

# THE RIVER MHADEI



## THE SCIENCE AND POLITICS OF DIVERSION

EDITORS

PETER RONALD DESOUZA | SOLANO DA SILVA | LAKSHMI SUBRAMANIAN

THE RIVER MHADEI: THE SCIENCE AND POLITICS OF DIVERSION

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*Edited by*

Peter Ronald deSouza

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*The River Mhadei: The Science and Politics of Diversion*

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*To  
the people  
of the Mhadei*

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# Introduction

Peter Ronald deSouza

Solano Da Silva

Lakshmi Subramanian

THE journey to the Mhadei started in the Narmada river. When we were asked to join the emergent community of scholars from across the world, who were bringing different perspectives from which to engage with the British Academy's rubric "The Times of a Just Transition," we were both excited and honoured. It was going to be an opportunity to learn from research findings from different regions of the world—South and North America, Europe, Africa, New Zealand, Australia—and also to showcase our own reading from India. We saw it as an occasion to initiate conversations between the global North and South, the past and the future, the conflicted and the resolved. The British Academy's rubric presented three nodes from which to speak: environment, time, and justice. This triangulation was promising. We must admit that we were most comfortable shuttling between "justice" and "environment", although the Indian word for tomorrow, "*kal*" (which is also the word for yesterday), gave us the courage to engage with the third node, "time".

The Narmada discussion on dams initially allowed us to speak to all three nodes from an Indian location. We spent six months looking at the discussion on the height of the Sardar Sarovar Dam, at the number of dams to be built across the river, at the ecological impact of these constructions on the river's flow and on its banks, at the contrasting benefits to distant populations in Gujarat and the corresponding burdens on proximate Adivasi populations in Madhya Pradesh, at the politics between the states of Maharashtra, Madhya Pradesh, Gujarat, and Rajasthan as it played out within a federal democracy, at the nationalism that was invoked and that coloured the "development" debates, at the protest movement of the Narmada Bachao Andolan that staged innovative demonstrations such as the *Jal satyagraha*, at the management systems that were put in place to deal with the dam oustees (a horrible word but that is what the people dispossessed by its construction are called), at the multiple court cases that unsuccessfully challenged the project, at the lethargic rehabilitation of displaced Adivasis populations, at

the irreparable costs to their culture and way of life, and finally at their subsequent livelihood insecurity. The latter in particular highlighted the deleterious consequences of timing practices—of telling populations that it was time to catch up—thereby obscuring, in Keri Facer’s words, multiple “temporal frames and timescapes present in any situation,” and failing to “engage in dialogue with others who use different temporal frames and practices.” (Facer 2003, 62)

This was a vast literature, extensive in scope and harrowing in its revelations. It was challenging. Did we have the wherewithal to enter this tangled world, we wondered? We discovered how keywords such as “development” get inverted and paradoxically result in placing unjust burdens on marginal peoples. Reports such as the one by the World Commission on Dams (Hemadri et al. 1999), project overviews by scholars (Peterson et al. 2010; Shelat n.d.) and summaries by experts commissioned by the World Bank (Berger 1993) convinced us that although this was a fertile area of study, we were, in 2022, a bit late to the table. Much had already been said, and although many key issues had not been settled, they had been archived.

Two themes, however, refused to be archived. Like the number 137 in Bertrand Russell’s “The Mathematician’s Nightmare”, from his book *Nightmares of Eminent Persons*, two themes refused to fall into line. They continued to trouble us because they were either intuitively persuasive or intuitively offensive. These two themes are, respectively, the idea of “The Greater Common Good”, elaborated on in the essay of the same name by Arundhati Roy (1999), and the suggestion by Swaminathan Anklesaria Aiyar that the displaced Adivasis were perhaps better off because they now had mobile phones and motorcycles (from the compensation money they got when they were displaced) even though they had lost their land, their forest, their river, and their village, which was the abode of their ancestors and the place of their cultural rituals. (Aiyar 2019). Neither of these two arguments could be ignored.

I proposed to the Principal Investigator of the British Academy project that we examine the idea “the greater common good” in the context of the Narmada cluster of dams, an idea that appears to offer utilitarian choices within a development paradigm, where we would also address the other “better off” claim. This was a promising proposal, but we soon realized that pursuing this strategy required us to visit the dam sites and spend considerable time meeting, interviewing, exploring, and documenting the lives of the affected persons (both beneficiaries and those who carried the burdens), a gargantuan exercise that involved resources of time and personnel that we did not

have. Clutching onto our concerns about the greater common good and the issue of benefits and burdens, we took a sidestep from the Narmada dams and landed at the banks of the river Mhadei, a river that was in dispute and one that offered an excellent site to think about value, time and the common good. Thus began our Mhadei journey.

Very soon, we found ourselves amidst a community of local researchers and activists—Rajendra Kerkar, Prakash Parienkar, Rahul Tripathi and Narayan Desai—who urged us to locate our concern with “just transitions” in the context of the Mhadei river diversion issue. It did not take much convincing since the issue was on the boil in Goa and since it appeared to have all the elements of the Narmada controversy and perhaps some more. An initial review of newspaper discussions about the river, the proposed diversion to answer the state of Karnataka’s water needs, the underlying rationale behind the project, the apprehension of serious environmental consequences, and conversations with activists persuaded us that an academic foray into the public debate was both timely and required. The debate, it was felt, would benefit from a range of scientific interventions coming from environmental activists, scientists, historians, and political scientists on both sides of the controversy. Our focus was to look at the scientific understanding of the diversion project and on its politics; hence the sub-title, “The Scientific and Political Aspects of the Diversion”.

What started off as a limited political science study of the diversion project proposed by the upper riparian state of Karnataka, wherein we thought we would examine the constitution, composition, processes, procedures, and working of the Mhadei Water Disputes Tribunal (MWDT), at its role as an adjudicatory institution in a federal polity, and at the politics that both preceded its setting up and that followed its award, soon grew into a study of the river itself and what it does, how it follows its own unique rhythms, and how that had the potential to help us cultivate a “temporal sensibility and imagination”. Thus, the study evolved from an examination of the river as a body of flowing water which was to be divided among the three states in which it flowed; to a river basin that is embedded within a prolific ecosystem; to a watershed within which the river offers multiple services, including ecological ones; to a commons where interaction with the river is mediated through a framework of rights and duties; and finally to a testimony to multiple time frames that had different stories to tell. Investigating a local dispute soon became a journey into a global discussion on rivers as natural resources, as cultural constructs, as bearers of rights, as carriers of histories, and as progenitors of civilizations. Rivers were becoming living waters. The Mhadei

had a life.

We realized that this was going to be a scholarly task that could not be performed by a single individual or even a small group of investigators. We needed a collective. From this realization emerged the idea of an “epistemic collective”: a grouping of academics, activists, journalists, filmmakers, lawyers, and writers who would bring their own epistemic viewpoints to the discussion, deliberate, and collectively produce an edited book on the different aspects of the river in dispute. Two workshops and many individual conversations later, we have been able to produce four deliverables: (i) an epistemic community, (ii) an article repository, (iii) a documentary on the river (all available at [www.mhadeicollective.org](http://www.mhadeicollective.org)), and (iv) this edited collection. We have tried to be as comprehensive as we could be within the constraints of a single edited book and to place a local issue within the growing global concern of a “just transition.” This book is Goa’s contribution to the global debate on safeguarding rivers and making them sustainable. The river Mhadei is our case study.

The river revealed itself through different time frames. (i) geological, (ii) ecological, (iii) cultural, (iv) political. Each was important for the following reasons. It was important to disaggregate the singularity of the life of the river into these four timeframes because they allowed us to reflect on the key aspects of each, which, when aggregated, show us why the river is so precious and why it is more than just a dispute about water diversion. Seeing the river through these different frames is like seeing the universe through the different infrared instruments of the James Webb Space Telescope. Seeing the river through geological time sensitizes us to the age of the river. We get perspective when we realize that the river existed before humans did, perhaps soon after the Gondwana continent broke up hundreds of millions of years ago, and the Indian plate collided with the Eurasian plate, and the peninsula that formed got regularly washed by the monsoons in an annual cycle, producing the mountains of the Western Ghats and its hundreds of rivers. The Mhadei emerged in this slow geological cycle of monsoon-winter-summer-monsoon. It is not an exaggeration to emphasize this geological process when thinking about water diversion because precipitation, water retention capability, excess, impact of climate change, and biodiversity all extend back in time to this changing geological landscape that is affected by the ocean currents of La Niña and El Niño. The Mhadei river clearly has geomorphic antecedents.

This regular cycle of monsoon and post-monsoon times in the Western Ghats has spawned a rich biodiversity in the basin of the river. We have

called this ecological time because in the lap of the mountains has sprouted, because of the monsoon, a diversity of flora and fauna, prompting UNESCO to recognize it as a prized biodiversity hotspot. The rich plant, animal, fish, reptile, amphibian, and bird life of the Mhadei basin was not always there but evolved through interactions between plant and animal life within the ecosystem. New species endemic to the region evolved, were discovered, and have yet to be classified. New interdependencies are still to be studied. New herbal plants remain to be documented. These are life forms which will give us a deeper understanding of ecosystem sustainability and of the balance between the species and of their dependence on each other. A five-minute walk through the forests would suffice to persuade anyone of the vitality of the Mhadei basin. The anthropocentrism of an earlier period, which placed humans at the centre of resource extraction and use, is being questioned today and replaced by an ecocentrism which places the ecosystem at the centre of thinking (although not in Trump's America) and is the correct way of seeing our place in the world. Gandhi's concept of trusteeship captured this interdependence very well, pointing out how we are trustees of the planet not just for ourselves but for all species and for future generations too. Seeing the Mhadei basin through the lens of ecological time thus underscores our deep interdependence on the ecosystem. Damage to it will damage our well-being and damage our futures. This perspective was shared and reinforced by many in the epistemic community that we forged, adding considerably to our understanding of not just the environment nurtured by the river but of the limitations of political protest as well, which did not fully comprehend and accommodate alternative realities and modes of living.

The third timeframe, the cultural, takes this idea of interdependence further and shows how human settlements endowed meaning to the ecosystem through their rituals, festivals, sacral ascription, and mythology. Human beings are meaning makers. This is what makes us unique. These meanings are produced in particular contexts of lived experience. In the Mhadei basin, rituals such as Nariyal Purnima announce the start of the fishing season after a prohibitory period during the monsoon, when fishing is disallowed since the monsoon period coincides with the fish spawning period, an important reminder of convergence between humans and non-humans in the dynamics of the ecosystem. Some of these rituals and festivals are discussed in chapters of the book and have also been visually captured in the documentary we have made. The "cultural" also involves the conferring of sacrality by human communities to parts of the sanctuary as sacred forests and to

parts of the river as sacred pools. These sacred zones require the permission of the presiding deity if we wish to use its resources. This conferring of sacrality on parts of the ecosystem has been described by environmentalists as good practice that protects the ecosystem and is seen by the host community as recognizing enchanted spaces that are meaningful. The Mhadei watershed has many such cultural practices from its sources at the Chorla Ghat, where the diversion is planned, to its meeting with the sea, where even Chhath puja is performed in the month of Kartika (October–November) by those who have recently migrated to Goa and brought their worship of the sun (*Surya devta*) at sunrise and sunset while standing in the water on the banks of the river.

The fourth lens of time is the political. This focuses on the present dispute around the diversion of the river's waters. It also highlights how a geological and ecological landscape is now, because of political intervention buttressed by dominant notions of temporal frames, divided into an integrated ecosystem and works as a key tool for implementing political projects (Facer 2023, 61). In political time, the present dominates the other times and comes to impact (inflict) its consequences on them. Because of the conflict between states, the river's waters are to be diverted and distributed by a mindset that ignores other frames with which to understand the river. Political time is located within the nation-state and has to negotiate the politics of a federal democracy. Its dominance has consequences for the gifts of the monsoon since the proposed diversion, it is alleged, will affect the deciduous nature of the Bhimgad forest that will consequently lose its moist atmosphere because of the diversion, thereby affecting rainfall precipitation. The dominance of political time, in the mind of our policymakers, will also have consequences for the flora and fauna, not just through the many dams being built (an obscene number on such a small river) but also through its reluctance to declare the surrounding forests as a tiger sanctuary. It is a truism that a healthy tiger means a healthy forest. A tiger sanctuary will not only protect the forest from "development" activities but will also disallow economic development. Political time also impacts the cultural. For instance, the cluster of barrages, check dams, and lift pump infrastructures being considered may impact (this is still to be established by scientific studies) the phenomenon which occurs every twelve years in which the holy *tirth* (water) at the Mauli temples in Kankumbi (at the source of the river) gushes white as it emerges from underground, heralding the start of the Mauli Devi festival. (Rodrigues 2024)

To recover all these aspects of the Mhadei river that we have hinted at above

and bring them to bear on the diversion debate, we have put together this volume of scholarly studies on the river, its history, and its contested present. The collection is firmly situated within the analytical rubric of “The Times of a Just Transition”, within which the Mhadei river is presented as a pertinent and salient case study from Goa. It adopts a thematic perspective across interconnected time frames: geological, ecological, cultural, and political. Each of the chapters explores complex dimensions of history and culture, science and politics, and environment and species history, offering in the process a multifaceted analysis of the river, the pressures it faces, and the diverse responses that are necessary to safeguard its integrity and the well-being of the communities that depend upon it.

The living ecology of the Mhadei basin sets the tone for the volume. Rajendra Kerkar's essay documents the ecological diversity of the basin, noting the presence of endemic species such as Wroughton's free-tailed bat (*Otomops wroughtoni*) found in the Bhimgad region and unique ecosystems like the *Myristica* swamps, which contain associations of endemic tree species. It underscores the environmental ramifications of proposed interventions, thus suggesting how coordinating multiple temporalities is critical for ensuring justice. It demonstrates how the proposed diversion of Mhadei waters will result in significant negative ecological impacts and how it would be patently unfair to Goa, a state recognized for judiciously managing its natural reserves, particularly forests and the Western Ghats, that ironically is now expected to bear the costs of a diversion project. The chapter suggests that Karnataka has not managed its reserves as judiciously and that projects such as the Kalasa-Banduri may impact wildlife sanctuaries. In the same vein, Nirmal Kulkarni provides a detailed account of biodiversity documentation efforts within the Mhadei region, characterizing it as a biodiversity hotspot within the Western Ghats. The chapter, framed as field notes, compiles observations across various life forms, including herpetofauna, mammals, birds, and insects, employing a visual and scientific approach. It identifies the constraints in terms of the lack of comprehensive data sets regarding the region's biodiversity. The chapter emphasizes the vulnerability of many site-specific species to habitat alteration resulting from development projects, including damming the river. It specifically mentions endemic and endangered species like the brown civet, Travancore flying squirrel, Indian pangolin, and various snakes, and makes the point about several data-deficient and endangered species. The contribution stresses the urgent need for continued documentation and conservation strategies.

Focusing specifically on the aquatic realm, Vidyadhar Atkore and Nandini

Velho's chapter highlights the spectacularly rich freshwater aquatic diversity present in the Mhadei river system. This is contextualized within the global decline of freshwater fish populations. The chapter describes the varied habitats within the basin, such as riffles, pools, runs, and cascades, across an elevation range of 10 to 760 meters. It includes first-hand observations detailing severe destruction in the headwater streams, attributing this degradation to construction activities associated with the diversion project. The authors note the presence of species such as the dwarf puffer fish (*Carinoteleodon travancoricus*) and the banded leopard blowfish (*Arothron leopardus*), which are listed as vulnerable and data deficient, respectively. The chapter argues for the importance of preserving free-flowing rivers and allowing natural flow regimes.

One way of ensuring responsible stewardship of the river-system is suggested by Helga do Rosario Gomes who argues for a more holistic understanding of the river system that requires a reorientation of our perspective on rivers. The chapter challenges the reductionist perspective of rivers merely as conduits for water supply, emphasizing instead their function as continua linking terrestrial and marine environments and transporting water, nutrients, biomass, organisms, and sediments from headwaters to deltas. It underscores the critical importance of the watershed and discusses the potential for severe downstream impacts from upstream interventions like damming and diversion. Specific attention is drawn to the potential consequences for downstream ecosystems, including the Mandovi estuary and the broader marine environment. In arguing for such a holistic understanding, the chapter holds a key to new modes of imagining both time and space and thus developing an attentiveness to traditions, rhythms of life processes, and altered perceptions of the river as a resource to be extracted, capitalized and defended. It emphasizes the symbiotic relationship between the river and the sea. Lakshmi Subramanian's chapter offers a historical perspective on the Mhadei's role during the Portuguese colonial period and the subsequent decades following Goa's liberation. By analysing the development of physical and social infrastructure on the river, the chapter illustrates the development of a river-centric imagination that influenced historical development, citing examples such as bridges, causeways, and forts built in relation to the river. It highlights how perceptions and usufructuary rights associated with the river were shaped over time, giving rise to a new discourse around use value.

The question of value is taken up in some detail by Dharendra Deshpande, who discusses the challenges and significance of quantifying the economic

value of the river's benefits. The chapter posits that rivers possess hidden and intrinsic values extending beyond their utility for water supply. It notes a scarcity of specific and authentic data needed for conducting comprehensive economic valuations of river benefits in Goa and the services it provides to the ecosystem. The analysis is speculative but intended to encourage stakeholders to view the river as a public resource in a more comprehensive manner and to be watchful of any disruption in supplies. We have an important chapter by A.G. Chachadi that supplements this perspective. Chachadi provides a scientific analysis of water availability and potential impacts of flow reduction on Mhadei river water sharing. Drawing upon existing scientific literature, the chapter summarizes the properties of the Mhadei basin and water availability. It specifically explores the impacts of reduced freshwater flows on the Mandovi estuary, detailing observed changes in nutrient concentrations, such as nitrates. This analysis contributes to the debate on estuarine ecosystem behaviour under stressed conditions. This scientific perspective adds weight to the older idea of the river as a commons, an idea taken up by Aurobindo G. Pereira whose chapter deploys the concept of the Public Trust doctrine and the idea of the river as constituting a commons, tracing its parallels with *gaunkari* and the colonial *comunidades*. The chapter aligns the notion of the commons to the sacrality of the river, viewing it as fundamentally connected to the people and the sacred Sahyadri mountains. The chapter argues that contemporary large-scale projects driven by a very different notion of development and utility, including the damming and diversion scheme, pose a threat to this fundamental doctrine and the socio-ecological relationship with the river. Implicit in the argument is the cleavage in diverse temporal frames, with the locals having to defer to the hegemony of current development paradigms.

Under the circumstances, how do we cultivate a sensitivity to the river and the myriad imaginations that it has nurtured? One way, as Sujata Noronha's chapter suggests, is to work with the community on the river. Her chapter introduces the *Nhoi* project by the Bookworm Library, a community-based initiative centred on the river, which is described in Konkani as *jeevan dhara* or "life stream." Utilizing visual art and documentation, the project explored the community's knowledge, memory, and vision for the river. The initiative involved workshops where participants collaboratively created large drawings, illustrating how the river's form and significance are intuitively understood by those living along its banks. The project attended to alternative time narratives about perceptions of the river, to the rich symbolic vocabulary that it sustained and to the community understanding of the ongoing

dispute. In demonstrating the potential of community action and shared creation in expressing identity around the river, it offers us an alternative possibility of political imagination and engagement.

The power of literary representation is highlighted by Narayan Desai's chapter that focuses on the cultural and literary significance of the Mhadei. This chapter demonstrates the river's integral role in the public imagination and modern Goan identity formation, noting its appearance in place names, institutions, and a wide range of literary works across the languages of Marathi, Konkani, Hindi, and English. The contribution illustrates the river's multifaceted importance throughout the region's history, its economy, and its connection to significant events like the freedom struggle. It highlights the river as a living entity deeply connected to the communities along its banks. The availability of these impressions helped in using creative media, including videos and street plays, to convey the "Save Mhadei" message as part of the agitation that developed around the river and the diversion project.

A core concern of the volume is to document and understand the recent dispute that has arisen over the issue of water sharing between the three riparian states of Goa, Karnataka and Maharashtra. It may not be out of place here to draw out the essential components of the raging dispute between these three states and to reflect on the processes of adjudication that have so far not been able to resolve the impasse. The dispute is a long-standing one and revolves around Karnataka's plan to divert water from the tributaries of the Mhadei to the Malaprabha basin to fulfil the drinking water needs of select drought-prone districts and to support sugarcane agriculture. Goa opposed this plan, citing ecological reasons, and the matter was turned over to the Mhadei Water Disputes Tribunal, whose 2018 decision to allot water was contested and remains in abeyance. The dispute offers an important lens to examine the politics and legality of diversion.

Not unexpectedly, the majority of the chapters examine the political and legal dimensions of the Mhadei dispute, engaging explicitly with the themes of political time and justice. Rahul Tripathi provides an analysis of the Mhadei issue as an inter-state river water dispute. The chapter employs an intersectional approach to understand the complex interplay of various actors, processes, and competing interests that have shaped the conflict and its current state. It discusses the genesis of the dispute, its phases, trajectories, stakeholders, and the outcome of the Mhadei Water Disputes Tribunal.

Parineeta Dandekar's chapter focuses specifically on the Mahadayi Water Disputes Tribunal and its verdict. This contribution critically assesses the Tribunal's process, highlighting significant concerns regarding the

reliability and sufficiency of hydrological data presented by the states. Crucially, it notes the Tribunal's perceived failure to adequately appreciate or incorporate the rich eco-cultural meanings interwoven with the river basin into its award. The chapter points out issues of data deficiency and miscalculations. Vaishali Kashyap also examines the Tribunal verdict, acknowledging its stated emphasis on meeting human water needs and promoting sustainability. However, this chapter identifies shortcomings within the legal process, specifically highlighting the observed absence of the voices and perspectives of affected communities. The chapter notes that state governments, despite claiming to lack substantial data, proceeded with their claims, highlighting in the process the failure of coordination and planning.

A legal perspective on existing regulatory frameworks pertaining to the Mhadei river is provided by Vasudha Sawaikar's chapter. This chapter reviews legislation pertinent to the Mandovi river, identifying numerous laws and policies at both the Union and state levels. It discusses their historical and political contexts, revealing what the author suggests are mixed motivations behind them, encompassing both the aims of environmental protection and the facilitation of economic activities. The analysis adopts a descriptive methodology to list legislations, their stated reasons, and contexts.

Legal redress and recourse to courts were only one aspect of the public outcry against the scheme of diverting the waters of the Mhadei. A campaign to save the river was launched with mixed results. Meera Mohanty's chapter details the history and efforts of the "Save the Mhadei" movement and the broader political aspects of the dispute. This contribution documents the actions of various individuals, organisations, and political actors involved in the agitation to protect the river. It traces the history of political negotiations and focuses on specific contentious projects like the Kalasa-Banduri damming and diversion project. The chapter illustrates how public mobilization, documentation, and media engagement have been employed as strategies in advocating for the river's protection. Key figures involved in activism and documentation, such as Rajendra Kerkar, are mentioned. On the other side, we have Rishikesh Bahadur Desai's contribution that looks at the pro-diversion movement launched by the state of Karnataka that wilfully overlooks the potential negative environmental consequences associated with the proposed diversion project, including impacts on wildlife sanctuaries, potential alterations in rainfall patterns, damage to riverfronts, adverse effects on aquatic life, and structural damage to geological formations like

laterite mountains caused by dam construction. Here was a case where timescapes and temporal frames, or narratives about time and progress, were on a collision course, wholly ignoring the disaster that is anticipated by both scientists and community stakeholders.

Evidently the mode of managing river basins has to remain sensitive to climate change and community perceptions and opt for a participatory governance structure. It is in this connection that Maya de Souza's chapter argues that the prevailing governance structure is not equipped to handle the increased risks of erratic rainfall, drought, and sea-level rise. Instead, it proposes a new, integrated approach, incorporating a strong, non-political executive body, robust public participation through assemblies and working groups, and utilizing the existing legal system for dispute resolution. It draws on examples from other international river basins and the work of Elinor Ostrom on managing common pool resources and uses these to advocate for a system that prioritizes agility, equitable distribution, and integrated water management to ensure the river's sustainability in a changing climate.

Collectively, these diverse contributions underscore how the Mhadei river serves as a dynamic case study illustrating the complex interplay between environment, the different dimensions of time, and the pursuit of justice. The chapters demonstrate that achieving a comprehensive understanding and effective safeguarding of the river necessitates recognizing its geological origins (alluded to in ecological accounts), its highly dynamic and ecologically rich environment across various timescales, its profound cultural significance in shaping identity, community life, and collective imagination; and navigating the intricate political landscape of inter-state disputes, legal frameworks, social movements, and competing interests. By integrating scientific analysis, historical narratives, legal critiques, cultural perspectives, and accounts of social activism, this collection offers a rich and multi-layered perspective on the unquiet flows of the Mhadei, providing Goa's unique voice to the global conversation on achieving a just transition towards sustainable river governance and acknowledging the intrinsic value of rivers and their associated ecosystems.

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## Contributors

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**Solano Jose Savio Da Silva** is Assistant Professor, Department of Humanities and Social Sciences, BITS Pilani, Goa, where he teaches courses in development and political theory. His research has looked at electoral politics, urbanization, and land use planning with a special focus on Goa. Before joining BITS, he worked at Goa University and at the Centre for the Study of Developing Societies (CSDS), Delhi. He completed his PhD on the dynamics of land-use planning in Goa in 2019. He has an M.Phil. in Development Studies from the University of Oxford as well as a Master's in International Studies and a BA in Economics from Goa University. Professor Da Silva is also deeply involved with Goan social issues, occupying himself in particular with overseeing, analysing, and sometimes agitating against variants of the Goa Regional Plan—an attempt to develop a broad strategy for Goa's development, which includes preparing a land-use plan.

**Lakshmi Subramanian** is retired Professor of History, Centre for Studies in Social Sciences, Calcutta, and BITS Pilani, Goa. She has had a long and distinguished research and teaching career and is credited with making major contributions to the fields of Indian business history and music history. She has many publications to her credit, the latest ones being *Singing Gandhi's India: Music and Sonic Nationalism* (2020) and *India Before the Ambanis: A History of Indian Business, Market and Economy* (2024). She has been the recipient of several international fellowships including the prestigious Mellon fellowship and Adam Smith fellowship.

**Rajendra P. Kerkar** is involved in environment education, protection, and conservation in Goa for the last three decades. He has been instrumental in initiating the movement for notifying the Mhadei and Netravali Wildlife Sanctuaries. He serves as the General Secretary of the Mhadei Bachao Abhiyan, as a member of the National Board of Wildlife, Goa State Biodiversity Board and other organizations involved in protecting the history, heritage, ecology, and wildlife of the Western Ghats.

**Parineeta Dandekar** is an environmental advocate and Associate Coordinator for the South Asia Network on Dams, Rivers, and People (SANDRP), where she works to ensure that India's last free-flowing rivers remain protected. Her research uncovers the failures of large-scale water projects while amplifying the voices of communities, cultures, and ecosystems that depend on these rivers. She is pushing for policies that prioritize both people and the planet, ensuring a future where rivers continue to sustain life.

**Meera Mohanty** is Editor at *The Economic Times*. A financial journalist with twenty years of experience, she covers politics, business, and closely covers the business of mining.

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**Rishikesh Bahadur Desai** is an award-winning Senior Assistant Editor at *The Hindu*, covering northwestern Karnataka. With experience at *The Times of India*, *Vijay Times*, and *The Asian Age*, he reports on governance, decentralization, agriculture, and social welfare. His 2024 Karnataka State Media Academy award highlights the impact of his journalism. Some of his best regarded stories include a series on the Siddi African tribe getting ST certification, an inquiry into the alleged sale of a poor widow, and restoration of the Surang Bavi Karez, an ancient heritage structure in Bidar. He has extensively covered Hyderabad-Karnataka's backwardness, farmer distress, and infras-

tructure projects like Bidar's multi-arch dams. His reporting on the kidnapping of actor Rajkumar gained wide attention. As India coordinator for BBC Radio, he worked on projects about the tobacco industry, Kaveri dispute, and the IT revolution. Fluent in English, Kannada, and Hindi, he holds degrees in English Literature, Political Science, and Law. He also edits and translates, organizing initiatives like a Wikipedia editathon in Bidar.

**Vaishali Kashyap** is a doctoral research scholar at the Department of Humanities and Social Sciences, BITS Pilani K.K. Birla Goa Campus. Her ongoing research explores factors behind livelihood change in a traditional fishing community in Assam. She holds a post-graduate degree in Water Policy and Governance from TISS, Mumbai. In the past, she has been a part of organizations like Tata Trusts and INREM Foundation, engaging with the development space with a particular focus on public health, nutrition, and water quality.

**Vasudha Sawaiker** trained in law at V.M. Salgaoncar College of Law, Goa University and has a post-graduate degree in social work from the Tata Institute of Social Sciences (TISS), Mumbai. At TISS, she was awarded the prize and shield for being the best student in Dalit and Tribal Social Work. As a lawyer, she represented clients in cases on social justice and inclusion in public employment. Her legal research encompasses diverse areas such as organ donation, forest rights, and construction workers. She was awarded the UGC-JRF Fellowship in Social Work in 2016 and is presently a research scholar at the School of Sanskrit, Philosophy and Indic Studies, Goa University.

**A. G. Chachadi**, former Professor, Goa University, Goa completed his M.Tech. and PhD from IIT Roorkee. Before joining Goa University as teaching faculty, he served as a scientist at the National Institute of Hydrology, Government of India for seven years. His research interests and works are related to the fields of hydrogeology and water resources management, environmental science and exploration geophysics. He has published several research publications in national and international journals and has worked as a consulting hydrogeologist for several mining companies.

**Nirmal U. Kulkarni** is a herpetologist and nature photographer with over two decades of experience in conservation science and field herpetology in tropical forests of Western Ghats and North East India. He has served as an Expert Member of the Goa State Biodiversity Board and Goa State Wildlife Advisory Board for two terms, besides being part of various state and national committees on wildlife and research. Nirmal is currently Chairman

of the Mhadei Research Centre, Goa, India and is leading research projects on the Leith's soft shell turtle in Karnataka, a snake bite awareness project in Goa, and a monitor lizard project investigating illegal trade in India. As an ecologist, Nirmal is involved in long term monitoring of the Chorla Ghats forests and the adjoining Mhadei bio-region. His research interests include field herpetology in tropical forests, tackling the organized illegal wildlife trade and conservation education.

**Vidyadhar Atkore** is a freshwater ecologist by training, interested in quantifying the anthropogenic and environmental factors on freshwater biodiversity across different scales. Currently he is a faculty member at the Salim Ali Centre for Ornithology and Natural History (SACON), South India Centre, Wildlife Institute of India, Coimbatore. He teaches wetland ecology and management, ichthyology, landscape ecology, GIS, human ecology and ecohydrology.

**Nandini Velho** is a wildlife biologist working on the human-dimensions of forest management. She has completed her PhD from James Cook University and was an Earth Institute Fellow at Columbia University. She has worked as a Policy Fellow with the Minister of Environment and Forests, and with multiple forest departments and communities across India. She is interested in the intersection of art, science and action.

**Helga do Rosario Gomes** is a Research Scientist at Lamont-Doherty Earth Observatory, Columbia Climate School. She graduated with a PhD in Biological Oceanography from University of Bombay and has held research positions in Japan and Maine. Dr. Gomes is interested in large-scale climatic questions such as the impacts of the new and unusual planktonic blooms in the Arabian Sea, the effect of Arctic warming and ice melt on the American lobster, the impact of urbanization on wetland systems, and ocean acidification and deoxygenation of waters from harmful algal blooms. With her colleagues she has been developing ocean monitoring and decision support systems tailored to meet needs for sustainable management of coastal resources in tropical countries experiencing climate change. She mentors postdoctoral, graduate, and undergraduate students, but her passion lies in providing guidance and support to high school students, some of whom have won national and international awards. She is a trustee and Science Advisor for Goa Chitra, an anthropological museum in Benaulim, Goa that preserves and showcases the culture and lifestyle of the people of the west coast of India.

**Dhirendra M. Deshpande** has nearly four decades of experience in Indian higher education, starting as a Lecturer in a degree college in Goa, working in various capacities in reputed institutions such as Symbiosis, Pune, KLE Society, Bengaluru, as Faculty, Principal, Director and finally retiring as the Vice Chancellor of ISBM University in Chhattisgarh. As a columnist for a leading daily newspaper in Goa, he has rich experience in writing on a range of economic and policy issues such as budgets, monetary policy, reforms and liberalization. As a faculty in Symbiosis, he was associated with guiding and evaluating various finance-related projects that included building economic models for producing hydroelectricity, long-range demand and sales forecasting.

**Leon Morenas** is the Principal of the Goa College of Architecture. He was Associate Professor of Architecture at the School of Planning and Architecture, Delhi. He was also a Fellow at the Indian Institute of Advanced Study, Shimla where he worked on a project entitled “Mohallas and Smart Cities: Post-Colonial Development in Delhi.” He was a World Social Sciences Fellow in Sustainable Urbanization (2014) and Programme Coordinator of the Masters in Social Design at Ambedkar University, Delhi (2013). He is an architect with a Master’s in Urban Design from the School of Planning and Architecture, Delhi and a PhD in Architectural Sciences—with a specialization in Informatics—from Rensselaer Polytechnic Institute, Troy, New York. Professor Morenas’s research uses the disciplinary lens of Science and Technology Studies (STS) to understand the relationship of technology with contemporary design, architecture and urban planning. His most recent writings have focused on urban governance through technology with a focus on smart cities and their command centres. He is also working on a set of essays that attempt to answer the question: “Is there an Indian way of thinking about technology?” using the foils of history, metaphysics and literature.

**Manisha Rodrigues** is an architect based in Goa. She holds a Bachelor’s degree from the Goa College of Architecture and a Master’s in Architecture with a specialization in architectural conservation from CEPT University, Ahmedabad. With over a decade of experience in practice and more than three years as an assistant professor at her alma mater, the Goa College of Architecture, her work often explores the intersections of water, heritage, and the built environment. She was part of projects like the Serampore Initiative led by the National Museum of Denmark, which documented Indo-Danish heritage along the Hooghly River. Her academic and professional work reflects a deep connection to water and cultural landscapes—from the Sabarmati and Hooghly to the Sal and Mandovi rivers in Goa. As a fellow of the Goa Wa-

ter Stories fellowship by the Living Waters Museum, she explored “What is a river?” through the lens of the built environment of the Mhadei–Mandovi–Mahadayi River. She currently leads her practice in Margao and continues to engage with architectural education as visiting faculty at the Goa College of Architecture.

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**Sujata Noronha** is an educator specializing in early literacy and enjoys working with children and books. She is deeply interested in the power of the printed word and the pathways to access and growth emerging from it. In Goa, she works out of her organization called Bookworm, that provides resources and facilitates libraries and reading within the community of Panjim and in schools around the state. She consults with the Tata Trusts within the education portfolio.

**Maya de Souza** has an inter-disciplinary background with over twenty years’ experience in public policy and the law. She graduated from Oxford University in Philosophy, Politics and Economics before studying and practising law. After an L.L.M. (London), graduating with distinction, she joined the Department for the Environment, Food and Rural Affairs in the UK Government Legal Services and later moved to policymaking. She headed various teams on better institutional structures for flood risk and integrated water management where she led a project on holistic approaches to water management in the climate risk context. She has also headed the Business Environment Council Hong Kong’s Policy and Research Team, leading projects on climate resilience; and served on the BITC–UK Circular Economy team as Co-Director, Environment. Maya has been an elected Green Party councillor in London, playing an active role in town and country planning and scrutiny of the environment among other policy areas. Currently, Maya lives and works in Goa, and is a co-director of Act for Goa, co-founder of Materia Verde (a new biomaterials industry accelerator powered by Quicksand). She was previously with Bangalore-based think tank, CSTEP. She also works with various consultancies on future-proofing and strategic insight.