THE RIVER MHADEI: THE SCIENCE AND POLITICS OF DIVERSION

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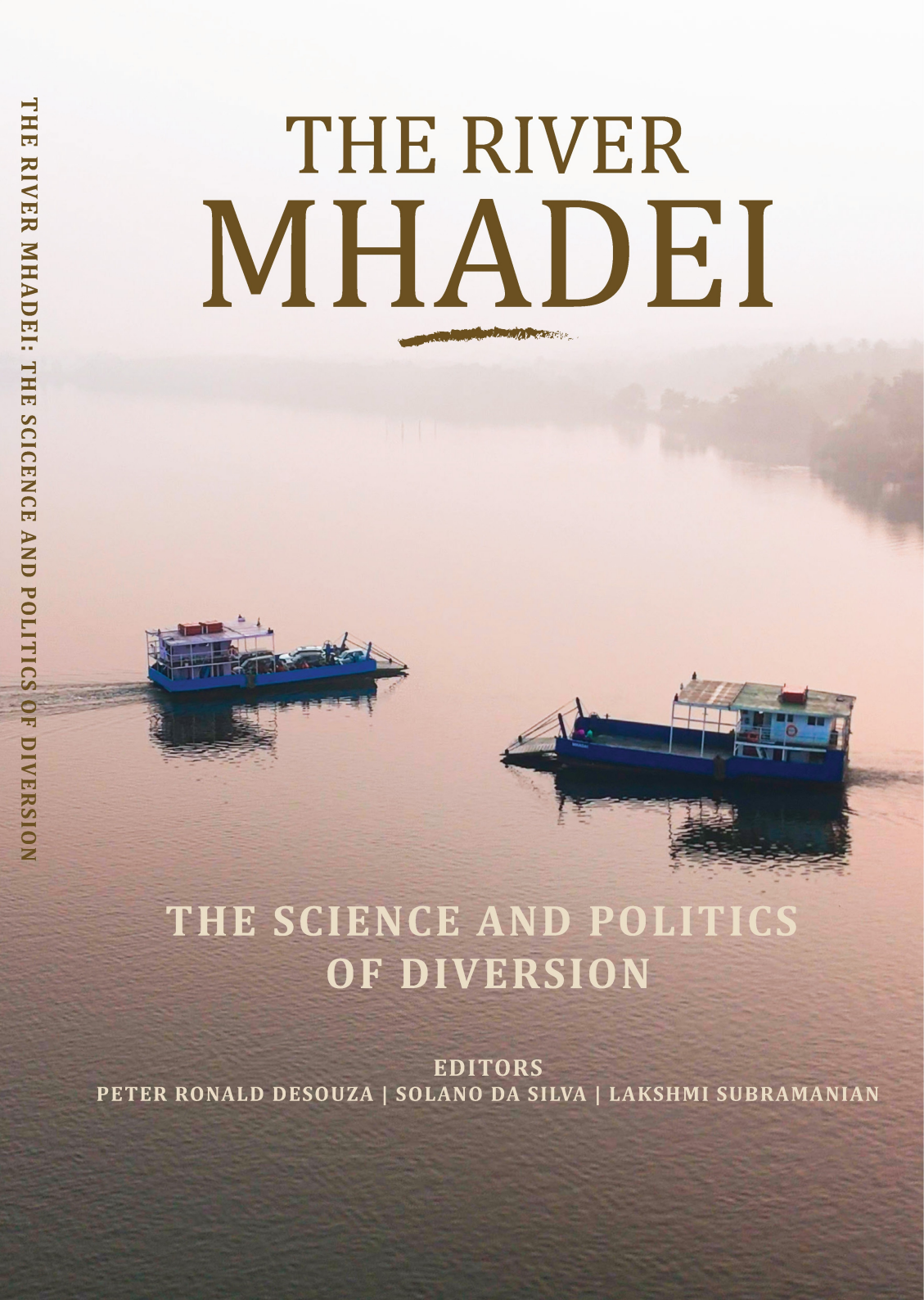

THE SCIENCE AND POLITICS OF DIVERSION

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The River Mhadei

The Science and Politics of Diversion

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To

the people

of the Mhadei

Contents

1. Conserving the Mahadayi: Biodiversity, Water, and Cultural Resources

Rajendra P. Kerkar

***Abstract**: This chapter explores the complex ecological, legal, and political dimensions of the Mahadayi (Mandovi) River dispute between the Indian states of Goa and Karnataka. It provides an in-depth analysis of Karnataka's damming and diversion projects, particularly the Kalasa-Banduri diversion scheme, which threaten the biodiversity-rich Western Ghats and the livelihoods of downstream communities in Goa. Drawing on ecological surveys, historical accounts, and legal documents, the chapter highlights the region's status as a global biodiversity hotspot, home to endemic and endangered species such as the Wroughton's free-tailed bat and the mahseer fish, as well as relic ecosystems like Myristica swamps. The legal section of the chapter examines violations of the Forest Conservation Act (1980), lack of mandatory environmental clearances, and judicial interventions including the 2018 Mahadayi Water Disputes Tribunal award and subsequent litigation. The chapter also situates the dispute within broader political dynamics, pointing to the unequal influence of Karnataka and Maharashtra compared to Goa and champions Goa's threatened priority of environmental stewardship.*

Introduction

RIVERS are the cradles of civilization. From time immemorial, great cultures have flourished by cultivating sustainable and harmonious relationships with the rivers on whose banks their foundations have been laid down. Much like the Sapta-Sindhu rivers, which played a rich and dynamic role in the growth and development of the culture of ancient India, there are nine prominent Goan rivers that sustain Goa's ecosystems, while also adding beauty and romance to the land (Alvares 2002).

The river Mandovi, known in Sattari and Karnataka as the Mahadayi, is the principal lifeline for the smallest state of India. It rises in the Western Ghats, amidst the evergreen forests of the hilly terrain in Degaon near Khanapur, inside Karnataka's Bhimgad Wildlife Sanctuary. The Mandovi, with its network of tributaries, has given rise to some incredibly scenic and fertile islands (such as Divar Island) with distinct ecologies. The pageantry of this riverine panorama and its picturesque beauty makes these islands the unique jewels of Goa and attracts a great deal of tourist attraction (Albuquerque 2014). The unique and varied character and ecology of the Mahadayi are, however, under attack by a series of proposed diversion and damming schemes mooted by the neighbouring states of Maharashtra and particularly Karnataka. If implemented, these projects will affect the natural flow of the river, disrupt the balance of freshwater and salinity, threaten forest cover, and pose grave danger to many species of endemic and rare species found in the region. This chapter considers the geography of the Mahadayi basin and some of the unique ecological treasures it fosters and examines the development schemes that place these species and environments at risk, particularly in Goa.

The Geography of the Mahadayi Basin

The river Mahadayi, one of the west flowing rivers in Karnataka, takes its birth at an elevation of 914.40 m above mean sea level in Bhimgad in Khanapur taluka of Belgaum district. The river traverses a distance of 28.8 km in Karnataka and 81.2 km in Goa. It rises in Jamboti ghat 10 km northeast of Sonasagar in Karnataka's Belgaum district. The Mahadayi river is joined by three tributaries in Karnataka, namely, the Bail nadi, Kotni nadi and Bhandura. In Goa, where it is known as the Mandovi river, it is joined by five tributaries, namely, the Khandepar or Dudhsagar, Dicholi, Mapuca, Ragada and Surla or Nanode nadi. The Cumbharjua canal connects Mandovi river with Zuari river. The catchment area of the river basin is 2,032 sq. km of which 1,579.93 sq. km lies in Goa, 76.96 sq. km lies in Maharashtra and 375.11 sq. km lies in Karnataka. The Mandovi river basin occupies 42.70 percent of the geographical area of the state of Goa and is the biggest of the nine river basins in the state (Master Plan 1999).

Species in the Mahadayi basin

The Mahadayi basin is a biodiversity hotspot with a high level of species endemism. It is home to several globally threatened species of floral and faunal wealth—mammals, reptiles, birds, amphibians, butterflies and various

other insects. Karnataka's proposed plan to divert the river at Nerse in order to carry out the Bhandura dam project will have serious environmental implications for the natural habitats of tigers, leopards, and sloth bears, among other species of wild animals. The region also hosts one of the largest species of butterflies—the southern birdwing—and the smallest—the grass jewel—as well as the largest moth—the Atlas. The largest venomous snake, the king cobra, which once lived in evergreen forests with perennially flowing water, is now often seen entering areas of human settlement and activity such as cashew plantations due to habitat loss. Such incidents will continue to rise if damming and diversion schemes are planned and implemented in these areas.

The Mahadayi basin is a tiger corridor, a bison resort, a bear habitat, a king cobra host and the only home in the world to Wroughton's freetailed bat (*Otomops wroughtoni*) at Barapedi cave near Talewadi on the crestline. Barely a kilometre below it are a series of rock cave amphitheatres, the Krishnapur caves, 1000–1500 feet in height, descending vertically into the lower Mahadayi loop, flanking its smaller tributaries arising on the crestline, and rushing down into the basin. These caves are one of only three homes in the whole country to another rare bat *Taphozous theobaldi*. The area is rich in flora and fauna; high in biodiversity, abundant in cane, bamboo, rosewood, matti and other hard timber, but low on high commercial value trees like teak. A general study carried out by Belgaum's Nature Lovers Club in 1998 reveals the existence of more than 25 types of mammals, fifteen types of reptiles, 120 types of birds, thirty types of butterflies and moths and 100 types of plants. A medicinal plant conservation park source has identified more than 170 types of medicinal plants (Sardeshpande 2001). The notification of the Mhadei and Netravali Wildlife sanctuary issued in June 1999 states: Floristically, the Western Ghats is one of the richest areas in the country, harbouring not less than 3500 species of flowering plants which is 27 percent of flowering plants in the country. There is no equal, if not richer, proportion of lower plants. The Western Ghats has 84 species of orchids—including two species of endemic orchids—belonging to 30 genera (three genera are endemic). Of the known orchids of the Indian peninsula, 37 percent are endemic to the Western Ghats region. Fifteen species of orchids in the Western Ghats are endangered.

Among the many endemic species that inhabit the Bhimgad area, of particular interest to me are the bats that inhabit the region. There are over one hundred bat species in India. These bats, which eat thousands of tonnes of insects per night, help the agricultural sector by acting as natural pest con-

trol agents. While we know how many species exist, we have little knowledge about their ecology, distribution, or population levels. More than half the bat species are classified by the IUCN as "Data Deficient," meaning that we do not even have enough basic information on them to ascertain if they are at risk. One of the rarest species of bats in India, Wroughton's free-tailed bat (*Otomops wroughtoni*), a bat found only in this part of the world, is located in the Bhimgad region. Furthermore, there are numerous species of endemic plants that could have great medicinal and economic value, that are yet to be discovered in this region (Sardeshpande 2001).

In 2003, Ramkrishna, M.S. Pradhan and Sanjay Thakur of Zoological Society of India conducted a status survey of Wroughton's free-tailed bat in the Barapedi cave near Talewadi village in Belgaum district. They made the following recommendations based on their study:

1. Full protection has been offered recently to Otomops wroughtoni (Thomas) by listing it in Schedule I (Part I) in the Indian Wildlife Protection Act. This will bring complete ban on collection of species for any purpose including academic and research purposes.

2. Although the cave is naturally concealed, it is unguarded and hence is vulnerable at any time to human interference. Therefore, the cave should be guarded and fenced appropriately to avoid any sort of destructive activities inside the cave.

3. The possibility of the occurrence of another diurnal roosting site in adjoining areas cannot be ruled out. Therefore, thorough intensive and systematic surveys of all the caves existing in the Bhimgad region may be carried out by a team of experts to find out the possible existence of additional diurnal roosting site of this species. However, while conducting such survey, care must be taken to avoid disturbance of any type to the existing population.

4. Developmental activities of any kind must be stopped immediately in this region to protect the species from extinction due to habitat loss.

5. Efforts may be made to protect the cave from the occasional fire in the surrounding grassland habitat.

6. Agricultural activities should be totally banned in the immediate surrounding areas of the Barapede cave.

7. Talewadi village is situated just about 2 km. away from Barapede cave. Therefore, the village boundary expansion in future should be

> refrained from extending further towards the cave to minimize the level of human interference. (Ramakrishna, Pradhan, and Thakur 2003).

If the proposed work of the Bhandura project is undertaken, it will pose a serious threat not only to the natural habitat, but also to the foraging areas of *Otomops wroughtoni*.

In terms of biodiversity of fish, the presence of mahseer, a threatened species of freshwater carp belonging to the family Cyprinidae and considered "the tiger among fish," has been revealed in the river Mahadayi and its tributaries. A commercially important species of game as well as an esteemed source of food, mahseer is classified as threatened due to increasing pollution, habitat loss, introduction of invasive fish species, and over-fishing. Once abundant, this species has now shrunk to a few small pockets. Mahseer are known to choose definite and special spawning grounds, which are usually rich in dissolved oxygen content and cool water temperature. They are highly sensitive to the slight alternative to their environment and spawning habitats (Punjabi et al. 2020). They consume plants, fruit, drifted insects, molluscs and shrimp.

Pistyachi Kond, situated on the borders of Kelil-Krishnapur in Karnataka and Cadwal in Sattari, has long provided the ideal habitat for mahseer, boasting perfect flow regimes for spawning, deep pools, various trees along the banks, loose sand at the bottom, and huge boulders regulating the flow of water (Kerkar 2021). Locals believe in the Pisto—the guardian spirit of the water body—and do not dare to fish in it either using traditional fishing gear or explosives. As the utmost protection has been accorded to Pistyachi Kond by the villagers of Krishnapur in Karnataka and also of Savarde and Nagargao Panchayat areas of Sattari, the mahseer have been thriving and observers can enjoy the enthralling sight of them swarming in large congregations in the water. After the monsoons one can also easily see juvenile mahseer swimming alongside other fish.

The Mhadei basin is also home to some unique forests and species of trees. The Myristica swamps are probably the remains of the most ancient forests of the Western Ghats with a history of more than 140 million years (Chandran et al. 1999). They are found in Sattari, in Bibtyan and the Ajobachi Tali sacred grove in Brahma Karmali, and also in Nirankarachi Rai, Maloli inside the Mhadei Wildlife Sanctuary. Three IUCN red-listed species, namely, *Syzygium travancoricum, Myrisca fatuamagnica, Semecarpus kathalekanensis* have been reported by researchers in the Mahadayi

forests of Sattari. Myristica swamps are freshwater swamps represented by any of the members of the Myricaceae family, such as *Gymnacranthera canarica* (King) Warb. and *Myristica fatua* Hou. var. *magnica* (Bedd.) J. Sinclair (Chandran et al. 1999; Bhat and Kaveriappa 2009). These swamps may occasionally include *Myristica malabarica* Lam., *M. beddomei* King, and *Knema attenuata* (Wall. ex Hook. f. & Thomson) Warb., which are more common outside the swamps. Associations of many endemic tree species in these swamps are well documented (Bourdillon 1908; Sasidharan and Sivarajan 1996; Ramesh and Pascal 1997; Chandran and Mesta 2001). Some of the red-listed plants in the Red Data Book of Indian Plants are associated with the swampy relics or low-lying forests (Nayar and Sastry 1987, 1990). This has been further substantiated by the discovery of a new tree species *Semecarpus Kathalekanensis* (Dasappa and Swaminath 2000) and of two critically endangered tree species—*Madhuca bourdillonii* H.J. Lam and *Syzygium travancoricum*—in the swampy relics of Uttara Kannada (Chandran et al. 2008), far away from their original distribution records. Another rare tree species, *Cassipourea ceylanica* (Gardn.) Alston of family Rhizophoraceae is also found associated with a Myristica swamp in Uttara Kannada (Mesta et al. 2009). Because of rich diversity, endemism and the threatened status of these swamps, Chandran et al. (2008) stressed on the need for intensifying efforts for locating such swampy relics (Prabhugaonkar and Janarthanam 2014).

These relic swamp forests were first formed when India was still a part of the supercontinent of Gondwanaland, during the time of the dinosaurs. At the end of the Cretaceous period, when India separated from Madagascar and began drifting northwards, its movement over an active volcanic hotspot known as the Deccan Traps caused violent volcanic eruptions that led to the creation of the Western Ghats and, subsequently, India's unique vegetation and climatic conditions, including these unique Myristica swamps. These forests rely on the surface and ground water table for their survival.

The Cultural Dimensions of the Mahadayi Basin

Some of Goa's lush hinterland tourist destinations may hold secrets of the prehistoric era, as these areas were among the first human settlements over a million years ago. Archaeological expeditions, led by retired professor Ravi Korisettar of the National Institute of Advanced Studies in Bengaluru, uncovered stone tools from the Lower Palaeolithic era, providing insights into the lives of early hunter-gatherers. The discovery, made between 1989 and 1993, reveals fifteen ancient stone tools that were found during surveys at

seven sites in South Goa, four of which are at Dudhsagar. The presence of wild fauna, abundant water resources, and the availability of rocks and minerals made these locations ideal for sustaining a hunter-gatherer way of life. The findings also shed light on the adaptability of these early humans to long-term climatic changes. Over the last 4,000 years, a shift towards a drier climate has affected environmental stability and population dynamics globally. However, the adaptation of these early settlers, evidenced by their tool-making technology, suggests a resilience to such changes.

Mauxi village in the Sattari taluka has emerged as a hotbed of Neolithic discoveries. Ancient rock carvings belonging to the Neolithic period etched into the meta basalt rock along the dry riverbed of the Zarme river were discovered by local residents and their great antiquity confirmed by the Archaeological Survey of India (ASI). The carvings are of animals such as zebus, bulls, and antelopes, alongside footprints and cupules (hemispherical cup-shaped depressions), revealing insights about the Neolithic inhabitants of the area who created them.

The Mahadayi and its tributaries provided favourable conditions for prehistoric humans in Goa. The old practices of agriculture known as *kumeri* (slash-and-burn agriculture) and *puran sheti* (traditional silt-based cultivation) that were in vogue in the region in the past indicate the rich history of the watershed. The fairs and festivals of the villagers reflect the rich sociocultural history of the region deeply rooted in the riverine culture.

Karnataka's Diversion Scheme

The revised Kalasa nalla project involves the diversion of around 27 hectares of land, including 11 hectares of tiger corridor between Karnataka, Maharashtra, and Goa. It aims to build multiple barrages to store and lift water from *nallas* and divert it into the Malaprabha. The damming and diversion schemes of Kalasa-Banduri have already posed a serious threat to the environment, ecology, and wildlife of the area and have and intensified human-wildlife conflicts in the region, thereby disrupting the livelihood of agriculturists and horticulturalists. When Karnataka undertakes steps to complete the unfinished work of the project as per the revised Detailed Project Report (DPR), it will have serious implications on the environment and sociocultural lives and livelihoods of the people downstream, including in the Myristica swamp forest in the Mahadayi region.

Dr T. V. Ramachandra, head of Energy and Wetland Research Group, Indian Institute of Science (IISc), cautions that the river catchments are essential to ensure water flow throughout the season or most of the year: "The rich tree

cover and the panoramic landscape hold the rainwater beneath it which is used during the drier seasons. And once the catchment area at the river's origin is destroyed, it's difficult to restore it. As it is, the catchments of Kalasa and Banduri are in bad shape due to afforestation and the implementation of projects with no consideration for the environment," he had highlighted in an article written by the India Water Portal for *Scroll.in* (India Water Portal 2016).

Mandatory Clearances

Deforestation causes ecological imbalance and leads to environmental deterioration. This has been taking place on a large scale all over the country. With a view to check further deforestation the Forest Conservation Act, 1980 was enacted by Parliament. This act provides for prior approval of the central government for use of forest land for non-forest purposes. Section 2 of the Act reads as follows:

> Restriction on the dereservation of forests or use of forest land for non-forest purpose: Notwithstanding anything contained in any other law for the time being in force in a State, no State Government or other authority shall make, except with the prior approval of the Central Government, any order directing:
>
> (i) that any reserved forest (within the meaning of the expression "reserved forest" in any law for the time being in force in that State) or any portion thereof, shall cease to be reserved; ii) that any forest land or any portion thereof may be used for any non-forest purpose.

By proceeding with the said project, the state of Karnataka had passed various orders for using the forest land in Mahadayi Basin for non-forest purposes, thereby violating section 2 of the Act. The said project work was not carried out by the Karnataka for conservation, development and management of forest and wildlife but rather to extract water from the Madhavi river at Kankumbi across the Kalasa nalla, a tributary of the Mahadayi, only for internal use. Karnataka's purpose in this case is a non-forest purpose as stipulated by the Explanation to Section 2 of the Forest Conservation Act, 1980. Hence the Central Government in its letter dated 16 October 2006 issued to the state government of Karnataka directed the state irrigation department not to take up any work on the project without obtaining the requisite statutory clearances.

Chapter 4 of the handbook on the Forest Conservation Act, 1980 issued by the Government of India, clarifies the law on projects involving forest and

non-forest land: "Some projects involve use of forest land as well as non-forest land. State Governments/project authority sometimes start work on non-forest lands in anticipation the approval of the Central Government for release of the forest lands required for projects. Though the provisions of the Act may not have technically been violated by start of work on non-forest lands, expenditure incurred on work on non-forest lands may prove to be in infructuous if diversion of forest land involved is not approved. It has, therefore, been decided that if a project involves forest as well as non-forest land, work should not be started on non-forest lands, expenditure incurred on works on non-forest lands may prove to be infructuous if diversion of forest land involved is not approved. It has therefore, been decided that it a project involves forest as well as non-forest land, work should not be started on non-forest land till approval of the Central Government for release of forest land under the Act has been given" (Ministry of Environment and Forests 2004).

On 28 February 2013, in writ petition No. 4766/2009 (GM-RES-PIL)—a case of public interest litigation alleging that the implementation of the Kalasa-Banduri project by the Karnataka government was against the Forest Conservation Act, 1980 and was being hastily implemented at the expense of tree cover and forest ecology—the High Court of Karnataka at Bangalore stated: "Upon stern consideration of the facts and the material, it is evident that part of execution of the project is to be done in the forest lands. It is admitted by the State of Karnataka that the entire project will be executed only after clearance from MoEF as required under the Forest Conservation Act and also from the National Board for Wildlife. Since no needed clearance is taken from the above said authorities, respondent Nos. 1 and 3 [the state of Karnataka and Karnataka Neeravari Nigam Limited respectively] cannot execute the project works in the forest area, without seeking necessary clearance".

In August 2017 the Supreme Court disposed of a petition filed by the Mhadei Bachao Abhiyan, an NGO based in Goa, after Karnataka assured the court that "no further construction work with respect to the Kalasa Bandura project would be carried out." The Mhadei Bachao Abhiyan in its petition has alleged that the project is continuing without any approval under the Forest (Conservation) Act, 1980 and other related clearances from the Ministry of Environment, Forests and Climate Change. In response, Karnataka has claimed through its counsel Adv. Fali Nariman that the project does not require an environmental clearance as the cost of the project is less than Rs. 100 crores. Earlier in 2017, the Supreme Court asked Karnataka to state on the record, whether they had applied for environmental clearance and for

the Ministry of Environment and Forests (MoEF) to state whether they had received any application from Karnataka.

Human-Wildlife Conflict

Earlier, the Goa government was denied permission by the MoEF to build the Mandovi irrigation project at Nanoda in Sattari as it would submerge 350 hectares of forests, even though Goa had already spent a total of Rs. 210.96 lakhs on the construction of colonies and other infrastructure. Karnataka's proposal will cause massive disturbances to the habitat of wildlife in the Mahadayi valley (Kerkar 2017). When dams and developmental activities increased in and around Dandeli Wildlife Sanctuary, elephants from these areas began to migrate and human-elephant conflicts occurred in the Tillari region, resulting in the deaths of both elephants and humans as well as the destruction of agro-horticultural crops. Goa too witnessed the deaths of three people and the loss of agro-horticultural crops in human-elephant conflicts. Additionally, from 2009 to 2020, five tigers were found killed in the forested areas of Sattari taluka in Goa. Every year, at least one or two leopards die in conflict with humans. Farmers have been complaining about damages caused to agro-horticultural crops by bison and other wild herbivores in the Mahadayi region in Goa. Human conflict with sloth bears is also continuously on the rise, raising serious concerns for locals. Collection of natural honey, wild berries, and other minor forest produce by humans and increasing encroachment on their habitat, has intensified this conflict, as sloth bears behave aggressively towards humans when they feel threatened. Other wild animals are also being displaced and disturbed, thereby creating a host of environmental problems.

The report of the high level committee appointed by the Karnataka government to suggest appropriate water management strategies for state irrigation projects, published in March 1999, highlighted Karnataka's mismanagement of its water resources. Farmers in Karnataka are raising crops according to their wishes, violating the prescribed cropping pattern, due to which it has become difficult to distribute water equitably to all parts of the command area. Adding to the water shortage are leakages in the pipeline supplying water to Hubli-Dharwad. Apprehending problems if the diversion project is linked to irrigation demand, Karnataka has invoked the need to supply drinking water, which has been accorded top priority in India's National Water Policy (Sonak 2014). Considering the projected water needs of Goa until 2050, it has been established by the committee of experts appointed by the Goa Department of Irrigation in 1999 that the Mahadayi is a water deficit basin and hence no scope exists for water diversion. Goans

are concerned that any diversion of water from the upper catchments of the Mahadayi would severely impact its downstream ecology, particularly due to changes in the salinity regime, decrease in sediment load, and the consequent impacts on estuarine and mangrove ecosystems. The project sites are home to natural forests, unique wildlife, and river origins and the catchments for the Mahadayi and Malaprabha rivers.

From 2006, the Maharashtra government has also entered the race to acquire the freshwater resources of Mahadayi. One of the significant rivulets of the Mahadayi coming from Virdi village has become the target of Maharashtra's damming plan. At Virdi, just 3 km from the Anjunem irrigation project of Keri-Sattari, Maharashtra has completed construction of an irrigation project 600 m. long and 48 m. high between Temb and Talyachya Vhalacho Dongar, without obtaining any statutory clearances and without understanding the actual situation and signing a memorandum of understanding for the share of water.

Karnataka has almost 22 rivers in Belgaum district that have the capacity to fulfil drinking and irrigation needs. Even when the case was being argued, Karnataka had drawn up plans to divert the water of the Dudhsagar, envisaging four dams on the upstream of Khandepar river namely Katla, Palna, Diggi-Mara, and Diggi-Bondeli to divert water to the Supa reservoir. Both Maharashtra and Karnataka have been aiming to decimate the upper reaches of the resource rich Western Ghats, a global biodiversity hotspot and a UNESCO World Heritage Site, by mismanaging the available water resources, practising unsustainable irrigation, and encouraging water guzzling crop selection models. They are doing this despite the fact that neighbouring states cannot divert the natural flow of the rivers that flow in the direction of wildlife sanctuaries without obtaining prior permission from the Ministry of Environment, Forests and Climate change and also from National Board of Wildlife of India.

The clarification given by Dr. S. Karekatta, one of the directors of the Ministry of Environment, Forests and Climate Change, that the Kalasa-Banduri project is purely a drinking water supply scheme is unrealistic. One must apply the provisions of EIA Notification 2006 and its subsequent amendments before giving any such clarification. The proposed Kalasa-Banduri project falls within the ecologically sensitive area identified earlier by Karnataka Forests Department and the Western Ghats Ecology Expert Panel headed by Dr. Madhav Gadgil in their report in 2011 and subsequently the high-level working group appointed under the Chairmanship of Dr. Kasturirangan in their report of 2013 (Herald Team 2019).

Part of the project area in Nerse for the proposed Kalasa-Banduri scheme falls within the eco-sensitive zone of Bhimgad Wildlife Sanctuary. On 14 August 2018 the Mahadayi Water Disputes Tribunal permitted Karnataka to divert 3.9 TMC of water through the Kalasa-Banduri project outside the Mahadayi basin after obtaining necessary statutory clearances. It also permitted 1.33 TMC feet of water to Maharashtra of the Mahadayi for in-basin use. The tribunal allocated Goa 24 TMC feet of water. The proposed Kalasa dam site is inside reserved forests notified by the Karnataka Forests Department and the Kalasa canal site of Karnataka is only 3.17 km away from the limits of the Mahadayi Sanctuary. Karnataka has obtained necessary approval from the Central Water Commission for building dams and *bundharas* (traditional Indian weirs), but so far has not obtained mandatory clearances mandatory pertaining to the environment and wildlife.

The presence of tigers has been proven inside the Mahadayi Sanctuary of Goa through camera trap techniques, as well as in the Bhimgad Wildlife Sanctuary in Karnataka and the reserved forests of the Kankumbi range and Tillari region of Maharashtra. This region of the Western Ghats is home to flagship species of wildlife like sloth bears, leopards, and slender loris. The Status of Tigers 2022 report indicated the presence of five tigers inside the Mhadei Wildlife Sanctuary (Qamar Qureshi, Yadvendradev V. Jhala, Satya P. Yadav and Amit Mallick 2023). As previously mentioned, the Barapedi cave inside the Bhimgad Sanctuary, situated a few scant metres from the proposed Bhandura dam site, is the only known home of the Wroughton's free-tailed bat *Otomops wroughtoni* (Shreyas 2020).

Regarding the damming and diversion of the Kalasa, Bhandura, Haltara, and Surla nallas, Karnataka has claimed before the Ministry of MoEFCC that EIA Notification 2006 and subsequent amendments do not pertain to this project, even though in reality, it requires permission from the National Board for Wildlife of India, clearances under Forests (Conservation) Act 1980, and approval under EIA Notification of 2006 and its subsequent amendments. If the damming and diversion schemes become reality, it will certainly affect the salinity regime and have disastrous effects on marine and human life, even as increasing global warming and climate change assault the fragile ecosystems of Goa.

The damming and diversion schemes proposed by Karnataka and Maharashtra affect the Western Ghats, which are known for their exceptionally high level of biological diversity and endemism, shelter at least 325 globally threatened species, and are globally recognised as one of the world's eight hottest hotspots of biological diversity along with Sri Lanka (C.P.R. Environ-

mental Education Centre on Conservation of Ecological Heritage and Sacred Sites of India 2024). It is highly likely that there are many hitherto undiscovered species in the region. Furthermore, megafauna like tigers need large habitats to fulfil their requirements for survival.

Karnataka claims are that its projects are meant exclusively to cater to drinking water needs but has nevertheless inserted an irrigation component into the revised DPR. It has also constructed oversized diversion tunnels at Kankumbi for a capacity of around 4 TMC water, even though the Mahadayi Water Dispute Tribunal (MWDT) had allotted just 1.72 TMC.

The new understanding of science is to develop a harmonious relationship with nature while showing due respect to its dignity. To maintain the natural balance and equilibrium, it is essential to allow the natural flow of water in the direction of Goa. The tiger census conducted by the National Tiger Conservation Authority in 2022 has indicated the presence of big cats in the border areas of Goa, Maharashtra and Karnataka. From 2009 to 2019, five tigers were killed treacherously (Kerkar 2023). In order to protect our forests and consolidate the water security of India's smallest state, it is essential to create the Mahadayi Tiger Reserve. When a wildlife sanctuary is notified as a tiger reserve, it gets extra legal protection. Furthermore, the National Tiger Conservation Authority provides funding to rehabilitate families from the wildlife core region if necessary and undertakes essential risk-mitigation measures to minimize human-wildlife conflict. Creating a tiger reserve would offer the area and its fauna much more robust ecological protections than its current wildlife sanctuary status.

A letter addressed by the Regional Office of MoEFCC, Bangalore to the Additional Secretary of Forest, Ecology and Environment of Karnataka has cautioned that the Kalasa diversion project is within the protected tiger corridor (Malkarnekar 2023). Earlier, Karnataka had represented in their DPR that the water was to be diverted through open cut canals from the Kalasa, Surla, Haltara, and Bhandura nallas through gravity flow. However, the revised DPR aims at a lift irrigation scheme, which involves the installation of huge pumps that emit high decibel noise and require power supply to be routed through 30 km of protected forest. This in turn poses danger to the natural habitat and will result in the displacement of flora and fauna.

Karnataka is known for its historical strategy of constructing oversized structures based on flawed data and calculations, then later complaining to the Central Government that their dams, retention, and other delivery structures are not running to their full capacity, feigning scarcity and pleading for more water allotment. When the MWDT revisits its award in 2048, it is likely that

Karnataka will plead for more water to cater to its ever-increasing drinking and irrigation needs and put forth new proposals for damming and diversion schemes that have presently been kept on hold.

The Tribunal Report

Dr. J. C. Almeida, the former Chief Secretary of Goa, Daman and Diu in his article entitled "Dams on Madei river is a serious issue" published in the *Daily Herald* dated 15 November 2006, wrote, "Sometime on 3.8.94, when Karnataka Government wanted to construct dams at Katla and Palna, to divert the waters of these tributaries of Madei river there was a meeting in Goa, between the then C.M of Karnataka Shri Moily and C.M of Goa Dr W. D'Sousa to discuss the issue of the diversion of waters of Katla and Palna, which are the tributaries of Dudsagar waterfall and which helps Opa water supply and the forest growth, before the water from the Madei river meets other Goan rivers. The diversion of water from the tributaries of Katla and Palna envisaged to provide water for the Supa Reservoir. The World Wildlife Fund for Nature had said that the diversion of even surplus water from Katla and Palna streams would cause ecological and economic disaster to Goa" (Almeida 2006).

After the declaration of the award by the Mahadayi Water Dispute Tribunal in 2018, and the subsequent nod given in 2023 by the Central Water Commission to Karnataka Neeravari Nigam Ltd. for a DPR of the damming and diversion schemes, the threat of the proposal has been looming over the state of Goa. The area where Karnataka has already completed major work of the Kalasa project in Kankumbi by constructing diversion channels, underground, and open cut canals lies in ecologically sensitive areas, identified as such by both the Forest Department of Karnataka and by Dr. Madhav Gadgil of the Western Ghats Environment Experts Committee, and endorsed by the High-Level Committee headed by Dr. Kasturirangan. All these areas have also been repeatedly notified by the Ministry of Environment, Forest and Climate Change of India (MoEFCC) as Ecologically Sensitive Areas.

Political Competition between Goa, Maharashtra, and Karnataka

When Maharashtra and Karnataka emerged as states under a newly independent India in 1947, Goa was still under Portuguese rule. When the Inter-State River Disputes Act of 1956 was passed by the Indian parliament to provide for the adjudication of disputes relating to waters of inter-state rivers and river valleys, Goa was still a Portuguese colony. It was liberated by the Government of India on 19 December 1961 through Operation Vijay, becoming the smallest state in the Indian Union. There was correspondingly an urgent

need to consider its fragile ecology and environment. However, both Karnataka and Maharashtra continued to take advantage of the important rivers rising in their domains by planning damming and diversion schemes. As far as the number of members of parliament is concerned, both Maharashtra and Karnataka are stronger politically which has resulted in inequitable outcomes for Goa, which is substantially smaller. But no state within the Indian union has any legal or constitutional right to degrade the natural resources of another state through any action.

Fresh water forms the very basis and foundation of a forest ecosystem. When water supply to a forest is reduced, the water tables and water bodies, which are the primary life-supporting entities of the forest, deteriorate. The forest in turn degrades and eventually can even die out. By choking off the water supply, Karnataka will virtually kill off the forests of a sanctuary and of a neighbouring state. Goa has tried to protect its forests with good reason.

Conclusion

Destruction of catchments for agricultural purposes can cause rivers and wetlands to go dry. For instance, "several perennial streams feeding the Sharavati river were going dry before the summer season, but later it was found out that the streams were being diverted for agricultural needs," says Dr. T. V. Ramachandra of the Indian Institute of Science (India Water Portal 2016). He emphasized that instead of adopting quick-fix measures to pacify agitating farmers, the Karnataka government must protect its natural wealth so that water is available for future generations. However, instead of taking needful steps for the protection and conservation of the environment and ecology, Karnataka has been continuously trying to dam and divert the tributaries of the Mahadayi—which naturally flow into Goa—into the Malaprabha basin, despite the fact that north Karnataka already has sufficient untapped water resources to fulfil both drinking water and irrigation needs within the Malaprabha basin, including the Benihalla nalla, Joul nalla and Bedti river.

Goa has not previously objected to Karnataka and Maharashtra's in-basin use of Mahadayi river water but trans-basin transfer of water (i.e., transfer from one river basin to another river basin) effected by damming and diversion schemes will certainly affect the natural flow of water towards the Mahadayi Wildlife sanctuary and also towards Bhimgad Wildlife Sanctuary, which is served by the Bhandura nalla. If water is diverted from the Bhandura, it will intensify human-wildlife conflict. Karnataka has already destroyed the Kalasa and Malaprabha from their sources up to 3 km downstream. This has resulted in degradation of both rivers and large-scale destruction of the forests lying in their catchment areas.

Karnataka Neeravari Nigam Ltd. laid the foundation of the Kalasa project on 2 October 2006 and felled trees from reserved forests without obtaining mandatory clearances either from the Ministry of Environment, Forest and Climate Change of the central government or from the Karnataka Forest Department. Even though this violation was brought to the notice of the Forest Department and an FIR was lodged, KNNL continued to work on the Kalasa project, which threatened the ground water table of Kankumbi, and eventually resulted in paucity of drinking water in wells.

As per the observations made by the Deputy Conservator of Forest of Karnataka the proposed dam site of the Bhandura is located among the most luxuriant and scenic, moist-deciduous, and semi-evergreen patches of forest. The Bhandura nalla is one of the perennial streams which joins the Mahadayi at Kongla and then enters Goa via Gavali- Krishnapur at Bondir along with the Panshira of Mendil. Near Dhave-Uste, the Kalasa stream joins the Mahadayi.

Karnataka has proposed yet another dam on the Haltara nalla. From the Haltara, water will be brought to the Kalasa reservoir through open cut channels and pipelines. From Kankumbi, the water of Kalasa will be taken to the Malaprabha through excavated open cut channels as well as the underground tunnels. As per the guidelines issued under the Forest (Conservation) Act, 1980, if a project involves forest as well as non–forest land, work should not be started even on non-forest land until the central government has granted approval for release of forest land. Till date, Karnataka has not received forest clearances from the Ministry of Environment, Forest and Climate Change, and the Ministry of Water Resources has not withdrawn the in-principle clearance which was placed in abeyance in September 2002. The Water Resource Department of Goa has already built numerous *bandharas* on various tributaries of the Mahadayi and there exist many lift irrigation schemes. The water treatment plants at Dabos cater to the drinking water needs of 52 villages in Sattari taluka, whereas the water treatment plants at Sanquelim and Padoshe supply potable water to Bicholim and Bardez. Across the Khandepar river, the Opa water treatment plant has been catering to the drinking water needs of Panaji and Ponda since the Portuguese era. In April 2002, the Goa government announced that it was considering a set of smaller dams to generate a total of 60 MW of Goa's power needs.

In 1989, Karnataka government's power corporation (KPC) had planned to construct a hydroelectricity project on the Mahadayi, which had raised a storm of protest, with environmentalists gearing up to cross swords with the KPC. The ambitious project was conceived with an installed capacity of 345

MW to propagate 828 million units of energy annually. The project cost was estimated at a staggering Rs. 304.50 crore which was expected to increase further in case of delay.

Taking the note of the project, Michele Perrault, vice president of international affairs, Sierra Club, San Francisco, appealed to James Wolfensohn, president of the World Bank on 29 June 2000, "The Sierra Club wishes to alert you to a controversial water development project in the Western Ghats region of India. This project, Indian environmentalists warn, includes construction of questionable damming and diversion work planned by the Karnataka government on the Mahadayi River ("Mahadayi River Diversion Scheme", Khanapur, Belgaum District, Karnataka, India). According to reports, such diversion would certainly endanger and likely damage irreparably the proposed Bhimgad Wildlife Sanctuary, possible submerging the very caves where a rare bat species—a principal reason for the sanctuary along with priceless tiger habitat and other biodiverse fauna and flora—is known to live." Accordingly, the World Bank refrained from providing the necessary funding for Karnataka's project.

With respect to the larger matter of World Bank funding of other projects, ongoing or proposed, throughout the extensive territory of the Western Ghats, the Sierra Club urges that they be undertaken only with the most rigorous scientific appreciation of this watershed's unique and priceless biodiversity. The Western Ghats, running parallel to India's Arabian Sea coast, constitute one of the Earth's most valuable but dwindling tropical watershed resources and outstanding rainforests. They harbour such exceptionally rich fauna and flora that the Earth Summit at Rio de Janeiro in 1992 deemed them one of the most ecologically and scientifically precious hotspots of genetic biodiversity on the planet.

The freshwater flow from the Mahadayi sustains the Mandovi in Goa. Like other Goan rivers, the Mandovi is affected by the tides of the Arabian Sea. Salinity reaches about 30 km upstream, necessitating freshwater inflow from the Ghats region bordering Goa. If the freshwater flow is reduced, as would happen if the diversion of the Mahadayi river is allowed, the fragile ecology and livelihood of Goan communities will be critically affected. The consequences of aggravating salinity in the 52 km stretch of the Mandovi river will pose a threat to the delicate environmental and ecological balance of what is one of the most biodiverse regions in the world. This area also sustains a rich cultural heritage. To preserve this cultural and environmental heritage, the state of Goa has committed to meeting the social and economic costs of preserving forest cover in 30 percent of its geographical area. Considering

the small geographical area of the state, the smallest in India, Goa has chosen to sacrifice some of its economic potential in the interest of maintaining natural forest cover in its river basins.

In keeping with the need to maintain environmental and ecological balance, which is the basis of life and livelihood in Goa, a unique model of agriculture and fisheries has evolved with a network of embankments along the sea and estuaries. These traditional networks, with sluice gates and productive patterns of horticulture, agriculture, and pisciculture are based on the critical balance of freshwater and saline water flow. The scenic beauty of Goa and its way of life is a source of attraction to tourists. It is one of the most favoured tourist destinations in India, both for the rest of the country and for foreigners. Other states would do well to follow its example.

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