

Conservation is Development in the Forests of Nagarahole Tiger Reserve, India

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Abstract

The relationship between conservation and development has undergone extensive scrutiny, primarily because of their outward antagonistic appearance. Recent work points to their complex intermingling, such as the potential economic benefits of conservation. In this article, I argue that conservation is an inherent part of the development regime. I argue this by describing conservation practices in Nagarahole Tiger Reserve that rely on scientific governance, an essential mechanism of the development regime. I trace this regime from its inception in the colonial period through forestry operations to its continuance in the conservation regime instituted post-independence. However, despite their co-evolution, this relationship is neither simple nor straightforward. I show how everyday governance draws on customary practices and experiential knowledge of local communities inhabiting Nagarahole. This aspect is devalourized in the official governance regime to the extent that these communities are disenfranchised from their lands. By establishing conservation as development, I suggest that conservation projects should be subjected to the same level of scrutiny and examination usually allocated to development projects, which are associated with exploitation, control and drastic modification of the landscapes we inhabit.

Keywords

Development regime, forest management, indigenous communities, Nagarahole Tiger Reserve, nature conservation, scientific governance

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Introduction

The success of nature conservation has often been ascribed to the utilization of science and technology. Some global conservation non-governmental organizations (NGOs) describe their work as '[...] grounded in science', where their 'scientists develop innovative approaches and apply the best available information to efforts directed at meeting the needs of both nature and people in a changing world' (World Wildlife Fund, n.d., para. 1). The genesis of conservation biology as a discipline in the mid-1980s has been attributed mainly to rapidly changing human, social, economic and ecological relationships as technological changes 'accelerated humanity's capacity to reshape the world to meet human needs and desires' (Meine et al., 2006, p. 633) and created concerns about species extinction. This pressing need to save nature from the impact of development emerged as a global concern, such that conservation biologists 'aim[ed] to change science, conservation, cultural habits, human values, our ideas about nature, and ultimately, nature itself' (Takacs, 1996, p. 2). Since then, conservation biology has successfully woven together several concepts related to contemporary conservation needs, such as 'wilderness protection, sustained yield, wildlife protection and management, ecosystem health and ecological restoration' (Meine et al., 2006, pp. 632–633). Thus, conservation, informed by conservation biology and its key concepts, emerged as a solution to the perils of development, with conservation biologists positioned as the saviours.

In this article, I argue against the notion of conservation as an antidote to development by suggesting that a nature conservation regime is akin to a development regime. I develop this argument in the context of Nagarahole Tiger Reserve, situated in the state of Karnataka in India. I argue that throughout the history of the governance regime at Nagarahole, though the focus shifted from forest governance (through working plans) to wildlife governance (through management plans), the language of science remained the same and scientific discourse continued to be seen as the means to achieve a progressive or 'developed' form of nature conservation. The instrument of such a 'scientific' form of nature conservation has been 'technology', by which I refer mainly to material tools such as maps and communication devices.

I also argue that scientific and technologically advanced conservation, as it was pitched in these policies, existed mostly on paper. In reality, everyday governance drew on—and continues to draw on—the lived experiences of the inhabitants of protected areas, who are usually marked as backward (understood as not developed) in official documents and continue to be seen as not belonging to the conservation area. The main aim of this article is to establish that conservation *is* development in its conceptualization and practice, and therefore that any critical examination of conservation practice should be carried out through the lens of development. This will not only expand the critical understanding of conservation read as development, but will also highlight the different ways in which the discourses and material practices of development have permeated popular discourses across different domains.

In the following sections, I first review the relevant literature to show how conservation and development have been linked and situated in relation to each

other. Next, I establish how science and technology have been invoked and used as inherent to a development regime. After establishing these linkages, I examine these interrelations by drawing on archival and textual material and the lived experiences of my interlocutors in Nagarahole.

Locating Conservation Within Development

The relationship between nature conservation¹ and development has been primarily understood through three approaches. In the first, they are seen as conflicting projects, with conservation posed as an antidote to the harmful effects of development on nature. This perspective has produced the radical conservation idea of seeking people-free conservation enclaves, which has been termed ‘fortress conservation’ (Brockington, 2002). As Goyes and South (2019) argue, ‘conservation discourses argue for the maintenance of nature in its pristine state’, while ‘development discourses seek to justify re-engineering spaces to give place to cities, monocultures and roads’ (Goyes & South, 2019, p. 89). Such an explanation places conservation and development at two extreme ends of a spectrum of human fashioning of the natural world and order—protection versus extraction. The view of conservation as an antidote to development projects has been termed as an ‘environmental fix’ (Castree, 2008a, 2008b; Cohen & Bakker, 2014; While et al., 2004), ‘a makeshift environmental solution to the problems caused by the capitalistic mode of production’ (Ramesh & Rai, 2017, p. 26).

The second approach is an extension of the first, where conservation and development are also seen in contrast to each other, but the focus is on reconciling the differences between these two agendas by linking them. Although they were regarded as separate and opposed categories, the idea of bringing their discourses together commenced in the 1980s. Development was considered to be the ‘modification of the biosphere and the application of human, financial, living and non-living resources to satisfy human needs and improve the quality of human life’, while conservation was defined as the ‘management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations’ (International Union for Conservation of Nature and Natural Resources, 1980, Introduction, para. 3, 4). The two terms were linked to ensure the well-being of humans as well as the natural world. The concept of sustainable development emerged around the same time as a global effort to ensure that development strategies for economic advancement integrate with environmental protection policies (United Nations General Assembly, 1987, p. 43). In the field of nature conservation, the linking of these concepts also resulted in the genesis of integrated conservation and development projects in the 1990s, when development, interpreted as poverty alleviation, was incorporated into conservation projects such as ecotourism, community-based conservation and sustainable resource harvesting (McShane & Wells, 2004).

In the third approach, the perceived separation between the two categories was largely obliterated by viewing conservation projects through the lens of

neoliberalism, with the emphasis on capital investment for financial gains. Such forms of conservation, seen particularly in Africa, are largely driven by transnational NGOs and funds, which have been playing a key role in the formulation of conservation policies and wildlife-oriented tourism activities. Such approaches to conservation have been conceptualized as neoliberal development models. For instance, Brockington and Duffy (2010, p. 470) note that 'a close relationship between capitalism and conservation is nothing new' and 'neoliberal conservation is but the latest stage in a long and healthy relationship between capitalism and conservation'. Transnational institutions have also been found to influence neoliberal conservation for capital accumulation, commodification, and green grabbing (Brockington & Duffy, 2010; Büscher, 2009, 2010; Castree & Henderson, 2014; Corson, 2010; Igoe & Brockington, 2007; Ojeda, 2012; Sullivan, 2006). Such analyses have offered a deeper and critical understanding of conservation understood as a neoliberal project driven by free market interests. In this article, I further extend this analysis by bringing in another angle, that of 'science'.

By examining the everyday governance of Nagarahole Tiger Reserve, I contend that nature conservation is but another face of the mainstream development regime and is not opposed or parallel to it. To do so, I first argue that forestry operations introduced during the colonial period established a development regime in Nagarahole by adopting a scientific approach to governance. I then demonstrate that the discourse of science was continued in the conservation regime that was introduced later. Drawing on the third approach discussed above, I view conservation and development as imbricated in one another, but in ways that predate the neoliberal moment. Here, I draw on David Ludden's (1992) conceptualization of 'development regime', which cuts across late colonial and post-colonial states. The development regime includes: (a) ruling powers that claim progress as a goal, (b) a 'people' whose conditions must be improved, (c) an ideology of science that proffers principles and techniques to effect and measure progress, and (d) self-declared, enlightened leaders who would use state power for development and compete for power with claims of their ability to effect progress (Ludden, 1992, pp. 251–252). I also draw on James Scott's (1998) and Tania Li's (2007) conceptualizations of development, in which key tools are homogenization and categorization, to make my argument about the development-centredness of the post-independence conservation regime at Nagarahole.

I use the term 'regime' as theorized by Lawson (1993) as 'clearly related to the values embodied in the principles and norms and implies that rules and procedures (which can take various forms and still be consistent with the character of the regime) derive from and are secondary to these values' (Lawson, 1993, pp. 185–186). In the context of a wildlife or conservation regime, this implies that the broader value system or principle is conserving nature to protect wildlife, but the rules and practices to achieve this goal may vary. In this article, I use 'forestry regime' to refer to the value system of resource extraction for financial gain; within this regime, the specific rules and practices consistent may vary over time. I show how both forestry and (wildlife) conservation regimes, despite emerging from distinct political structures and at different points in time, were part of a larger development regime that was established during the colonial period.

Science and Technology as Tools of Development

The 'science' that I refer to in this article has been called 'western science' by some scholars (Bala & Gheverghese Joseph, 2007; Chakrabarti, 2004), because it made inroads into India during the colonial period and introduced a 'scientific culture that values the systematic exploration of nature' (Basalla, 1967, p. 611). This science was viewed as 'intrinsically progressive as well as superior to other forms of knowledge originating outside the sphere of organized scientific activity' (Guha, 1985, p. 1939). MacLeod (1992) explicated how 'western' knowledge was established as the dominant form of knowledge in the colonies, as it claimed to be driven by 'scientific acumen'.

However, such binaries between 'western' and other sciences have been rejected by others as highly simplistic and linear, because they hide 'a great array of independent and interdependent local histories of the production, application and diffusion of natural knowledge' (Chambers & Gillespie, 2000, p. 227). The rhetoric of science has varied according to the particular political and economic situations in the colonies (Philip, 1998). Anderson (2018) argues that scholars should 'recognize the postcolonial plurality of knowledge making' (2018, p. F), an insight that can be extended to the production of knowledge in the colonial era as well. Below, I discuss the introduction of new and improved methods of data collection for biological research in Nagarahole as an example, while recognizing that the binary between indigenous and western science is untenable.²

I draw on Macleod (1992) in my use of terms, such as scientific acumen, theories and principles, to highlight that certain forms of knowledge became dominant in the official governance of Nagarahole during the colonial period. I show how these terms were employed in that context to argue that the kind of scientific approach used in the forestry and conservation regimes in Nagarahole has itself been problematic. Although the question of science and technology in relation to society has been extensively examined (Gibbons, 1999; Latham, 2016; Schoferet al., 2000), the aim of this article is not to critique the *usage* of science in general, but to explore *how* its utilization has shaped a particular conservation landscape and its people.

Cooper has argued that a close 'organic' relationship developed between the progress of scientific and technological knowledge and the growth of production in advanced industrial capitalism, and that science has become critical for social and economic development (Cooper, 1971, p. 165). Thus, he establishes a direct relation between science, understood as technological knowledge, and development, understood as economic and societal progress. Others have examined the fraught relationship between science and nature:

Anybody who hoped for a straightforward and harmonious relationship between scientific understanding of ecological issues and agreement on the practical steps to be taken will have been disappointed [...] For one thing, many of our leading ecological problems can be seen as the *result* of our technological civilisation (Yearley, 1996, p. 174).

Despite these critiques, science and technology continue to be used to resolve ecological issues. Scientific forestry, as we currently know it, emerged in Germany in the mid-nineteenth century (Bryant, 1994; Guha, 1985; Kumar, 2012) and was later introduced in colonial India where it was largely used for the optimal extraction of forest resources. More recently, scientific theories have been employed to inform nature conservation, increasingly through the use of technologies (Wall et al., 2014) such as spatial mapping, GPS collaring and camera trapping. This shows how the use of science and technology evolved and has become an everyday norm in the practice of conservation.

In the following discussion, I draw on the works of Scott and Ludden to explore the interface between development and conservation through the lens of scientific governance. In particular, I examine the governance (or planning) practices and use of science and technology in the everyday management of Nagarahole Tiger Reserve. While Scott has examined governance by the state and described the ‘administrative ordering of nature and society’ as ‘the unremarkable tools of modern statecraft; [...] as vital to the maintenance of our welfare and freedom as they are to the designs of a would-be modern despot’ (1998, p. 4), Ludden highlighted science as a tool for development, understood as ‘moral and material progress’ (1992, p. 251). I bring these two conceptualizations together to show that the mirrored relationship between conservation and development is neither modern nor new, but has existed at least since the establishment of the scientific approach to forest governance. Further, as my main purpose is to examine the conservation-development nexus and establish that this nexus predates the current neoliberal moment, I have paid more attention to the colonial period than the post-independence era in tracing developments in Nagarahole.

Landscape of Nagarahole and Its People

Nagarahole Tiger Reserve, situated in Kodagu (also known as Coorg) and Mysore districts of Karnataka, is one of the most prominent tiger reserves of India, also home to elephant, leopard, gaur, deer and other wild animals. Wildlife conservation in the part of Nagarahole that falls in Kodagu district was introduced in the 1950s, and became more regimented, intensive, and expansive after 1975 when the state government declared its intention to incorporate the reserve within a larger area and form Nagarahole National Park (forests of Mysore district were also included in the new park). The final notification came out in 1983, and in 2008 Nagarahole was declared a tiger reserve.

Nagarahole is home to many Adivasi communities, the most prominent being Jenu Kurubas, Betta Kurubas and Yeravas. In the 1970s, when a strict wildlife conservation regime was established in Nagarahole, many Adivasis were forcibly evicted from their homes without compensation—a process that continued for over a decade. In 1999, the state government initiated a compensatory relocation scheme in which people were moved out of the forest and settled in nine rehabilitation colonies in Mysore district, near the boundary of the reserve. Today, the main source of income for members of these communities is employment as

labourers in coffee plantations and agricultural fields in Kodagu and Mysore districts. Some families, mainly of Yeravas, also cultivate their own lands.

This article builds on my doctoral research during which I collected narratives and documents in the field to understand the process of displacement in Nagarahole. These include official reports and forest working and management plans from both the colonial and post-independence periods. I used these documents to trace the historical evolution of governance methods and use of science and technology in the landscape. The site of Nagarahole, with its long history of forest exploitation and conservation, allowed me to understand this evolution as well as the multiple development discourses that are circulated by different actors—particularly conservation practitioners and Adivasi rights advocates.

Establishment of a Forestry Regime in Nagarahole

During the early colonial period, colonial administrators considered the governance of Coorg to be ‘primitive’ and ‘simple’ (Richter, 1870, p. 385). Consequently, in 1834 the entire administrative structure of Coorg was reformed to make it the ‘most advanced [administrative] systems of modern Government in India’ (Richter, 1870, p. 397). This included the establishment of various branches of state administration and earmarking of forest areas for development. As in other areas of the country, the forests of Coorg were viewed as rich sources of timber to build ships and facilities needed for the expansion of the colonial empire. The establishment of an official forest administration in Coorg in 1863–1864 instituted a structured management system for exploiting forest resources.

During the early years, in the absence of standardized rules and regulations, forests were managed through ad-hoc practices. For example, Kurubas were called on to judge the maturity of trees for extracting timber (Van Someren, 1867). However, this practice was not favoured by later forest administrators, who believed that such unsystematic timber cutting based on crude indigenous knowledge caused vast deforestation. George Bidie, a Surgeon General in the colonial administration who was posted in Coorg in 1867–1868, expressed his concern about the destruction of the forests in Coorg due to the cutting of trees for timber as well as coffee plantations (which were being cultivated by European coffee planters) in the mid-nineteenth century (Bidie, 1869).

Because similar concerns were being raised in other parts of India as well, several forest laws were enacted (in 1865, 1878, and 1927) by the British colonial government, which increased state control over the forests. These laws marked the ‘administrative ordering of nature and society’ (Scott, 1998, p. 4) by replacing the seemingly ad-hoc local practices with ‘systematic’ and ‘uniform’ practices of forest governance. For instance, the laws provided for reserving and categorizing forest areas across the country and formulating specific rules and regulations for each category of forest. Such ordering was initiated in 1870 in the eastern forests of Coorg (Stebbing, 1926, p. 27), which are today part of Nagarahole Tiger Reserve.

These laws were also part of a larger country-wide drive to establish a 'scientific' approach to the management of forests through the preparation of forest working plans. These plans were prepared by 'visualizing a terrain where science could plan unimpeded the manipulation of the forest, compelled a more complete enumeration and disposal of local rights that might obscure the vision' (Sivaramakrishnan, 2000, p. 65). As I observed during my fieldwork, the main purpose of these working plans was to ascertain the amount of timber and firewood that could be removed without harming their future supply. These working plans laid the foundation of what the colonial administration regarded as a standardized system of management.

The first of these working plans was prepared in 1886 when older methods of timber felling (for the extraction of saleable trees) were abandoned. The 1886 plan prescribed a new system of selection-cum-improvement felling (Somaiah, 1959). In this system, valuable commercial species were favoured, while other less valuable or those interfering with the growth of the former were removed (Stebbing, 1923). This practice was modified in the 1912–1925 working plan with new regulations to improve future stocks of valuable timber. Also, further impetus was given to *kumri* cultivation³ for teak plantations in this plan (Somaiah, 1959).

The 1912–1925 working plan also introduced smaller administrative units called compartments, with detailed methodical listing of boundaries, soil and rock types, growing stock descriptions, forest types, and quality of timber species for each compartment. Along with evolving scientific practices, these steps further transformed forest management, making it more systematic and structured. Such systematization was intensified when the forests were divided into different working circles in the working plans for 1942–1955 and thereafter. These circles were categorized based on the prospective outcome from that area, for example, teak regeneration working circle, minor forest produce working circle, and an overlapping working circle of bamboo, minor forest produce and grazing. The management of each circle was separately defined with details such as estimated expenditure and management practices to be adopted.

Thus, the overall forest management structure was strengthened and refined over time with the steady division of forests into ever smaller categories and areas, each with its own clearly defined rules and regulations. These plans, along with four additional ones prepared between 1912 and 1970, resulted in the heavy manipulation of forests. They only concentrated on a few aspects of the forest—those which provided revenue to the state—and reduced all other relationships to a set of rights and concessions allowed to various actors. This approach established a forestry governance regime, elements of which were later incorporated into the governance of Nagarahole Tiger Reserve.

In addition to the forests, the Adivasi communities of this region also came under the purview of colonial forest management. Prior to the colonial period, their primary mode of subsistence was gathering food from the forests and practising shifting cultivation. Sedentarization was a key method employed by the modern state to make a society legible for 'taxation, conscription, and prevention of rebellion' (Scott, 1998, p. 2). In Coorg, settling this mobile forest-dwelling population was essential to ensure regular supply of labour. Various strategies were adopted to incentivize certain practices of the Adivasis and to

prevent their flight to other areas, such as allowing a modified *ragi kumri* cultivation inside the forests instead of banning the practice altogether, and replacing single cash payment with the same value of food grains, clothes and cash as a reward for the successful protection of the forests from fire (Thurston & Rangachari, 1909).

In addition to dividing forests into different administrative blocks and sedentarization of the Adivasis, another measure that amplified state control and symbolized the transition from forest management to nature conservation was the transformation in the bureaucratic apparatus established in Nagarahole since the 1970s. For administrative purposes, Nagarahole was divided into forest ranges, with each range being further divided into smaller administrative units. This resulted in the ubiquitous presence of forest staff and associated infrastructure. A senior forest official informed me that Nagarahole has 27 permanent anti-poaching camps, each staffed by several forest guards and watchers who are equipped with wireless communication systems. In addition, several fire towers are spread across the forests—forest guards or watchers who are well acquainted with the area are posted in these towers to enable early detection of the fires. By the 1990s, the working circles were replaced with zones, with each zone having its own objectives and management strategies to ensure the conservation, particularly of keystone species like tiger, as well as promote tourism activities.

Science for Nature Conservation: Establishment of a Wildlife Regime in Nagarahole

In this section, I discuss how the use of scientific principles and tropes and the notion of ‘scientific temper’ shifted from the extraction of forest resources to the protection of wildlife. For example, concepts such as selection felling were replaced with predator-prey relationship and habitat suitability index. Another important addition under the wildlife protection regime was the introduction of new technologies, from basic topographical maps to maps prepared using remote sensing and geographic information systems.

In the post-independence period, while silviculture operations to improve forest yield (using methods such as selection felling, artificial regeneration and rotation) continued, policies were formulated to reflect concern for wildlife protection. This led to the notification of Nagarahole Wildlife Sanctuary in the 1950s. A wildlife protection circle, called Sanctum Sanctorum,⁴ was formed in the 1957–1972 working plan. This aspect of wildlife protection was based on two divergent forest management approaches. One approach wanted silviculture operations banned in the Sanctum to make it a natural haven for wildlife, while the other considered that wild animals had become accustomed to forestry operations (of timber felling, grass removal, and general human movement) and so tree felling would no longer disturb them (Somaiah, 1959, p. 47). Neither argument was supported by any scientific studies, and as revenue generation from forests remained the main focus of forestry operations at that time, selection felling of timber was permitted in the Sanctum Sanctorum circle. Also, until the 1970s,

some wild animals, such as bison and wild boars, were considered harmful to the forests, especially in the highly valued timber plantations of teak. Wild elephants were also considered dangerous to young teak plants, but the damage caused by them was not considered to be substantial (Somaiah, 1959, p. 10).

A scientific approach to wildlife conservation was introduced by Alva (1978) in the working plans of 1978–1979 to 2002–2003. A Wildlife Sanctuary Working Circle was also formed; one of its objectives was ‘to serve as a field laboratory for wildlife studies’ (Alva, 1978, p. 62). Till the 1970s and 1980s, although wildlife conservation received sufficient impetus both nationally and globally, scientific studies of wildlife were relatively scarce, especially in India.⁵ Thus, although Alva formed a wildlife circle, what kind of knowledge should be used for wildlife protection was not clarified. However, the plan prescribed that:

[...] writing up of a separate wildlife management plan for Nagarahole National Park is taken up by Addl. Chief Conservator of Forests (Wild-Life), Bangalore, for scientific management of wildlife and its habitat as per the guidelines contained in the National Wildlife Action Plan (Alva, 1978, p. 63).

Towards the end of the 1980s and through the 1990s, many studies were carried out at Nagarahole,⁶ most focussed on the tiger. In fact, as Lewis (2005) noted, Nagarahole became the first site in India where biological research on tigers was conducted by someone outside of the Indian Forest Service. These studies fundamentally modified how the landscape was perceived: it came to be seen as a safe haven for wildlife, especially tigers, and so was to be kept free of ‘human disturbance’. This view was sharply opposed to the earlier forestry regime which focussed on resource extraction. The scientists involved assisted forest officials in formulating the management plans for Nagarahole. They also helped to establish several local conservation NGOs which engaged in wildlife advocacy, research, and practice in Nagarahole. During the 1990s, these scientists started working with global conservation NGOs which had projects in India. These NGOs played an important role in shaping Nagarahole’s wildlife regime, as they facilitated training programmes for forest officials and assisted the Karnataka Forest Department in carrying out the compensatory relocation programme. These programmes were mostly funded by international organizations, especially from the United States. In parallel, the scientists continued to assist forest officials in formulating the management plans for Nagarahole. As I discuss below, results of the scientific research carried out in Nagarahole was fed into these management plans. Due to the influence wielded by these NGOs, Adivasis were forced to leave their homes and lands, creating intense conflict in Nagarahole (Gupta, 2020a).

As mentioned above, the scientists who worked in Nagarahole also assisted in formulating the management guidelines for this landscape, which relied rather heavily on scientific concepts. For instance, the management plan prepared by M. K. Appayya for 2000–2010 mentioned many scientific studies and explained how the findings of these studies were relevant to Nagarahole. He cites the pioneering studies carried out by Sukumar on elephants in another forest area of Karnataka to highlight that the elephants of Nagarahole also exhibit similar

movement patterns and home ranges (Appayya, 2001, p. 32). He also cites studies by Ullas Karanth that explain the behaviour and ecology of wildlife inside Nagarahole and justify the need for conservation (Appayya, 2001, pp. 33, 103, 125, 164, 169). In later years as well, newer and supposedly improved methods and technologies were implemented in Nagarahole as it became fertile ground for ecological and wildlife research. For example, the older method of counting pug marks to estimate the tiger population was strengthened with the use of camera traps and radio collars. The concept of 'carrying capacity', which essentially means the population that can be sustainably supported by a natural ecosystem, became a new benchmark to ascertain the conservation action needed in the landscape. This was evident in a discussion with a member of a conservation NGO, who mentioned that '6000 people in 600 km² with 60 tigers and 600 elephants and several other gaur and other species, it's not going to work'. Further, '[...] these densities [of human population] exceeded anything that [this] forest could support naturally' and the ecosystem may even collapse. Such alarmist arguments⁷ have dominated the conservation discourse around Nagarahole and have justified the need for evicting people and creating inviolate areas to support wildlife populations (Gupta, 2020a). It is important to note that the local Adivasi communities were used to carry out the activities mentioned above, an aspect I discuss below.

In addition to these scientific studies, the management plan for 2000–2010 also mentions the need for conducting training programmes for forest staff to acquaint them with scientific methods such as 'census of elephant by dung counting', 'camera trapping and monitoring of tiger population', and 'line transect and pellet count monitoring' (Appayya, 2001, pp. 58–59). As mentioned above, such programmes were supported by a combination of national and international NGOs such as the National Fish and Wildlife Foundation's Save the Tiger Fund, Exxon Corporation, and Wildlife Society. Thus, a number of actors played a role in inculcating a 'scientific temper' in the Forest Department and influencing the everyday governance of Nagarahole National Park.

Advanced technology was also making inroads in the everyday management of the park. Forest personnel were provided with walkie-talkies and mobile hand sets for coordination. Detailed mapping also became essential for forest governance, and the 2000–2010 management plan included 22 remote sensing and geographic information system maps containing details about the physical and administrative aspects of Nagarahole such as slope, elevation, multicriteria analysis of elephant habitat suitability, and vegetation change analysis. To further encourage the use of advanced technology, Appayya (2001) recommended the setting up of a digital electronic weather station in each forest range to monitor rainfall distribution, temperature, humidity and seasonal average wind speeds, to improve fire control measures.

This discussion establishes the continuity in scientific governance from the forestry regime to the conservation regime, and demonstrates how the use of science varied depending upon the requirements of that regime. In the following section I discuss how lived experiences find place within the scientific governance of Nagarahole, by showing how the development regime (one where science

is privileged) is dependent on the experiential knowledge and customary practices of the inhabitants.

Everyday Realities of Nature Conservation: Customary Practices and Lived Experiences

During fieldwork, I visited many places inside the forests where Adivasis used to live prior to being forcibly evicted during the 1970s and 1980s. During one such visit, I noticed that forest personnel, including senior forest officers from the nearby forest office, along with their subordinate officers such as guards and watchers, had come to pray at a temple inside the forest. I had been told earlier that this was an important shrine for the Adivasis, mainly Jenu Kurubas and Betta Kurubas.⁸ When I enquired, a senior officer told me that they prayed in this temple every year before and after the fire season to seek the blessings of the deities. As the incidence of fire was very low that year, they had come to offer their gratitude. This incident struck a discordant note because the management plan and other official texts focussed on cultivating a scientific temper amongst the staff and had mostly elided Adivasis' role in conservation. However, such incidents show that customary practices find place within the scientific conservation regime of Nagarahole, because although the Forest Department is antagonistic towards the Adivasis and considers them an unwanted presence in the forest, forest officers do not hesitate to worship their deities to ensure the well-being of the forest. Moreover, the experientially acquired forest knowledge and skills of the Adivasis have been continuously used by the Forest Department. Adivasis served as labourers under the earlier forestry regime, and then as guards, watchers, trackers and field assistants under the nature conservation regime. However, Adivasi settlements were never seen as 'belonging' to the forest.

We ourselves worked for that [wildlife research carried out in Nagarahole]. We gave the names like Mara, Sundari, Daasu, and Mudiya [to the animals captured] [...] We measured weights and did all other work. We taught him [the scientist] about plants, trees, and animals.

The above narrative is from a Jenu Kuruba Adivasi leader who lives inside Nagarahole. His anger resonated with the frustrations shared by many others:

When he [the scientist] came here at that time, he carried a cotton bag with a camera and a notebook. Now he comes in a car and says that he needs the whole forest. [But] from where did he get the money? [...] Kings of the forest [Adivasis] became zero and he became a hero.

These narratives highlight the sense of betrayal that the Adivasis feel towards the 'outsider' scientists who used the Adivasis' expertise and knowledge to carry out their studies. Further, the same scientists advocated for the Adivasis' removal from the forests to create 'inviolable spaces' for wildlife. I experienced this deep-seated distrust of outsiders and researchers during the initial weeks of fieldwork,

when I faced disinterested and at times confrontational Adivasis. The conservation regime, while attempting to provide a peaceful safe haven for wildlife, created a volatile, conflictual atmosphere for human communities within Nagarahole. Thus, the formal language of scientific development subsumed the seemingly informal other (of experience).

During my interactions with them, personnel of the Forest Department and conservation NGOs usually referred to Adivasis as people in need of development, that is, in terms of improving their lives through poverty alleviation and better access to amenities. But they never spoke of them as guardians of the forests, with valuable knowledge and a valid existence within Nagarahole. However, a few forest officials did cite Adivasis as their source of knowledge and skills. For example, a retired forest official mentioned that he learnt to make snares and cages to trap small animals from the Adivasis, and he used the same knowledge while assisting the scientists in radio collaring studies because the animal capturing methods attempted by the scientists never worked. However, such recognition was limited to the Adivasis as sources of information and labour in field research. The lack of recognition of Adivasis' contribution was most evident in the emphasis given to protecting forest areas for wildlife and the need to create 'people free' spaces. Pointing to the 'poor' condition of Adivasis became a way to argue for such a space. One conservationist explained:

Two things became clear [to me] — one is that these densities [of human population] exceeded anything that [this] forest could support naturally, in some sense, without massive transformation of agriculture eventually and other things. Secondly, their living standards were pretty awful. People were romanticizing it outside but what I was seeing inside was everything ranging from malnutrition, their women being abused by Forest Department staff and contractors, [and] even by these hunters who came from the upper caste. [...] So, it was very clear to me that it was not a happy life as it was often portrayed.

This rationale given for evicting people from the forest was thus based on both the 'scientific concept' of carrying capacity and seeking 'improvement' (or development) for them. These conservationists believed that the Adivasis were not dependent on the forests for their livelihoods but rather on labour in coffee plantations outside the forests where they spent most of their day. Therefore shifting them outside would not be detrimental. Here, forests were not perceived as 'cultural landscapes that embody and reflect the historical, social and economic relationships between people and place' (Mahanty, 2003, p. 23). Rather, they were viewed as natural landscapes which were forcibly inhabited by people during the colonial period, who now needed to be rescued.

Because of this understanding, Adivasis were never consulted while formulating the working or management plans. As these plans are supposed to be based on scientific knowledge and advanced technologies, they provide little (or no) space for communities to participate in the governance of the forests. However, to stake claim over their forests and establish themselves as the true custodians, in 1998 several Adivasi rights NGOs, along with the Adivasis, compiled a People's Plan

for conserving and managing Nagarahole, based on their own cultural and traditional practices. The Plan was in striking contrast to the state-dominated narrative of conservation. Instead of advocating an 'only by the community' approach, this plan also included the state and other actors in management. Although the plan was discussed with senior forest officials, the recommendations were never adopted. On the contrary, the long-envisioned plan of making Nagarahole people-free commenced officially in the late 1990s with the implementation of the government sponsored compensatory rehabilitation programme (Gupta, 2020b; Mahanty, 2003).

While the indigenous and empirical knowledge of Adivasis remains outside the purview of official management plans, I observed that everyday management and patrolling depends upon this knowledge of the watchers and guards, most of whom belong to Adivasi communities of Nagarahole. These forest personnel embody both their cultural connections with the forest as well as the coded rules and regulations prescribed by the management plans. For instance, the middle-aged Jenu Kuruba watchers who accompanied me during a field visit had spent most of their lives inside the forest and had also been evicted from their settlements. While showing me their earlier settlement locations, they reminisced about how they had lived deep inside the forests, offered prayers at their old temples, and shared their knowledge of the trees and animals. At the same time, they assumed the role of Forest Department personnel, such as when they found a man wandering inside the forest and took him to the range office and filed a complaint against him. Here, both structured and codified rules were followed alongside the embodiment of experiential knowledge and informal practices.

Discussion: Science, Governance and Conservation as Development

The forestry regime established in Nagarahole during the colonial period laid the groundwork for a type of scientific governance that was codified and formalized through the working plans. These plans were critically important in two ways. First, they drastically altered how forests were viewed (and governed) by introducing a highly systematic forest governance regime: there was a clear division of forests into several levels, and each level had its own management system and practice. These plans established an administrative infrastructure (both bureaucratic and physical) inside the forests, aided by everyday forest management, highlighting the increased government control over the forests. They also appear similar to development projects, with systematic division of administration, clearly designated boundaries and well-defined rules and regulations, instead of haphazard management. Second, they prepared the ground for long-term governance of the forest, following scientific principles. Both these aspects of systemization and scientific governance are synonymous with modernization and development (Ludden, 1992; Scott, 1998).

The wildlife conservation regime established after the 1970s, and particularly the practices adopted after the 2000s, highlight the advances made in science and technology for nature conservation. The infrastructure (both bureaucratic and

physical) established through such plans, as well as the Forest Department personnel posted inside the forests, indicate how an 'inviolable space' is created by extensive and intensive manipulation of the forests with the use of technology and not by simply 'letting nature take its course'. Activities such as cutting grass and creating fire and viewing lines were judiciously practiced to let the area 'grow naturally', but only up to a certain limit.

As the nature of the regime changed in post-independent India, the language of science as progress and development remained and continued to make its presence felt. It established the conservation landscape of Nagarahole as a development project, with the use of science and technology (Ludden, 1992) as well as through systematic management using the management plan (Scott, 1998). I therefore argue that forest governance in Nagarahole, from the colonial period onwards, indicates the establishment of a development regime within which forestry and conservation regimes flourished. Changes in the political system, and the ways in which scientific knowledge was employed, did not alter the larger ideological stance of the development regime.

The wildlife conservation regime worked within the official guidelines mentioned in the management plans, but was also dependent upon the informal experiential knowledge and skills of the Adivasi forest personnel for day-to-day governance. This conclusion echoes Scott's argument that a '[f]ormal order, to be more explicit, is always and to some considerable degree parasitic on informal processes, which the formal scheme does not recognize, without which it could not exist, and which it alone cannot create or maintain' (Scott, 1998, p. 310). Such a development regime, while amply aided by local practices and knowledge, does not find legible expression for the latter and ultimately disempowers the local communities (Goyes & South, 2019). In the case of Nagarahole, it is not 'informal practices' in the form of experiential knowledge and skills of the Adivasis, but the use of science and technology that is seen as the marker of 'best practices' in conservation. Such formal schemes and policies (enacted through the working and management plans discussed in this article) are generally understood to be based on logical and systematic ways of thinking. However, in another context, Lindblom (1959) convincingly argues that policies are formed by 'muddling through' and not necessarily through a rational process. This idea of 'muddling through' becomes a useful way to understand the forest management practices of Nagarahole—scientific, that is, rational, logical, and systematic on paper—but ad-hoc (whether 'formal' or 'informal') at the level of everyday practice.

Lindblom (1959) further argues that official policies are typically formulated through incremental changes to on-going governance structures and not by a comprehensive overhaul of the system. This may explain how science and technology for conservation continues to thrive at Nagarahole. Forest governance policies, driven first by colonial, then post-independence, forest administration, and later by conservation goals, never underwent a complete restructuring to provide legitimate spaces to local communities in forest governance. Their local knowledge and developmental needs, such as providing infrastructure facilities, remain unrecognized in policy discourse. The eviction of Adivasis from these landscapes highlights how the idea of development is used by conservation biologists to gain

legitimacy for the ideologies they propagate. Similarly, Li (1999, p. 296) makes the point for the postcolonial era that ‘concern with welfare and improvement falls under the rubric of “development” and provides many governing regimes with a significant part of their claim to legitimacy’. I extend this argument for the colonial period, where the logic of improvement and welfare was similarly used for both forests and their inhabitants. Legitimacy gained through the invocation of science also creates what Guha (1997) has called ‘authoritarian biologists’, where ‘authority’ is assumed by the adoption of scientific practices.

An important question raised by this article is that if conservation (which is considered for the greater good) is seen as another facet of a development regime (which is associated with exploitation, control, and drastic modification of our world), would it strip off some of the benevolence assigned to it by its practitioners and advocates? This raises further questions about whether conservation projects should receive the same level of scrutiny as do development projects (at least in principle), where localized social impacts as well as environmental costs are assessed during the conceptualization stage. In most cases, the social impact of conservation areas has been assessed only after their formation, with end of pipe solutions. For instance, the enactment of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 in India has provided the legal basis for local communities to decide the fate of development projects proposed on their lands, even if in practice this remains a struggle. Similarly, conservation projects could be opened up to community-level scrutiny prior to their implementation. Another question this discussion raises is whether conservation plans should be prepared and conservation areas demarcated on the basis of abstract scientific theories or contextualized local realities.

Conclusion

The case of Nagarahole Tiger Reserve highlights the complex ways in which conservation and development are intertwined with each other through the language of science. The formation of conservation areas was meant to be an antidote for the environmental destruction caused by development projects, but in practice conservation has always thrived on, and used, the same tropes of development—systematic and organized planning, science and technology.

In this article, I have argued that in Nagarahole, the colonial forestry regime that was designed to ensure the systematic extraction of forest produce, and the later conservation regime based on the principles of protecting nature and wildlife using science, are both facets of the same larger development regime. Scholars have generally pitched conservation and development either against each other or have sought an intersection between the two. Seen from the perspective of neoliberal capitalism, some scholars have also identified conservation as a value-generating development project. In this article, I have sought to advance this perspective by focussing on governance tools and the employment of science and technology to argue that conservation has always been part of the

development regime. I have shown that the seeds of this regime were not sown with the advent of nature conservation, but much earlier, during the establishment of forestry operations in the colonial period. Although this analysis concerns a particular site in India, it can be extended to other sites with similar historical trajectories. The arguments could also prove useful in examining conservation landscapes that are governed by the state and have not received investments from 'neoliberal' capital.

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Notes

1. In this article, I use the term conservation, whether of nature in general or wildlife in particular, to refer to the most dominant form of conservation practiced today globally, which is premised on the 'western imaginaries of nature and culture [separation]' (West et al., 2006, p. 256). Most of these conservation areas fall under state jurisdiction, which decides the rules and regulations of its governance. In many of these areas, transnational agencies also play a controlling role as they align with the state in providing funding, research inputs, technology, and other supports. A detailed examination of the role and influence of transnational agencies in conservation areas can be found in Brockington et al. (2008), Goldman (2001), Igoe & Brockington (2007), and Moore (2010).
2. For a deeper engagement with the literature questioning the binaries of western and indigenous science, also see Agrawal (1995), Raj (2007, 2013), and Sivasundaram (2005).
3. *Ragi kumri* cultivation refers to an agroforestry method where *ragi* (finger millet) and teak were sown interspersed with each other on the same forest land.
4. 'Sanctum sanctorum' as a concept mainly refers to the holiest place. In temples, it usually refers to the innermost part of the temple where the idol of the main deity

- resides and where only priests are allowed, with the entry of devotees being mostly restricted.
5. See Lewis (2005) for a detailed analysis of the lack of biological studies from India in the 1970s and 1980s due to conflicts between government officials and conservation biologists, who were often backed by US-based institutions and scientists.
 6. I have not discussed these studies in this paper. See Karanth (1995), Karanth & Nichols (1998), and Karanth & Sunquist (1992, 1995) for ecological studies carried out in Nagarahole in the late 1980s and 1990s.
 7. Saberwal (1998) has discussed how certain alarmist discourses around environment degradation based on discredited concepts and lack of research were selectively adopted due to a power struggle between two government agencies over forest land in Himachal Pradesh, India. He further argued that ‘forest policy was critically influenced by the institutional context within which policy was being formulated’ (1998, p. 311).
 8. This temple, known as *Balekovu devasthanana*, is situated in the Nagarahole forest range of the tiger reserve falling in Kodagu district. The Adivasis told me that the temple was established nearly 30 years ago when large-scale evictions forced these communities to leave their ancestral places along with their deities. During this visit, I also went to see the old temples and settlements from where Adivasis, both Jenu and Betta Kurubas were evicted. There I saw the *Ammale devasthanana* of *Ajjamma* and *Ajjayya*, their ancestors, who were shifted to *Balekovu devasthanana* after the evictions. This temple is important for both Jenu and Betta Kurubas, and over time has become a place of worship for other communities as well.

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