ed.), *The Palgrave Handbook of Climate Resilient Societies* (Springer, 2021), pp. 1423–46; B. Ohdedar, 'Climate Adaptation, Vulnerability and Rights-Based Litigation: Broadening the Scope of Climate Litigation Using Political Ecology' (2022) 13(1) *Journal of Human Rights and the Environment*, pp. 137–56.

[11] A. Dzebo, 'Effective Governance of Transnational Adaptation Initiatives' (2019) 19(4–5) *International Environmental Agreements: Politics, Law and Economics*, pp. 447–66; J. Setzer et al., 'Transnationalization of Climate Adaptation by Regional Governments and the Regions Adapt Initiative' (2020) 3 *Global Sustainability*, p. e10.

[12] A. Dzebo & J. Stripple, 'Transnational Adaptation Governance: An Emerging Fourth Era of Adaptation' (2015) 35 *Global Environmental Change*, pp. 423–35.

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The remainder of the article is structured as follows. Section 2 introduces the conceptual framework of the hydro-social cycle, which aims to understand the processes behind the production and sustaining of environmental injustices. Section 3 then applies this framework to the Damodar river. Firstly, it explores how the root causes of contemporary floods can be traced back to colonial flood control and land-related laws and policies. It argues that these laws promoted a narrow view of water and land as separate entities. Moving to the present, subsection 3.2 demonstrates how water conflicts and injustices are driven by the operation of law within the broader context of capitalism and governance disputes among state parties. It emphasizes that colonial-era law and its ideologies persist in perpetuating these disparities, especially through the continued prevalence of technocratic solutions. Finally, in Section 4 the discussion shifts to how the analysis provides valuable lessons for contemporary flood governance, focusing on climate adaptation and law.

2. Environmental (In)justice, Law, and Colonialism

Environmental justice scholarship has been pivotal in revealing how environmental hazards affect communities and regions unevenly.[13] This article focuses on the processes that produce and maintain patterns of environmental injustice. Gareth Walker outlines a comprehensive framework in this regard, outlining three key components that feature in claims for environmental justice.[14] The first component involves normative claims that articulate theories of justice, outlining the desired state of affairs or '*how things ought to be*'. The second component involves evidentiary claims that demonstrate instances of injustice, such as statistical evidence of water inequality or pollution distribution, or '*how things are*'. The third component involves process-related claims that provide explanations for *why* patterns of injustice persist and how they are generated – in other words, '*why things are how they are*'. Building upon Walker's three-pronged approach, this article specifically directs its attention towards the third aspect, or '*why things are how they are*'. To do so, I draw on critical insights derived from political ecology scholarship, which provides a valuable analytical framework for comprehending the different intersecting processes that sustain environmental injustices. The next subsection introduces the hydro-social framework, and subsections 2.2 and 2.3 explain the role of law, colonialism, and post-colonialism.

2.1. Analyzing Environmental Injustice through the Hydro-Social Framework

As Paul Robbins notes, 'political ecology stories are stories of justice and injustice'.[15] Although there are many commonalities between political ecology and environmental

[13] On environmental justice generally see R.R. Kuehn, 'A Taxonomy of Environmental Justice' (2000) 30 *Environmental Law Reporter*, pp. 10681–703; S.A. Atapattu, 'Justice for Small Island Nations: Intersections of Equity, Human Rights, and Environmental Justice', in R. Abate (ed.), *Climate Justice: Case Studies in Global and Regional Governance Challenges* (Environmental Law Institute, 2016), pp. 299–322.

[14] G. Walker, *Environmental Justice: Concepts, Evidence and Politics* (Routledge, 2012), pp. 42–5.

[15] P. Robbins, *Political Ecology: A Critical Introduction* (Wiley Blackwell, 3rd edn, 2019), p. 88.

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justice scholarship, the former places stronger emphasis on theory and power relations.[16] It delves into the processes that generate and sustain inequalities.[17] Political ecologists challenge naturalized explanations of environmental events – such as floods, which are often attributed solely to excessive or inadequate rainfall. Accordingly, integrating political ecology into environmental justice discourse provides a deeper understanding of the power dynamics and structural factors that contribute to environmental injustice.

One particularly useful concept in the context of floods is that of the 'hydro-social' cycle. The hydro-social cycle, in contrast to the hydrological cycle, recognizes the intertwined relationship between water and society, and emphasizes that our interactions with water are both social and natural.[18] Water, flowing through various pathways such as rivers, landscapes, and engineered systems, sees its distribution influenced by social, political, and technological processes.[19] As Erik Swyngedouw describes, 'hardly any river basin, hydrological cycle, or water flow has not been subjected to some form of human intervention or use; not a single form of social change can be understood without simultaneously addressing and understanding the transformations of and in the hydrological process'.[20]

This interconnectedness is evident in recent conflicts related to water, which often arise not between nations but rather among different users and uses of water. Conflicts over water resources involve various stakeholders with diverse interests, which include industrial, drinking, agricultural, recreational, and ecological uses, as well as rural, urban, and peri-urban users. These conflicts create winners and losers, exposing disparities in access and control. For example, during the Cape Town' water crisis of 2018, it was evident that affluent households retained access to water for activities like filling pools and maintaining golf courses, while others faced severe shortages for most basic needs.[21] Similarly, in India, during droughts wealthier landowners with greater water access often profit by selling water to marginalized and landless communities.[22] The hydro-social framework provides an analytical lens to examine these events, and draws attention to the political, technological, and material dynamics that interact to produce such inequalities. In doing so, it also

[16] H. Svarstad & T.A. Benjaminsen, 'Reading Radical Environmental Justice through a Political Ecology Lens' (2020) 108 *Geoforum*, pp. 1–11.

[17] E. Swyngedouw & N.C. Heynen, 'Urban Political Ecology, Justice and the Politics of Scale' (2003) 35(5) *Antipode*, pp. 898–918; Svarstad & Benjaminsen, n. 16 above.

[18] J. Linton & J. Budds, 'The Hydrosocial Cycle: Defining and Mobilizing a Relational-Dialectical Approach to Water' (2014) 57 *Geoforum*, pp. 170–80; R. Boelens et al., 'Hydrosocial Territories: A Political Ecology Perspective' (2016) 41(1) *Water International*, pp. 1–14.

[19] E. Swyngedouw, 'Modernity and Hybridity: Nature, Regeneracionismo, and the Production of the Spanish Waterscape, 1890–1930' (1999) 89(3) *Annals of the Association of American Geographers*, pp. 443–65, at 446.

[20] Ibid., p. 444.

[21] E. Savelli et al., 'Urban Water Crises Driven by Elites' Unsustainable Consumption' (2023) 6 *Nature Sustainability*, pp. 929–34.

[22] M. Taylor, *The Political Ecology of Climate Change Adaptation: Livelihoods, Agrarian Change and Conflicts of Development* (Routledge 2014), pp. 143–65.

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challenges the depoliticization of water, environmental, and disaster issues.[23] Depoliticization is frequently employed by elite actors to promote managerial and technocratic solutions for environmental challenges that reinforce existing power relations.[24] Framing these issues as purely natural phenomena, attributed solely to 'more' or 'less' rain, masks their inherently political, economic, and historically contingent nature.

2.2. Law and the Hydro-Social Cycle

Law critically shapes the production of the hydro-social cycle.[25] Legal frameworks empower certain actors, demarcate certain spaces, produce boundaries, and permit certain activities, all of which produce the environments in which we live. The law, through permitting or restricting activities like water extraction and land use, can create uneven landscapes. It delineates the political boundaries of water politics, determining who holds power to organize, distribute, and manage water. The way in which law functions can also be influenced and challenged by the properties of water, soil, climate, and the environment. For example, property laws that assume a clear separation between land and water are called into question where landscapes are constantly changing, as is the case with many rivers subject to seasonal fluctuations.[26] Floods can further disrupt the division between land and water, shifting property boundaries and creating or destroying land in river channels.[27] Law not only plays a pivotal role in driving environmental injustices, but also serves as a system through which justice claims are articulated.[28] Understanding this dual role of law is crucial for grasping the interplay between environmental justice and the hydro-social cycle. In the following, I explore the role of law, its interactions with social, economic, and political processes, and its impact on the uneven hydro-social cycle in the Damodar region. By scrutinizing how law shapes the distribution and management of water resources, we can gain a better understanding of the environmental injustices occurring in the region and advocate reforms to establish a different set of 'hydro-social' relations.

2.3. Continuities and Discontinuities: Post-Colonial Legal Systems

An important theme of this article is the relationship between colonialism, post-colonialism, capitalism, and the law. I argue that these different processes influence and interact with the material environment, shaping the operation of the law and driving injustices across the hydro-social cycle in the Damodar. Scholars

[23] M. Zwarteveen & R. Boelens, 'Defining, Researching and Struggling for Water Justice: Some Conceptual Building Blocks for Research and Action' (2014) 39(2) *Water International*, pp. 143–58, at 149.

[24] A.J. Nightingale et al., 'Beyond Technical Fixes: Climate Solutions and the Great Derangement' (2020) 12(4) *Climate and Development*, pp. 343–52.

[25] K. Meehan et al., *Water: A Critical Introduction* (Wiley, 2023), pp. 48–70.

[26] J.W. Donaldson, 'Paradox of the Moving Boundary: Legal Heredity of River Accretion and Avulsion' (2011) 4(2) *Water Alternatives*, pp. 155–70; D. Bhattacharyya, 'Discipline and Drain: Settling the Moving Bengal Delta' (2018) 11(2) *Global Environment*, pp. 236–57.

[27] Bhattacharyya, n. 26 above, pp. 254–5; K. Lahiri-Dutt, 'Beyond the Water-Land Binary in Geography: Water/Lands of Bengal Re-Visioning Hybridity' (2014) 13(3) *ACME*, pp. 505–29.

[28] Wenta, McDonald & McGee, n. 10 above.

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have repeatedly highlighted how colonialism and capitalism are integral to understanding the present ecological and climate crisis.[29] Geographers and social scientists argue that environmental vulnerabilities, such as flooding or drought, are products of the uneven geographies created by the legacies of 'development'.[30] Environmental law scholarship has similarly emphasized these linkages.[31] However, there is much more to be done in drawing out the specificities of these linkages. Colonial and capitalist effects cannot be analyzed in the abstract, but only as they unravel in the post-colonial global south, which faces the brunt of the climatic crisis.

The colonial legal system dealing with the environment and natural resources was based on the centralization of power and control. For instance, in India, colonial land laws that rely on the concept of eminent domain allowed the sovereign to take property for 'public use' and served as a central mechanism of expropriation.[32] With regard to water, centralization in the control over surface water by the state, through legislation, was integral to colonial expansion.[33] Colonial water laws, whether in India or elsewhere, led to widespread dispossession of existing water uses.[34] Colonial rule redirected the economy towards markets and commodity production, shaping natural resource-related laws accordingly. A top-down governance system based on 'subjecthood' rather than 'citizenship' was designed, and colonized people had scant opportunities to participate in decisions or assert rights.[35]

India's legal system, like that of many other post-colonial states, continues to be shaped by these legacies. As Baxi puts it, 'postcolonial law registers *breaks* as well as

[29] See, e.g., A. Ghosh, *The Nutmeg's Curse: Parables for a Planet in Crisis* (John Murray, 2023); A. Malm, *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming* (Verso, 2016); J.W. Moore, *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism* (PM Press, 2016).

[30] C. Amoako & E. Frimpong Boamah, 'Becoming Vulnerable to Flooding: An Urban Assemblage View of Flooding in an African City' (2020) 21(3) *Planning Theory & Practice*, pp. 371–91; F. Edward, 'Planned Vulnerabilities? Street Flooding and Drainage Infrastructure in Colonial Dar es Salaam' (2022) 16(1) *HoST – Journal of History of Science and Technology*, pp. 29–47; M. Pelling, 'The Political Ecology of Flood Hazard in Urban Guyana' (1999) 30 *Geoforum*, pp. 249–61.

[31] A number of authors have written on the linkages between colonialism, capitalism, and environmental law; see, e.g., U. Natarajan & K. Khoday, 'Locating Nature: Making and Unmaking International Law', in U. Natarajan & J. Dehm (eds), *Location Nature: Making and Unmaking International Law* (Cambridge University Press, 2022), pp. 21–44; J. Dehm, 'Carbon Colonialism or Climate Justice? Interrogating the International Climate Regime from a TWAIL Perspective' (2016) 33(3) *Windsor Yearbook of Access to Justice*, pp. 129–62; C.G. Gonzalez, 'Bridging the North-South Divide: International Environmental Law in the Anthropocene' (2015) 32(2) *Pace Environmental Law Review*, pp. 407–33; A.P. Kameri-Mbote & P. Cullet, 'Law, Colonialism and Environmental Management in Africa' (1997) 6(1) *Review of European Community & International Environmental Law*, pp. 23–31. More recently, Emily Webster has argued that transnational environmental law scholarship needs to be more attentive to power and the legacies of colonialism: E. Webster, 'Regulating Humanity's Impact on the Earth: The Promise of Transnational Environmental Law' (2022) 13(S3) *Global Policy*, pp. 38–48.

[32] N. Sundar, 'The Rule of Law and Citizenship in Central India: Post-Colonial Dilemmas' (2011) 15(3–4) *Citizenship Studies*, pp. 419–32.

[33] P. Cullet & J. Gupta, 'India: Evolution of Water Law and Policy', in J.W. Dellapenna & J. Gupta (eds), *The Evolution of the Law and Politics of Water* (Springer, 2009), pp. 157–73.

[34] B. van Koppen et al., 'Roman Water Law in Rural Africa: The Unfinished Business of Colonial Dispossession' (2014) 39(1) *Water International*, pp. 49–62.

[35] Sundar, n. 32 above.

continuities'.[36] In many post-colonial states, upon independence the collaboration between elites and the government led to a kind of 'internal colonization', marginalizing rural workers and Indigenous groups.[37] In India, significant steps towards decolonization, like meaningful land reforms, were abandoned after the country gained independence.[38] The Indian bourgeoisie partnered with the new government for a mutually beneficial, state-driven infrastructure development approach.[39] Similar to other post-colonial nations, India also embraced market-oriented neoliberal reforms in the 1990s, resulting in resource exploitation and displacement in the name of progress. The use of colonial-era laws, for instance, in relation to land, forestry, and water, played a key role in this appropriation.[40] Thus, the legacies of colonial law continued to serve neoliberal capitalist expansion.

Finally, the influence of transnational practices, policies, and legal frameworks is pivotal in the post-colonial era. Following independence, the immediate pursuit of technology-driven water initiatives, such as hydropower, triggered a transformation in river governance, shifting towards centralization and utilization. The influence of American and Soviet hydropower practices, along with the expertise of their engineers, planners, and technocrats, directly shaped these changes.[41] Consequently, legal reforms were patterned after these established systems. During the neoliberal era, a significant transformation manifested in the gradual commodification of various aspects of society. Notably, the impact of transnational institutions and policies played a key role in reforms of the electricity and water sectors during the 1990s.[42] As the next section will illustrate, these factors are critical for the shaping of the hydro-social environment in the Damodar.

3. Floods in the Damodar: (Post-)Colonialism and Law

Floods in the Damodar have become a regular occurrence, leaving devastation, claiming lives and disrupting livelihoods. In July 2017, hundreds of villages in West

[36] U. Baxi, 'Postcolonial Legality', in H. Schwarz & S. Ray (eds), *A Companion to Postcolonial Studies*, (Blackwell, 2007), pp. 540–55, at 543 (emphasis in original).

[37] P. Calvert, 'Internal Colonisation, Development and Environment' (2001) 22(1) *Third World Quarterly*, pp. 51–63.

[38] T. Amin-Khan, *The Post-Colonial State in the Era of Capitalist Globalization: Historical, Political and Theoretical Approaches to State Formation* (Routledge, 2013), p. 137; K.L.M. Walker, 'Neoliberalism on the Ground in Rural India: Predatory Growth, Agrarian Crisis, Internal Colonization, and the Intensification of Class Struggle' (2008) 35(4) *Journal of Peasant Studies*, pp. 557–620, at 566.

[39] Amin-Khan, n. 38 above, p. 138.

[40] P. Sampat, 'Limits to Absolute Power: Eminent Domain and the Right to Land in India' (2013) 48(19) *Economic & Political Weekly*, pp. 40–52; A. Roy, 'From Colonial to Neoliberal Regime: Understanding the Paradigms of Land Dispossession in India' (2023) 11(1) *Journal of Land and Rural Studies*, pp. 28–51.

[41] D. Klingensmith, *'One Valley and a Thousand': Dams, Nationalism, and Development* (Oxford University Press, 2007), p. 109–55.

[42] X. Yichong, 'The Myth of the Single Solution: Electricity Reforms and the World Bank' (2006) 31(6–7) *Energy*, pp. 802–14; A. Oletta, 'The Role of the World Bank in Water Law Reforms', in P. Cullet et al. (eds), *Water Law for the Twenty-First Century: National and International Aspects of Water Law Reform in India*, (Routledge, 2010), pp. 81–106.

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Bengal were flooded, resulting in many deaths and affecting 2 million people.[43] Over 45,000 people sought temporary relief in flood camps, facing dire challenges in accessing safe water, sanitation, and healthcare. The floods devastated the region's farm economy, leaving fields submerged for weeks, fish rotting, and farmers drowning in debt.[44] Daily wage workers suffered, and the state's supply chains and livelihoods were disrupted. Rather than tackling the root causes of such recurring floods, authorities engage in a political blame game that obscures the underlying environmental injustices.[45] The floods in this region are no anomaly. Every few years, communities endure large-scale floods, driven by a combination of excess rainfall, climate change, and the release of water by the Damodar Valley Corporation (DVC). While these floods are a catastrophe for human life and livelihoods, and are particularly acute with ongoing climatic changes, the 'catastrophic' element of the floods is in many ways a disaster by design. The manipulation of the river's flow, influenced by particular interests and policies, exacerbates the impacts on vulnerable communities.

This section explores the historical and legislative foundations of the Damodar river and the intricate dynamics between water, society, law, and power. It delves into how colonial origins shaped the region and the post-independence dominance of the DVC. Analyzing the Damodar's hydro-social cycle, including relevant laws and policies, brings attention to the root causes of injustice patterns. Transitioning to the present, the latter half of this section illustrates how law, along with political, social, and environmental processes, sustains environmental injustices. The Damodar Valley Corporation Act 1948 (DVC Act), and broader energy policies are analyzed for their role in redirecting water towards profitable ends, with an impact on flood intensity and water availability for local communities.[46]

3.1. Damodar's Hydro-Social Dynamics: Colonial Legacies, Legislation, and Flood Challenges

The intricate connection between the river, water, and society, as David Mosse puts it, is a 'historical, sociological, and regional problem as any that can be imagined'.[47] Colonial relations embedded by the law played a pivotal role in reshaping the

[43] News reports gave varying figures for the number of deaths: from 16 to 150 people; see, e.g., Express News Service, '16 Dead, 20 Lakh Affected in 165 Villages', *The Indian Express*, 28 July 2017, available at: https://indianexpress.com/article/cities/kolkata/16-dead-20-lakh-affected-in-165-villages-4770559; G. Chatterjee, 'Narendra Modi's "India First" Policy is Mere Talk, Centre Overlooking West Bengal in Flood Relief is Proof', *FirstPost*, 5 Sept. 2017, available at: https://www.firstpost.com/india/narendra-modis-india-first-policy-is-mere-talk-centre-overlooked-west-bengal-in-flood-relief-4007763.html.

[44] A.R. Ghatak, 'India's Floods Expose Poor Countries' Total Vulnerability to Climate Change', *Climate Change News*, 1 Sept. 2017, available at: https://www.climatechangenews.com/2017/09/01/indias-floods-expose-total-vulnerability-climate-change.

[45] Chatterjee, n. 43 above; Scroll Staff, 'Mamata Banerjee Blames West Bengal Floods on Centre-Run Damodar Valley Corporation', *Scroll In*, 27 June 2017, available at: https://scroll.in/latest/845268/mamata-banerjee-blames-west-bengal-floods-on-centre-run-damodar-valley-corporation.

[46] Damodar Valley Corporation (DVC) Act, 1948 (Act No. XIV of 1948) available at: https://www.indiacode.nic.in/bitstream/123456789/1807/1/194814.pdf.

[47] D. Mosse, *The Rule of Water: Statecraft, Ecology, and Collective Action in South India* (Oxford University Press, 2003).

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environment for resource extraction and profit. The drivers of floods and injustices across the Damodar region can be traced back to historical events and decisions during both the colonial and post-colonial eras. During colonial times, the British aimed to grow high-value crops for export from their colonies. This required the conversion of peasant farms, which were primarily producing crops for local consumption, into irrigated tracts for mass production.[48] To manage the conversion, the colonial rulers introduced Permanent Settlement Regulations, which initiated private land ownership and capitalist social relations in Eastern India.[49] Critical to this process was the separation of land from water so that the former could become a distinct unit capable of ownership and revenue extraction. By creating units of land that were privately owned, colonial-capitalist logics aimed to increase 'productive' land. Law and policy focused on the need for land to be stabilized and legible for individual private property ownership.[50] Relatedly, during colonial rule, land value was taxed rather than the value of exchanged crops. Taxing land would provide a steady revenue stream for the colonial government. In turn, it would also establish a class of landlord farmers who would be motivated to increase agricultural yield and value private property.[51]

Legislation thus entrenched the idea of 'permanent land'. This legal fiction can be contrasted with the material reality of the land in the area, which was more fluid and aqueous. Permanent land was an idea imported from English property law, based on a vastly different material geography.[52] In the late 19th century, a suite of legislation around water, embankments, and canals was passed, which still applies today. The Bengal Canals Act 1864, the Bengal Irrigation Act 1876, the Bengal Embankment Act 1882, and the Indian Easements Act 1882 all appear from the outside as mundane and, at times, bureaucratic legislation. However, they have had a significant impact on the daily lives of millions. These laws, as Debjani Bhattacharya asserts, effectively were a 'legal straight jacketing of the rich ecological world'.[53] They embedded a narrow view of how water and land were distinct and separate. Moreover, they transformed water into a source of bureaucratic state power, narrowed it into legible form as a distinct entity that could be used for productive irrigation work, and 'produced' the hydro-social environment of the Damodar today.

With the separation of land and water, the state gained a significant role in providing water for farmers via its water infrastructure. Scholars have termed this the 'hydraulic society', where a state bureaucracy controls water (and with that society) in an autocratic way.[54] As agricultural yield for mass production became reliant on the

[48] P. McCully, *Silenced Rivers: The Ecology and Politics of Large Dams* (Zed Books, 1996), p. 18.
[49] R. D'Souza, *Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India* (Oxford University Press, 2006), p. 53.
[50] N. Sinha, 'Law, Agro-Ecology and Colonialism in Mid-Gangetic India, 1770s–1910s', in G. Cederlöf & S. Das Gupta (eds), *Subjects, Citizens and Law: Colonial and Independent India* (Routledge, 2016).
[51] D. Hardiman, 'The Politics of Water in Colonial India' (2002) 25(2) *South Asia: Journal of South Asian Studies*, pp. 111–20.
[52] See, e.g, the Permanent Settlement Act 1793 and the Bengal Alluvion and Diluvion Act 1825.
[53] D. Bhattacharya, *Empire and Ecology in the Bengal Delta: The Making of Calcutta* (Cambridge University Press, 2018), p. 77.
[54] K.A. Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (Vintage Books, 1957).

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separation of water from land, it was vital to protect such land from being inundated by the river. The state worked to regulate, control, and build embankments, canals, and other water-related infrastructure, all of which became central to the operation of the colonial hydraulic project. These infrastructures were constructed and controlled via a centralized form of water governance. Moreover, boundaries, surveys, and land titling were legal techniques and methods used to categorize land as a stable entity under the law. This paved the way – or so the authorities hoped – for regular revenue collection.[55]

However, the physical hybridity of land and water in low-lying, riverine, and deltaic Bengal posed challenges for the colonial notion of a binary between water and land. The region's mobile landscape, characterized by shifting silt and swamps, differed significantly from the European riverine landscape, where dry land and rivers are stable.[56] As Bhattacharya puts it, colonial navigational charts and ship logs are 'replete with the horrors of the shifting and floating land-water admixture that greets one at the mouth of the Bay of Bengal'.[57] Colonial authorities were met with a river channel where the water rushed down in great force, bringing down water and sediments that flushed into the delta.

In the pre-colonial era, adaptive strategies employed included building low-lying embankments that deliberately blurred the lines between water and land, allowing water to enter and mix with the land, providing nutrients for the soil.[58] Such strategies were ways of 'coping with floods' rather than the colonial aim of 'taming' the river.[59] Other strategies, such as building houses on raised platforms and cultivating flood-tolerant crops, were additionally used.[60] The flood water was effectively used for growing food and crops while communities coped with seasonal hydraulic volatility, although agriculture was a secondary occupation to artisan and textile-based production.[61]

Despite the colonial authorities' best efforts to 'discipline' the river through canals and higher, more comprehensive embankment infrastructure – accompanied by laws, policies, and governance mechanisms – the floods continued. Indeed, a new phenomenon was that of floods as a disaster.[62] The embankments, albeit with varying success, created a dividing line between the river and the land. As water rushed down the Damodar, it was averted from its usual interactions with the land. The river was effectively 'straight-jacketed', and the embankments served to raise the riverbeds, clog up drainage, and enhance flood height.[63] Accordingly, the water became more

[55] C.V. Hill, 'Water and Power: Riparian Legislation and Agrarian Control in Colonial Bengal' (1990) 14(4) *Environmental History Review*, pp. 1–20; D'Souza, n. 4 above.
[56] Lahiri-Dutt, n. 27 above.
[57] Bhattacharyya, n. 26 above, p. 239.
[58] Lahiri-Dutt, n. 27 above, p. 516.
[59] K. Lahiri-Dutt, *State and the Community in Water Management Case of the Damodar Valley Corporation, India* (Institute for Global Environmental Strategies, 2006), p. 8.
[60] D'Souza, n. 49 above, p. 111.
[61] Lahiri-Dutt, n. 27 above, pp. 516–7.
[62] K. Lahiri-Dutt, 'Imagining Rivers' (2000) 35(27) *Economic & Political Weekly*, pp. 2395–7.
[63] K. Lahiri-Dutt & G. Samantha, *Dancing with the River: People and Life on the Chars of South Asia* (Yale University Press, 2013).

'ferocious', and when the embankment did breach, its impact was much worse. Embankments also created a perception of security from floods, which meant that their impacts were more severe when there was a breach. This legacy lives on in today's embankment infrastructure. Across South Asia, embankment breaches are starting to be seen as disasters by design.[64]

The colonial legislative framework had another important impact on the hydro-social configuration of the Damodar: it endowed the state and its bureaucracy with lasting authority over water-related decisions. Centralizing control over natural resources stood as a key function of colonialism. For example, the District Collector, serving as the chief revenue collector and administrative head in each district, acquired significant powers. The Collector's role encompassed a broad spectrum of responsibilities, ranging from overseeing embankment and canal construction to levying taxes on land and water charges. Ramesh Arora and Rajni Goyal characterized the Collector as the 'kingpin of the district administration in India', endowed with extraordinary powers crucial for British colonial rule over the vast subcontinent.[65] The Bengal Embankment Act and Irrigation Acts further consolidated the Collector's role in embankment construction, dispute resolution, and collection of water charges.[66] This historical legacy persists today, with the Collector, although now sharing power with elected officials and various technical departments, remaining a key figure in managing government affairs at the district level.[67] Additionally, legislation bestowed extensive powers upon bureaucrats and engineers of the Irrigation Department, granting them the authority to acquire land for embankments, control embankments and canals, and collect revenue from freshwater distribution.[68] Recent scholarship from the region has underscored the significant discretion held by Irrigation Department engineers in influencing the location and nature of (re)constructed flood-protection infrastructure.[69]

The hydro-social environment of the Damodar river was thus shaped by a complex interplay of colonial ideologies, legislative enactments, and the physical realities of the region's landscape. While colonial agendas of profit extraction and land transformation for high-value crops propelled the separation of land and water, the region's dynamic and shifting landscape contradicted these ideas. Despite the extensive efforts to control and regulate the river through embankments and governance mechanisms, the floods persisted, often exacerbated by the very interventions intended to mitigate them.

[64] EPW, 'Floods in Indian Rivers: Are Dams and Embankments the Solution or the Problem?', *EPW Engage*, 21 Feb. 2021, available at: https://www.epw.in/engage/article/floods-indian-rivers-are-dams-and-embankments. A. Acharya, 'Engineering a Season of Floods', *MintLounge*, 18 Nov. 2019, available at: https://lifestyle.livemint.com/news/talking-point/engineering-a-season-of-floods-111642574434035.html.

[65] R.K. Arora & R. Goyal, *Indian Public Administration: Institutions and Issues* (New Age International, 1995), p. 244.

[66] See, e.g., the powers of Collectors under ss. 7–10 Bengal Embankment Act 1882 and the powers of the state under ss. 8–10 and 13–15 Canals Act 1864.

[67] Arora & Goyal, n. 65 above, p. 246.

[68] See, e.g., s. 5 (taking land) and s. 7 (powers of the Collector) Bengal Embankment Act 1882; ss. 3–5 (taking land) and s. 8 (payment of tolls) Bengal Canals Act 1864.

[69] A. Mukhopadhyay, *Living with Disasters: Communities and Development in the Indian Sundarbans* (Cambridge University Press, 2016).

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3.2. Post-Independence and the Dominance of the DVC

Amidst this historical backdrop, the evolution of the hydro-social landscape of the Damodar river took a significant turn in 1943, only four years before India became an independent country. A catastrophic flood prompted an inquiry as well as a quest for a more comprehensive reform.[70] This inquiry intersected with the influence of transnational hydro-engineering practices, influenced particularly by United States (US) engineers in the 1940s. US hydro-governance was gaining influence after the development of the Tennessee Valley Authority, a 'multipurpose river development'.[71] The idea was to build a hydropower dam and again tame the 'wayward' river through technology; however, this time flood control would be combined with energy production and irrigation.[72] The focus in this post-independence period was on how to 'train' rivers, control flooding and devastation, and harness their waters for irrigation, power generation, and transportation.[73] With the influence of US technocrats and funding via the World Bank, a multipurpose river development was planned for the Damodar. The DVC Act was passed in 1948, constituting a statutory body, the DVC, which would operate the dam, control the river, and have broad powers over the lives of those in the region.[74]

The DVC Act created a new actor which would have an overarching role in decisions around the use, allocation, and conservation of water. It lists six functions for the DVC: flood control, power supply, irrigation, water supply management, soil conservation, and the promotion of public health and development.[75] Further, the DVC was equipped with the authority to construct and manage dams, barrages, reservoirs, canals, and several other hydraulic infrastructures.[76] Until today, it maintains the power to store and release water from its reservoirs, subject to certain regulatory restrictions.

The board of the DVC consists of representatives from central and state governments, technical experts, and bureaucrats.[77] Decisions around the release of water is made by a specific committee of the DVC, made up similarly of technical experts and bureaucrats.[78] There is very little oversight; nor does the DVC have a democratic mandate. For instance, the local authorities and village level assemblies, who are the primary actors at the local level, do not have a direct route to participate

[70] D'Souza, n. 49 above, p. 187.
[71] For a detailed history of how the Tennessee Valley Corporation influenced in the design and governance aspects of the dams in the Damodar, see Klingensmith, n. 41 above.
[72] A. Nandy, 'Dams and Dissent: India's First Modern Environmental Activist and His Critique of the DVC Project' (2001) 33(8–9) *Futures*, pp. 709–31, at 711.
[73] J.N. Sinha, 'Congress and Conservation: A Look at the NPC Reports' (2005) 40(1) *Indian Journal of History of Science*, pp. 55–80, at 64.
[74] DVC Act 1948.
[75] Ibid., s. 12.
[76] Ibid., s. 22(ii).
[77] DVC Amendment Act 2011, s. 2.
[78] The present composition can be found at India WRIS, 'Damodar Valley River Regulation Committee (DVRR)', 2012, available at: https://indiawris.gov.in/wiki/doku.php?id=damodar_valley_river_regulation_committee_dvrr.

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in decision making over the allocation and use of water in the Damodar.[79] In practice, the hydro-social relations of the Damodar are dominated by the decisions made by the DVC, which plays a crucial role in the release of water downstream. Consequently, opportunities for democratic engagement through local governance systems are subordinate to the decisions of the DVC.

While the scope for democratic participation may have been limited, the DVC's multipurpose vision, at least, had aimed for consideration of different uses, including energy, irrigation, domestic use, and conservation. However, this vision also became undone only a few years after its creation. A political tussle between the central government, the West Bengal state government and the DVC meant that the irrigation function was transferred to the West Bengal Irrigation and Waterways Department (WBID) by 1964.[80] The Damodar's reservoirs and hydropower dams straddle the border between two states, Jharkhand and West Bengal. Accordingly, after the division of responsibility, as the water courses downwards past the hydropower dams, it falls within the jurisdiction of the WBID and not the DVC.[81] Crucially, however, how much water the WBID has to allocate for irrigation (and how much is left for other uses) depends on the release of water by the DVC through the dams. Thus, the post-independence era has witnessed a transformation in the hydro-social landscape of the Damodar river, driven by the empowering of two state entities – the DVC and the WBID – both of which operate with a considerable amount of discretion over decisions around the river. However, each entity has conflicting priorities over the use of the river, which create significant consequences for communities living around the river.[82]

3.3. Hydro-Social Transformation: Unravelling the Multipurpose Vision and Unleashing Water-Grabbing Dynamics

Today, the DVC Act, as well as broader energy policies, incentivize the diversion of water towards profitable uses. This significantly influences flood intensity and water availability across different periods of the year. Amelie Huber and her co-authors' notion of 'capital-driven disasters', in their work on Himalayan rivers, provides a

[79] In India, a large amount of responsibility over water supply rests with local authorities in both rural and urban areas; see 73rd and 74th Amendments to the Constitution of India. For more on participatory water governance in India see P. Cullet, 'Water Regulation and Public Participation in the Indian Context', in M. Tignino & K. Sangbana (eds), *Public Participation and Water Resources Management: Where Do We Stand in International Law* (UNESCO, 2015), pp. 20–9, available at: https://unesdoc.unesco.org/ark:/48223/pf0000231631; B. Chakrabarti, *Participation at the Crossroads: Decentralisation and Water Politics in West Bengal* (Oriental Blackswan, 2016).

[80] R. Laporte Jr., 'Intergovernmental Change in India: Politics and Administration of the Damodar Valley Scheme' (1968) 8(9) *Asian Survey* 748–60.

[81] The enactment of the West Bengal Irrigation (Imposition of Water Rate for Damodar Valley Corporation) Act, 1958 (Damodar Irrigation Act) gives power to the state government to earn revenue from irrigation water.

[82] S. Choudhury, 'Damodar Valley Corporation, the Missed Opportunity' (2011) 3(2) *Journal of Infrastructural Development*, pp. 117–26. A similar point is made by Danny Marks, in examining the conflicting priorities of different state agencies in relation to floods and the production of uneven vulnerabilities in Bangkok: D. Marks, 'The Urban Political Ecology of the 2011 Floods in Bangkok: The Creation of Uneven Vulnerabilities' (2015) 88(3) *Pacific Affairs*, pp. 623–51.

valuable way of comprehending the dynamics in the Damodar, underscoring capitalism's active role in the emergence of hazard scenarios like floods.[83] It centres the logics of capital in decisions around regional development and the actions of various stakeholders. Similarly, the concept of 'water grabbing' is useful here to illustrate how powerful entities appropriate water resources for their advantage, in doing so affecting local communities and aquatic ecosystems, and driving environmental injustices.[84] The next two subsections thus uncover the interconnected causes of floods, water use, and scarcity, stemming from both capital-driven disasters and water grabbing.

The birth of the DVC gave rise to India's first-ever multipurpose river basin plan and transformed the socio-ecological make-up of the river basin once again. A key idea was to 'harness' the river's water for state-led energy production.[85] The development aspirations of the newly independent state were to provide adequate, regular, and cheap electricity to industries built around the river valley and its surrounding towns. However, there was tension between the need for water to increase revenue generation from energy production and the other functions of the DVC, such as flood control and conservation, given the vision of a 'multipurpose' development that balanced different aims and objectives. This tension is particularly acute today. In an era of liberalized energy markets, the search for profits has seen the DVC's energy production increase drastically.[86]

Once the responsibility around irrigation water, for downstream of the Damodar, was transferred to the West Bengal State government (via the WBID), the river became subject to the governance of distinct entities. Each of these entities has distinct responsibilities, interests, levels of influence, and authority. This transformation did not just entail a division of roles; it also meant that various departments now perceived water through distinct lenses, shaped by their specific mandates. This divergence in perspectives resulted in a narrowing of the broad vision of how water is and should be used, and of the various stakeholders and citizens who have an interest in using water. Specifically, the WBID focuses narrowly on maximizing utility for the irrigation needs of farmers, reducing the role of the river to a singular function.[87] Legal constructs play a pivotal role in this narrowing, as the irrigation regulations compelled the Irrigation Department towards the singular function of achieving maximum irrigation capacity through its initiatives and projects.[88]

[83] A. Huber et al., 'Beyond "Socially Constructed" Disasters: Re-politicizing the Debate on Large Dams through a Political Ecology of Risk' (2017) 28(3) *Capitalism Nature Socialism*, pp. 48–68.

[84] J. Franco, L. Mehta & G.J. Veldwisch, 'The Global Politics of Water Grabbing' (2013) 34(9) *Third World Quarterly*, pp. 1651–75; G.J. Veldwisch, J. Franco & L. Mehta, 'Water Grabbing: Practices of Contestation and Appropriation of Water Resources in the Context of Expanding Global Capital', in R. Boelens, T. Perreault & J. Vos (eds), *Water Justice* (Cambridge University Press, 2018), pp. 59–70.

[85] K. Lahiri-Dutt, 'Rebirth of a River' (2001) 36(14–15) *Economic & Political Weekly*, pp. 1181–3; D'Souza, n. 49 above.

[86] Choudhury, n. 82 above.

[87] Interview with Executive Engineer, WBID (Damodar Circle) (Bardhaman, West Bengal, 21 Mar. 2017).

[88] E.g., the West Bengal Irrigation (Imposition of Water Rate for Damodar Valley Corporation) Act 1958 was even narrower in many ways than the earlier colonial irrigation act which, at a minimum, had some recognition that ensured drinking water was not detrimentally affected by irrigation (Bengal Irrigation Act 1876, s. 12).

For the DVC, the multipurpose vision has been undermined by a focus on hydropower generation. Its other functions, including flood management, have slowly receded to a secondary role. Although six functions are mentioned in the DVC Act, there is no guidance on how to balance or prioritize each function. This shift is clear from how soon after the division of responsibility the DVC's capital expenditure disproportionately began to go into power generation.[89] A key reason for this was the increasing demand for and profitability of energy production. Over the past three decades, the expansion and evolution of electricity markets, propelled by broader neoliberal reforms, have fostered a climate that incentivizes the maximization of power generation.[90] Furthermore, the imperative to foster 'clean' and low-carbon energy sources as part of climate change mitigation efforts has revitalized the impetus for hydropower-based energy generation. The shift to a market-oriented economy in India during the 1990s ushered in significant reforms, spanning various sectors, including electricity and hydropower generation. The Electricity Act of 2003 mandates the formulation of tariff regulations to promote renewable energy sources, encompassing hydropower in its ambit.[91] Policies at the state and national levels, such as the Mega Power Policy, provide substantial incentives – including tax breaks, generous debt-equity ratios, and import duty exemptions – to facilitate hydropower.[92] Additionally, measures to streamline environmental and regulatory clearance processes were implemented to facilitate increased private sector participation.[93] The judiciary has also reinforced the pivotal role of harnessing water for energy generation.[94]

Within this context, the DVC operates to allocate water for its profitable thermal power plants. Under the DVC Act, there is nothing that compels the DVC to prioritize flood management or to release water through the year based on maintaining ecological flow.[95] While the 'multipurpose' vision remains on paper, economic processes of energy production have driven how the institution functions in practice. In its present vision the DVC sees itself as a 'mega-producer' and power distributor in Eastern India,

[89] K. Lahiri-Dutt, 'Negotiating Water Management in the Damodar Valley: Kalikata Hearing and the DVC', in K. Lahiri-Dutt & R.J. Wasson (eds), *Water First: Issues and Challenges for Nations and Communities in South Asia* (SAGE, 2008), pp. 316–49, at 343.

[90] The DVC continues to expand its ambition on power generation; see, e.g., PTI, 'DVC Registers "Highest" Power Generation at 43.32 bn Units in FY'23', *The Economic Times*, 3 Apr. 2023, available at: https://economictimes.indiatimes.com/industry/energy/power/dvc-registers-highest-power-generation-at-43-32-bn-units-in-fy23/articleshow/99188094.cms?from=mdr; and PTI, 'DVC Plans Capex of Rs 70,000 Crore by 2030 to Increase Power Generation Capacity', *The Economic Times*, 4 Aug. 2023, available at: https://economictimes.indiatimes.com/industry/energy/power/dvc-plans-capex-of-rs-70000-crore-by-2030-to-increase-power-generation-capacity/articleshow/102427994.cms?from=mdr.

[91] Electricity Act 2003, s. 61(h).

[92] S. Karambelkar, 'Hydropower Development in India: The Legal-Economic Design to Fuel Growth?' (2017) 57(2) *Natural Resources Journal*, pp. 361–94, at 371.

[93] Karambelkar, n. 92 above; A. Pal, 'Power Sector in India; Growth, Policies and Challenges' (2013) 3(3) *International Journal of Emerging Technology and Advanced Engineering*, pp. 527–36.

[94] See, e.g., *Narmada Bachao Andolan* v. *Union of India and Others* (2000) 10 SCC 664 (Supreme Court of India), in which social and environmental issues were overlooked partially, in the Court's reasoning, because of the 'clean, eco-friendly hydropower' the project would generate.

[95] While the DVC has its own internal guidelines, these are not available in the public domain.

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with its other responsibilities as secondary.[96] The World Bank concludes that the DVC has ended up as 'basically a power generation company with little responsibility for water management'.[97]

The impact of decisions around the timing and quantity of water releases is significant because the DVC has been blamed for aligning these decisions so as to enable more power generation.[98] In 2015, the South Asian Network on Dams, Rivers and People (SANDRP) found a 46% increase in power generation during the flood period.[99] As the speed of the flow of water is important for the production of hydropower, the SANDRP analysis suggests that the DVC increased the flow of water downstream (after initially holding back water), ostensibly generating more electricity. Inevitably, the DVC and the government of West Bengal were locked in disagreements and shifted the blame onto each other.[100] However, there is no obligation for the DVC to prioritize water in a particular way. As the government of West Bengal is limited in its ability to influence decisions on water releases, it can shift blame for any other shortcomings upon the DVC. Meanwhile, more flooding from extreme rainfall events in the context of hydro-climatic change is looming, raising the potential for future disasters.[101]

3.4. Downstream Water-Related Conflicts and Injustices

The DVC's utilization of water for energy production and its timing of water releases holds considerable implications for downstream water distribution and accessibility. These decisions heavily shape the hydro-social landscape of the region, further inciting conflicts among various stakeholders. 'Water grabbing' manifests in the region as a multifaceted challenge. Despite the region's relative water abundance, downstream water users, particularly small-scale farmers, endure prolonged periods of water scarcity, particularly when there is variable rainfall.[102]

[96] The DVC is currently the fourth largest thermal power utility company in India; see World Resources Institute (WRI), *Parched Power: Water Demands, Risks, and Opportunities for India's Power Sector* (WRI, 2018).

[97] World Bank, *India's Water Economy: Bracing for a Turbulent Future* (Oxford University Press, 2006).

[98] South Asia Network on Dams, Rivers and People (SANDRP), 'Damodar Valley Dams Role in W Bengal Floods: DVC Dams Could Have Helped Reduce the Floods, They Increased It', 5 Aug. 2015, available at: https://sandrp.in/2015/08/05/damodar-valley-dams-role-in-w-bengal-floods-dvc-dams-could-have-helped-reduce-the-floods-they-increased-it.

[99] SANDRP, ibid.

[100] HT Correspondents, 'Bengal Flood: Six Killed; Govt, DVC Squabble over Release of Water from Dams', *Hindustan Times*, 26 July 2017, available at: https://www.hindustantimes.com/india-news/bengal-flood-six-killed-govt-dvc-squabble-over-release-of-water-from-dams/story-bXHUExBuBb8XWwnGVqiZRM.html.

[101] S. Ghosh & B. Mistri, 'Geographic Concerns on Flood Climate and Flood Hydrology in Monsoon-Dominated Damodar River Basin, Eastern India' (2015) *Geography Journal*, article 486740; S. Ghosh, 'The Impact of the Damodar Valley Project on the Environmental Sustainability of the Lower Damodar Basin in West Bengal, Eastern India' (2014) 7(2) *OIDA International Journal of Sustainable Development*, pp. 47–54.

[102] G. Singh, 'Trouble in the Rice Bowl of Bengal', *Gaon Connection*, 11 Aug. 2022, available at: https://www.gaonconnection.com/lead-stories/bengal-rice-production-bardhman-farmers-rainfall-deficit-water-supply-irrigation-paddy-sowing-food-security-51132; Team MP, 'Scanty Rainfall in Few South Bengal Districts: Min Holds Meet To Take Stock of the Situation', *Millennium Post*, 24 July 2024,

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As a result of the division of responsibilities between the DVC and the Irrigation Department, and the different visions and ideas around the role of water, a cascading set of processes produces multiple injustices and inequalities. Firstly, as mentioned earlier, the DVC continues to manage water largely for its hydropower needs. As a result, during the dry period, whatever water exists is held back in reservoirs and the river flow is low. This reduces the amount of water available for farmers downstream during most of the year.[103] Secondly, the Irrigation Department, which controls water once it is released by the dams, has a limited vision outside water for irrigation use. Thirdly, because of the fluctuations of water from the releases by the DVC, farmers can fall short of water,[104] as a result of which they often have had to rely on groundwater.[105] Relatedly, impacts from other activities, such as industrial pollution and sand mining, have also had a significant effect on the hydro-social environment of the Damodar.[106]

These conflicts, injustices, and inequalities can also be seen in the drinking water situation. The neighbouring city of Asansol, a main city in the region, has been experiencing significant water shortages over the last ten years.[107] Mobile water tankers are the main source of water during summer, provided by the government or by private tanker owners. Rural areas also suffer greatly with drinking and domestic water availability.[108] As potable groundwater is low in this particular region, water from the river is a vital source of drinking water. Yet, the DVC has plans to expand its thermal power capacity, driven by the profit incentive, which will further exacerbate water scarcities downstream.[109] With less predictable and more extreme rainfall patterns, there will also continue to be conflict between various uses (such as drinking, domestic and industrial use in the cities).

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available at: https://www.millenniumpost.in/bengal/scanty-rainfall-in-few-south-bengal-dists-min-holds-meet-to-take-stock-of-the-situation-526815.

[103] Studies in this area demonstrate high seasonal fluctuations; see, e.g., Md. Hoque, A. Islam & S. Ghosh, 'Environmental Flow in the Context of Dams and Development with Special Reference to the Damodar Valley Project, India: A Review' (2022) 8(62) *Sustainable Water Management*, pp 1–27; Ghosh, n. 101 above.

[104] E.g., drinking water and agricultural water may have to compete with water that is released by the DVC; see, e.g., S. Chakraborty, 'Irrigation Crisis Seeks Solution in Pumps', *The Telegraph India*, 30 July 2022, available at: https://www.telegraphindia.com/west-bengal/irrigation-crisis-seeks-solution-in-pumps/cid/1877198.

[105] Ibid.

[106] Pollution has been an issue in the Damodar for a long time; see U. Shankar, 'Choking Slowly to Death', *Down to Earth*, 31 Jan. 1993, available at: http://www.downtoearth.org.in/coverage/choking-slowly-to-death-30582. Meanwhile, sand mining has increased significantly in the past decade, with significant ecological and social justice threats: M.S. Chatterjee, 'Bengal: People Fear Losing Homes, Farmland as Sand Mining Further Erodes Damodar River Banks', *NewsClick*, 18 Aug. 2023, available at: https://www.newsclick.in/bengal-people-fear-losing-homes-farmland-sand-mining-further-erodes-damodar-river-banks.

[107] 'জল সমসযায় জেরবার শিলাচল ('Asansol is Groaning under Water')', *Eisamay*, 1 May 2017, available at: https://eisamay.com/west-bengal-news/durgapur-news/-/articleshow/58457715.cms.

[108] N. Sarkar, 'In West Bengal's Coal Belt, Villagers are Struggling with Joblessness and Pollution', *Scroll In*, 30 Mar. 2022, available at: https://scroll.in/article/1020533/in-west-bengals-coal-belt-villagers-are-struggling-with-joblessness-and-pollution.

[109] 'Damodar Valley Corporation Looks to Expansion', *The Telegraph India*, 19 July 2022, available at: https://www.telegraphindia.com/business/damodar-valley-corporation-looks-to-expansion/cid/1875363.

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4. Rethinking Climate Change Adaptation law

Floods are not purely natural phenomena. Their devastating impacts are produced through both ecological and climatic processes as well as political and economic decisions around the use, allocation, and management of water. The law plays an important role in driving these decisions while interacting with and mediated by the ecological environment in which it operates. By examining the interactions between social relations and water that influence the distribution and movement of water, the hydro-social framework allows us to imagine a more just, inclusive, sustainable, and equitable form of organizing water-society relations. However, it also implies a more challenging set of changes than the quick fixes of technical and managerial approaches that have been used to date.

In the contemporary law and policy context, floods are increasingly analyzed through the framework of climate change adaptation.[110] The intersections between disaster and water law with climate change adaptation are an area of growing academic scholarship and (much slower) legal and policy reforms.[111] This is also an area of much transnational interest, with adaptation practices, policies, and governance frameworks being developed internationally and diffused by development actors.[112] This section reflects on the themes of Sections 2 and 3, and draws out lessons for the emergence of climate change adaptation and water law in this context.

Climate adaptation law and policies have traditionally focused on incremental adjustments to existing socio-ecological systems, often relying on technical or managerial solutions.[113] For instance, responses to floods typically involve reinforcing existing embankments, upgrading infrastructure, or elevating houses for flood management. These 'solutions' stem from a framing of climate change as a purely 'external force' acting upon an otherwise stable system.[114] The focus lies on shielding communities from this externalized threat. Vulnerability, which adaptation interventions aim to reduce, is measured by the relative exposure to 'external' climate risks, rather than being seen as a product of social and natural processes affecting how meteorological change materializes on the ground. The root causes of the devastating floods in the Damodar can be traced back to aspects such as the legally embedded governance arrangements and decisions made by colonial rulers according to capitalist logics. Climate change brings much uncertainty to the region, including the prospect of

[110] P. Driessen et al., 'Governance Strategies for Improving Flood Resilience in the Face of Climate Change' (2018) 10(11) *Water*, pp. 1595–611; M. Francesch-Huidobro et al., 'Governance Challenges of Flood-Prone Delta Cities: Integrating Flood Risk Management and Climate Change in Spatial Planning' (2017) 114 *Progress in Planning*, pp. 1–27.

[111] R. Lyster, *Climate Justice and Disaster Law* (Cambridge University Press, 2016); S. Mehryar & S. Surminski, 'National Laws for Enhancing Flood Resilience in the Context of Climate Change: Potential and Shortcomings' (2021) 21(2) *Climate Policy*, pp. 133–51; J.M. Verschuuren, 'Climate Change Adaptation and Water Law', in J.M. Verschuuren (ed.), *Research Handbook on Climate Change Adaptation Law* (Edward Elgar, 2013), pp. 250–72; J.W. Dellapenna, 'Global Climate Disruption and Water Law Reform' (2010) 15 *Widener Law Review*, pp. 409–541.

[112] Dzebo & Stripple, n. 12 above.

[113] Clark & Mitchell, n. 10 above, p. 1431.

[114] Nightingale et al., n. 24 above; Taylor, n. 22 above, pp. 26–48.

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more frequent severe rain events and a shifting monsoon, but the recent climatic shifts merely weave into this complex and messy hydro-social cycle. Adaptation responses will need to grapple with root causes to adequately address the impact on communities, or else risk perpetually reinforcing the injustices that are occurring today.

As it stands, state-level climate change policies in West Bengal – such as increasing reservoir storage, removing siltation, and unblocking drainage – continue to push technological 'solutions'.[115] There are currently plans for large-scale embankment and canal projects in the Damodar, funded by the World Bank, to include desilting canals and rebuilding concrete embankments.[116] Indeed, these types of transnational flood resilience and adaptation project are common in the broader South Asian region.[117] Generally, climate change adaptation has occurred in a top-down fashion and based itself upon physical infrastructure projects that do not try to reshape power relations significantly.[118] While these measures may be required in some contexts, they often only address a narrow set of issues. A narrow framing of adaptation effectively depoliticizes climate issues, without investigating the underlying causes and persisting environmental injustices.

The Intergovernmental Panel on Climate Change (IPCC) recognizes the need to shift from incremental to transformative adaptation.[119] However, the IPCC also acknowledges that most adaptation measures have followed an incremental logic.[120] The latter's shortcomings have been documented in great detail.[121] A truly

[115] Government of West Bengal, 'West Bengal State Action Plan on Climate Change' (2017), pp. 34–5.

[116] S. Ghosal, 'West Bengal Govt, DEA, World Bank and AIIB Sign Loan Agreements for $413 Million Major Irrigation Project', *The Economic Times*, 19 May 2020, available at: https://economictimes.indiatimes.com/news/economy/agriculture/west-bengal-govt-dea-world-bank-and-aiib-sign-loan-agreements-for-413-million-major-irrigation-project/articleshow/75829947.cms.

[117] See, e.g., literature on embankments in West Bengal and Bangladesh, and their framing within climate change adaptation: C. Dewan, '"Climate Change as a Spice": Brokering Environmental Knowledge in Bangladesh's Development Industry' (2022) 87(3) *Ethnos*, pp. 538–59; S. Chakraborti, 'Dutch Experts Help Strengthen Sundarbans Embankments, West Bengal to Seek Global Funds', *The Times of India*, 5 Apr. 2023, available at: https://timesofindia.indiatimes.com/city/kolkata/dutch-experts-help-strengthen-sundarbans-embankments-west-bengal-to-seek-global-funds/articleshow/99253974.cms; A. Ghosh, *Sustainability Conflicts in Coastal India: Hazards, Changing Climate and Development Discourses in the Sundarbans* (Springer, 2018).

[118] S. Vij et al., '"Power-Sensitive Design Principles" for Climate Change Adaptation Policy-Making in South Asia' (2021) 9 *Earth System Governance*, article 1001019; H. Ojha et al., 'Policy Without Politics: Technocratic Control of Climate Change Adaptation Policy Making in Nepal' (2015) 16(4) *Climate Policy*, pp. 415–33.

[119] I.R. Noble et al., 'Adaptation Needs and Options', in C.B. Field et al. (eds), *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2014), pp. 833–68, at 836.

[120] H.-O. Pörtner et al., 'Summary for Policymakers', in IPCC (H.O. Pörtner et al. (eds)), *Climate Change 2022: Impacts, Adaptation and Vulnerability. Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 2023), pp. 3–33, at 20.

[121] M. Pelling, K. O'Brien & D. Matyas, 'Adaptation and Transformation' (2015) 133(1) *Climatic Change*, pp. 113–27; Clark & Mitchell, n. 10 above; S. Eriksen et al., 'Adaptation Interventions and their Effect on Vulnerability in Developing Countries: Help, Hindrance or Irrelevance?' (2021) 141 *World Development*, article 105383.

transformative approach calls for a fundamental revaluation of strategies, aiming to tackle the underlying causes of environmental justice issues rather than merely treating the symptoms. Transformational adaptation requires 'shifting inequitable socio-political relations as well as the worldviews and paradigms within which they are (re)produced'.[122] Transformative adaptation entails addressing the fundamental causes of vulnerability and injustices.

Although delving into specific proposals goes beyond the scope of this article, reforms must shift or transform the relationships that create and sustain environmental injustices. In the Damodar context, for instance, in the realm of water law, reforms might include addressing a lack of democracy in decision making about water distribution, making the governance of flood and hydraulic infrastructure more democratic, expanding people's participatory rights related to water, and legally recognizing the ecological and social values of water. These measures would recognize adaptation as a social and political process, addressing the social and political reasons for vulnerability. It goes beyond seeing adaptation as separate from socio-political changes.[123] Moreover, as Siri Eriksen and others point out, climate change adaptation is about recognising that people are not 'recipients' of adaptation activities; rather, they are 'active agents in shaping their destinies'.[124]

Although scholars debate the necessity for a distinct 'adaptation law', adaptation principles must be integrated into various areas of law, including disaster, water, and climate change laws.[125] Furthermore, adopting an approach aligned with environmental justice principles is crucial.[126] There is a dire need to move beyond the conventional focus on resilience and incremental adaptation measures. As highlighted by IPCC reports, embracing transformative adaptation necessitates a radical restructuring and democratization of hydro-social relations. Law assumes a pivotal role in this reconceptualization of the intricate dynamics between water, society, and the legal framework it shapes.

5. Conclusion

Floods are not merely natural phenomena, nor do they affect people equally. Economic, legal, political, and ecological processes jointly drive the unjust causes and outcomes of such disasters. Colonialism and capitalism, as materialized in certain legal, policy, and institutional frameworks, have exacerbated the severity of floods in Eastern India. To understand the role of law in the context of environmental injustices requires an examination of its interaction with these different processes across space and time. My analysis, in particular, has drawn on concepts from political ecology and environmental history to analyze how floods are produced and sustained through the law.

[122] Eriksen et al., n. 121 above, p. 2.
[123] S.H. Eriksen, A.J. Nightingale & H. Eakin, 'Reframing Adaptation: The Political Nature of Climate Change Adaptation' (2015) 35 *Global Environmental Change*, pp. 523–33, at 526.
[124] Ibid., p. 526.
[125] B. Mayer, 'Climate Change Adaptation Law: Is There Such a Thing?', in B. Mayer & A. Zahar (eds), *Debating Climate Law* (Cambridge University Press, 2021), pp. 310–28.
[126] Wenta, McDonald & McGee, n. 10 above.

Environmental injustices in the Damodar region are driven by colonial legal frameworks, ideologies, and governance arrangements which empowered state- and profit-driven policies that determined the allocation of water to certain uses. Their interactions with material realities 'produced' the uneven and unjust hydro-social environment of the Damodar. The DVC Act 1948 builds upon colonial imaginaries and hierarchies aimed at high-value crop export, instituting a system that empowers the state (both the DVC and later the WBID). The evolution of the DVC, initially envisioned as a multipurpose entity, into an energy-focused institution underscores the influence of (post-independence) capitalism and new governance priorities. The article demonstrates how the role of law has been central to these changes and transformations, embedded in certain ways of framing the relationship between the land, river, and society, as well as between citizens and the state. The concepts of 'capital-driven disasters' and 'water grabbing' emerge as ways to understand how the legal framework serves to drive injustice across this hazardous hydro-social environment.

In the broader context of global and transnational climate adaptation, the article emphasizes the crucial need for 'transformative adaptation', particularly in flood-related contexts. Transformative adaptation requires moving beyond laws and policies focused solely on protecting communities from impacts while maintaining existing power structures. Rather, it calls for addressing the root causes of floods and their related injustices. These root causes, as I have shown, are complex and both global and local. The design of laws and policies for transformative adaptation thus calls for a critical examination to understand why any specific hydro-social environment produces injustices and inequalities. This scrutiny is essential for envisioning alternative sets of relationships, governance arrangements, and laws. To be sure, such grounded and contextual analysis may take more resources and encounter greater political challenges than those posed by technocratic solutions or quick fixes. Nevertheless, to address the escalating climate crisis and the environmental injustices it highlights, such a shift is indispensable.

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