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The evolution of forest restoration in India: The journey from precolonial to India's 75th year of Independence

Anirban Roy[1,2,3] | Forrest Fleischman[3]

[1]Ashoka Trust for Research in Ecology and the Environment, Royal Enclave, Bengaluru, Karnataka, India

[2]Manipal Academy of Higher Education, Manipal, Karnataka, India

[3]Department of Forest Resources, University of Minnesota, St. Paul, Minnesota, USA

Correspondence
Anirban Roy, Ashoka Trust for Research in Ecology and the Environment, Royal Enclave, Srirampura, PO Jakkur, Bengaluru, KA 560064, India
Email: anirban.roy@atree.org

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Abstract

This paper examines the history of forest restoration in India. While contemporary literature often emphasizes the novelty of forest restoration programmes as exemplified in large-scale global pledges such as the Bonn Challenge or the Trillion Trees initiative, we show that forest restoration has thousands of years of history in India. Furthermore, this history plays an important role in shaping current restoration efforts, in ways that often undermine restoration goals. We find four themes in this history: the definitions of forests changed as the national administration metamorphosed, the philosophy behind the afforestation practices transitioned from commercial to a focus on forest cover that still underemphasizes ecological and subsistence values of forests, the involvement of forest-dependent people in forest restoration has been limited by government policies through much of this period, and current restoration practice draws more from the history of commercial timber production than from contemporary restoration science. Drawing on these insights, we argue that restoration programmes need to be reconsidered in India.

KEYWORDS
afforestation, colonial, forest restoration, India, postcolonial, precolonial

1 | INTRODUCTION

In the current regime of human-induced climate change, there is a global movement to restore forest cover as a mechanism to improve ecosystem services, adapt local communities, and mitigate climate change (Gisladottir & Stocking, 2005; Gosain et al., 2015; Griscom et al., 2017). The 15th of the 17 Sustainable Development Goals (SDGs) includes the restoration of forest cover as a measure to sustain 'Life on Land' (Zhang et al., 2020). To remediate desertification, soil erosion, and water drainage, India has adopted reforestation and restoration policies (de Jong et al., 2021). Gopalakrishna et al. (2022) reported that 1.58 million ha of land in India is suitable for restoration, for a potential of 61.3 Tg of carbon sequestration. Forest restoration may also improve the lives of forest-dependent people (Rao et al., 2021), but recent studies have reported widespread restoration failures (Coleman et al., 2021; Asher & Bhandari, 2021). This review article seeks to understand the historical development of restoration practices in India to better understand why contemporary practices are failing, and what can be done about it.

We find four major themes in our review. The first is the shifting meanings of forests, as and when the governance and the power positions changed, the perception of forests moved from natural resources to the habitat of military animals to sources of the national economy to a refuge from climate change. The second finding is closely associated with the first as restoration goals underwent multiple changes; at one point, afforestation was promoted to provide wood for the development of railroads, and at another point, afforestation was promoted to realize a goal of having one-third of national

land under forest cover. Third, we found that the role of forest-dependent people was ambiguous; the colonial exclusion of people from forests was based on an irrational and inadequate understanding of how forests should be conserved. But colonial laws persist and local people still have an inadequate role in government restoration policies. The fourth finding is that the practice of restoration is grounded in repeating historical practices, rather than in the growing science of ecological restoration or a detailed understanding of present needs. The hastening race to pursue 'green' has blinded us from the detrimental ecological and social impacts of the wrong choice of plant species. Apart from the addition of this article as an important resource to the literature of Indian forestry and restoration, the findings can better the planning and execution of prospective restoration projects. History is a surviving referent that sculpts the contemporary endeavours, in the interests of a country like India with a large scope of forest-based restoration. The lessons from this article are specific to India, but it is likely that the broader theme—of restoration being shaped by historical practices—is widely applicable.

2 | THEORETICAL BACKGROUND

A nation as diverse as India witnessed long and complex historical events of the forest–society interface (Sekhar et al., 2018). The changing meaning of forests can be traced through the relics of ancient India to the present-day forest regulations. Multiple investigations of Indian forest history have revealed that plants were deified due to their medicinal properties and personified as Lord *Varuna* during the Vedic era (Srivastava & Barman, 2019). The *Atharvaveda*—the fourth oldest Veda—mentioned the human interaction with forest flora where the people classified, appreciated, and cultivated wild plants for their therapeutic worth (Bagchi, 2011). Indian religious faith and principles have advocated the sense of 'altruism' in human minds toward nature, where the concern for forests surpassed their use values (Gupta, 2013). India's floral diversity in forests has always harboured the scope of tapping the traditional medicinal knowledge leading to the ancient practice of *Ayurveda* (Padalia et al., 2015; Parihaar et al., 2014; Shankar & Ved, 2003; Vibhuti et al., 2022). Above the ethnobotanical uses, plants represent cultural (and religious) significance in India. For instance, initially a forest plant *Ocimum sanctum* L. (holy basil) is domesticated to the extent that it is grown in the courtyard of Hindu households and tendered with great care (Tewari & Tewari, 2009). The connotation of forests was, therefore, partly influenced by religious psychology in ancient India, which slowly changed to other dimensions in the future.

The restoration of forests has been promoted as a solution to sustain the 'ailing' condition of the terrestrial ecology (Ravindranath & Sukumar, 1998). Forests in India have been lost due to their conversion to agricultural fields, factories, and settlement areas (Singh et al., 2017). A study reported that around 5% of Central Himalayan forests were converted to agricultural lands during 1963–93 (Semwal et al., 2004). In a similar study in the Western Ghats, Jha et al. (2000) found 26% of forest cover was lost to agriculture in 22 years (1973–95). Such human-driven land-use change alters the biophysical properties of the forestlands and degrades its ecological functionality, thus causing land degradation (Acharya & Kafle, 2009). These losses have spurred social movements such as *Chipko Andolan* (Shiva & Bandyopadhyay, 1986) involving struggles between government officials and forest-dependent people (Guha, 2001).

This article is concerned with forest restoration (alternatively, restoration), which is aimed at restoring degraded forest lands. However, in most (global and Indian) cases, the concept of restoration has been loosely applied (Schweitzer, 1998; Aronson & Vallejo, 2005), where the primary approach is to plant one to three overstory tree species (like, *Quercus* sp., *Pinus* sp., *Eucalyptus* sp., etc.), precisely, revenue-yielding timber species (Gardiner et al., 2004; Stanturf et al., 2009). Such dictatorship of timber-based forest economic models on the forest management practices has limited the notion of reforestation to tree-based monoculture plantations (Ratnam et al., 2011). The concept of restoration has traveled a long way across the historical timeline forest protection policies ranging from rulers' edicts to government decrees bracketed the strategies of restoration.

The environmental consciousness of stakeholders in the Indian history of forests and its management has focused on disparate attributes of restoration based on the forest discourses of the concerned period. There was a dichotomy between the objectives of forest restoration (specifically, afforestation) during colonial and postcolonial India. As the readers move across the article, they will be able to discern the evolution of the concept of forest restoration in India from ancient to modern times. The review is based on the evolution of the state policies—precolonial, colonial, and postcolonial—showing trends of change and continuity. From the emerging themes, this article provides a suggestion that forest restoration needs to embrace the social aspects under its aegis such that the preconception of restoration as a 'biological intervention' changes in the light of climate change adaptation and mitigation.

3 | METHODOLOGY

This is a systematic review (Snyder, 2019) focusing on how the idea of forest restoration in India changed over the course of more than 2000 years. Following the framework by Pullin and Stewart (2006), we staged our systematic review as—formulating the question, designing a review protocol, searching and selecting relevant data, data synthesis, and reporting the results. The exhaustive literature search was conducted using keywords or search terms. The sources accessed were academic databases and search engines covering peer-reviewed journal articles, conference proceedings, published theses, edited books, statistical data, and copies of acts and regulations from governmental websites. The sources included Academia, CAB Abstracts, Directory of Open Access Journals, Google Scholar, ISI Web of Science, JSTOR, PubMed, and Semantic Scholars. The abstracts of articles in the journal *The Indian Forester* were given special attention owing to its vast archival collection of papers on Indian forestry dating back to 1875.

The searching was through keywords or search terms either in the title or the abstract or both. The choice of keywords or search terms was based on a preliminary exercise using intervention and target terms with the scope of maximum articles. We also had a "set term" of "India," which was kept unaltered throughout the searches. The intervention terms were "forest restoration," "forest definitions," and "forest management." Complimentary target terms like "afforestation," "reforestation," "social forestry," and "colonial forestry" were employed as indicators for "forest restoration." Specific acts, laws, and regulations/policies were separately explored through a chronological scale. The article is divided into three broad parts depending on the major temporal phases. The first part is concerned with the precolonial era wherein the authors discussed the forest legislations and restoration policies that dated back to the time of the *Mauryan* empire—the first pan-Indian empire that covered a maximum of this nation's region followed by the *Mughal* understanding of forest restoration. The second part dealt with the colonial regulations of the Indian forests and how they molded the idea of forest restoration. This part also discussed the colonial misperception of labelling grasslands as 'degraded' creating a premise for tree plantations in the name of restoration. Finally, the third part catalogued the postIndependence forest restoration attempts and the government initiatives to increase forest cover. This third part is extended into the fourth to present the more recent forest-related transformations in India (Figure 1).

4 | PRE-COLONIAL UNDERSTANDING OF FOREST RESTORATION IN INDIA

Arthashastra—the ancient Indian treatise drafted by (Chanakya) Kautilya (ca 375–c.a 283 BCE) contained information on the classification of forests, duties, and responsibilities of forest officers toward preservation of forests, and rules including game laws, penalties for forest exploitation (Boesche, 2003; Basu & Miroshnik, 2021). In a similar time frame, afforestation was highly accentuated by *Kautilya* when he advised adopting monocultural plantations. The motivation behind afforestation was to improve the Nation's forest reserve through growing valuable tree species (Shah, 2010). Contemporary forest restoration initiatives in Indian states can be closely linked to this school of thought. Moreover, concepts of recreational forests and social forestry were mentioned in the *Arthashastra*; this marks the earliest records of interactions between forests and people whose latest reflections can be observed in the community forest restoration programmes of modern India (Shah, 2010). Having said that, there were policies for revenue collection through timber and forest-related products (Kamini, 2019).

The concept of forest restoration in ancient India can also be traced to the late monarchical history of the *Mauryan* dynasty when Emperor Ashoka (c. 268–c. 232 BCE) declared trees should be planted on both sides of the roads and abolished the burning of forests (Negi et al., 2015; Rakshit, 2005). In obedience to the 14 *Rock Edicts of Ashoka*, fruit plants and medicinal herbs were grown on wastelands (Kumar et al., 2012; Dagar & Tewari, 2017). *Abhayaranya*, the first concept of sanctuary and national park in India, was conceived during Ashoka's reign to restore forest and its resources (Prakash, 2015). Records of afforestation for specific purposes in reserve forests outside the limits of *Abhayaranya* have also been found relating to this time (e Mustafa, 2002). In addition to the existing rules (like levying fines) of forest maintenance, he declared more stringency to the rules related to forest destruction due to clearing or burning (Mishra, 1994). One of the primary philosophies for the forest restoration attempts during that period was to ensure a healthy environment for elephants owing to their significant roles during battles (Gautam & Rajan, 2014). Another was the ideologies and principles of nonviolence adopted by Emperor Ashoka following the principles of *Gautama Buddha* who personified and revered nature and its components (Jha, 2004). During the same time, metal implements such as copper and iron became more widespread, and local communities were not incentivized enough for the forest products which gradually led to less forest destruction (Ray, 1996).

The Indian subcontinent was ruled by the *Gupta* dynasty (c. 200-c. 600 ADE) after the *Mauryans* and the forest governance was similar to that in the past (DasGupta & Shaw, 2013). However, this age also witnessed the enactment of new regulations where the forests were extensively converted into agricultural lands (Pandit, 2013). Referred to as the Golden Age of India,' this period encouraged peasantry by

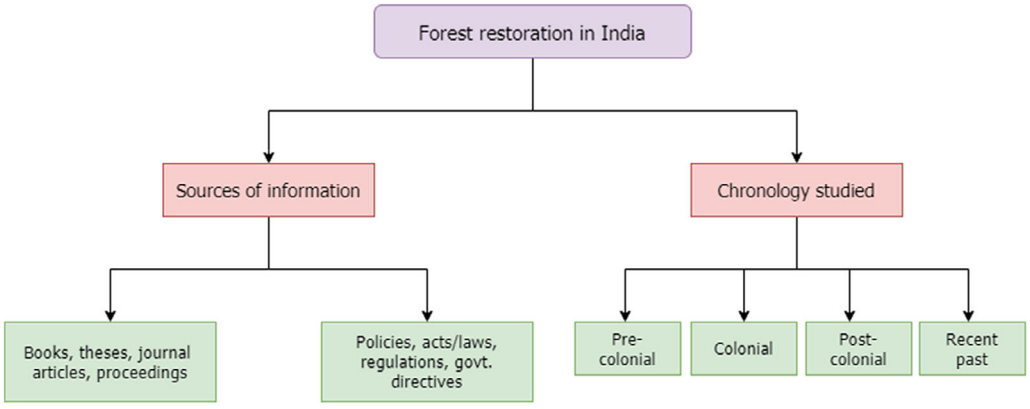

FIGURE 1 Methodology of the review [Colour figure can be viewed at wileyonlinelibrary.com]

bringing the forests and uncultivated lands under the plough (Chakrabarti, 1996). After the *Guptas*, the stability in forest management practices worsened and forest-dependent communities mostly took charge of the forestlands (Iftekhar & Islam, 2004). The outlook toward forests transitioned into becoming sources for state revenues (Ghosal, 2011) and *Gaulmikas* (revenue collectors) were appointed for this purpose. Few fibre products like cotton, hemp, and flax were economically exploited during this phase (Demske et al., 2016), and such plant species were prioritized in forest conservation.

It was followed by the *Mughals* (or *Moguls*) (1526–1761) building an empire that spanned almost all of India. The religious paradigm of medieval India changed, where the definition, use-value, and restoration of forests were interpreted through the *Quranic* verses (Qazi & Zia, 2019). The forests were treated as water in the Islamic religious sculptures where it was avowed as a free gift from nature, with no check on destroying it (Ribbentrop, 1900). At this point in the Indian forest history, forest-dependent communities bore all kinds of privileges and responsibilities concerning forests and *Mughals* did not show interest in forest restoration and protection (Anonymous, 2021). The social narrative during the Mughal regime was dominated by an agrarian frame with an indent toward animal hunting at the *Shikargarh* (Parpia, 2018). Both these actions gradually led to increases in deforestation, and if the *jungle* (forest was labelled as *jungle*) was left as natural wilderness, it was more often reserved for the emperor's game hunting (Ribbentrop, 1900). *Zamindars*—the royal mediators—were rewarded if they brought forestlands under the category of cultivation; thus, there was a monetary award for clearing forests (Ghosh, 2015). However, at the end stage of the *Mughal* sovereignty when *Sher Shah Suri* took over the authority, roadside plantations were encouraged (Kant, 2001). Although not directly, the *Mughals* contributed to specific floral protection through building magnificent gardens, which was also one of the reasons behind clearing forests (Roy, 2020).

This era is also associated with sacred groves, although we do not know when these were first created. These are protected forest patches deified as a heavenly abode of spirits (Gadgil & Vartak, 1976). Symbolic of an ancient preagrarian hunter-gathering era, a religious dialog between forest-dependent people and forests existed where the people used and valued the forests (Malhotra et al., 2001). This cannot be directly labeled as restoration, but this planned natural protection of forests from exploitation could be seen as a restorative action of that era that continues to the present. As a lesson, sacred groves can be envisioned as a tool to manage biodiversity while involving forest-dependent people (Bhagwat & Rutte, 2006).

5 | TRANSFORMATION OF IDEAS OF FOREST RESTORATION IN THE COLONIAL ERA

There is contraposition of opinions regarding the colonial forest management and restoration; Gadgil and Guha (1993) admired precolonial forest restoration over the colonial, tagging the former as a 'period of better ecological equilibrium.' They depicted a nemophilist society devoid of any external influences, which were negatively impacted by colonial regulations. Differing from this perspective, Richard Grove (1955–2020) opined that it was the British period that initiated scientific interventions in the Indian forests along the lines of conservation, which he termed 'Green imperialism' (Thomas, 2009; D'Souza, 2020).

Colonial encounters with the Indian forests were mostly driven through profit-aimed practices and cultural perceptions (Joshi et al., 2018). Krishnan (2015) reported that the forestry and restoration techniques in colonial India mainly revolved around recreation and revenue, with little consideration to the native floral diversity. The restoration initiatives emphasized commercially viable tree species generating one- to two-species monoculture tree plantation(s) (Guha & Gadgil, 1989). Grasslands were often misconstrued as degraded lands based on lack of (seasonal) greenness, and it was assumed that degradation was the result of grazing and fires; therefore, there was a need to 'forest' the grasslands (Vanak et al., 2017). Grasslands were planted with exotic tree species, which either turned invasive or have eased invasions in the longer run (Joshi et al., 2018; Kumar et al., 2020; Vetter, 2020).

According to (Chakrabarti 2007), the colonial administration initially sought to convert forests to farmlands and subsequently devised policies and regulations for their conservation. The colonial dialog with Indian forests can be placed into three distinct phases: 1796–1850, 1850–1880, and 1894–1947. During the first phase (1796–1850), there were accounts of plantations mainly during the 1820s to save deforested lands—through growing plants like teak (*Tectona grandis* L.f.) in the Bengal Province of India (Grove & Grove, 1996). The British took charge of teak plantations in other parts of the Nation like Malabar (Johnson, 2010) to create an enterprise of commercial forestry. There are multiple notions of science in 'scientific forestry' undertaken by the colonial government in the Indian forests (Kumar, 2012), depending on the narrative through which it is described. However, these apparent restoration activities were either directly or indirectly designed toward infrastructural development (like railways, shipbuilding, and revenue) of the British empire (Kumar, 2010). At the later stage (1847–1850), trees were seen as the potential media that can affect climate and forest productivity (Bandopadhyay, 2010) and that added to the incentives behind tree plantations.

In the second phase (the 1850–1880), plantations of exotic tree species (*Acacia* sp., *Coffea* sp.) were designed to address the rising demand for wood and establish so-called scientific forestry (Sutton, 2011). Local people were detached from the plantations, forbidding them to access the sites for any purpose (Aravindakshan, 2011). *Eucalyptus* sp. started replacing *Acacia* sp. by the early 1870s. This transition was due to the threat from Acacias (particularly, *Acacia melanoxylon*) as a probable weed with its branches invading buildings and rapid vegetative propagation (Sutton, 2011). Eucalyptuses were received with great gusto for their timber values and easy growth (Bennett, 2010). With the goal of using scientific forestry to restore grasslands, the practice of *Jardinage* forestry began in the 1880s (Gass, 1894). *Jardinage* is a French word meaning gardening inspired by 17th Century French forestry. It was introduced in India to maintain uniformity of the trees (Davis & Robbins, 2018). The utility of the plants was limited to aesthetic sensibilities where misshaped trees were removed. This phase also marked the inauguration of the Indian Forest

Department in 1864 with *Dietrich Brandis* as the first Inspector General of Forests (Guha, 1990). Soon after, the first Indian Forest Act was passed in 1865, which handed forest ownership to the state with no reflection on any restorative activities (Saravanan, 1998). At that time, forests were obliged to meet the needs of the growing railway industries across the Country (Das, 2012). In a similar vein, colonial forest 'conservation' efforts undertaken in the then-future were dictated through the lens of railways and revenue, deprived of any ecological concerns (Guha, 1983). The second Indian Forest Act (passed in 1878) followed the former, widening the definition of forests to include plantations along with land covered with trees, brushwood, and *jungle* (Dhanapal, 2019). The notion of reserved, protected, and village (and/or civil) forests was instituted for the first time in India with this forest act (Tripathi, 2016). Nevertheless, this division of forests further limited the people's access only to a few areas of village/civil areas (Prasad, 1999). There was no reference of restoration—afforestation and/or reforestation—in the 1878 Forest Act. The Madras Forest Act of 1882 (also known as Tamil Nadu Forest Act, 1882), which applied to only one region, further curbed the rights of the native inhabitants on using forests under the banner of 'environmental conservation' by expanding the area under reserved forests for commercial purposes (Bennett, 2014).

The third phase (1894–1947) saw a series of forest acts (and policies) that were amended to bracket the larger goals of forests. The Indian Forest Policy of 1894—the first forest policy—was central to the agrarian needs of the nation with no discussion on extant forest cover or measures to increase the same (Joshi et al., 2011). Along a similar line, Murthy and Kumar (2019) argued that this policy did stress aspects of climate changes, soil erosion, and the need to maintain forest cover—only to scale up the agricultural production. This policy, however, loosened the colonial grip over the forest by permitting local people access to the small forest areas adjacent to villages (since products were trivial to the Government) and forest pasture lands (Roy, 2017). There was also a clause in the policy that community lands would be granted to the Crown, should the need for land under cultivation arise (Kulkarni, 1987). The first forest school—the Imperial Forest Research Institute (renamed as the Forest Research Institute, FRI)—began working in 1906 in Dehradun, which paved the first fondation stone for scientific forestry and subsequently, forest restoration and planning in later India (Kumar et al., 2019). The Indian Forest Act 1927 (Ministry of Forests, 1927) followed the footprints of its predecessors and was revenue-centric where minimal legal rights were left with forest-dependent people (Ghatak, 2009). This act states that the Government could afforest any suitable land within the reserved forests. Similarly, under the section of social forestry, the act mentions that the Government could afforest any land voluntarily given to them by the owners (Act No. XVI of the Indian Forest Act 1927). Regardless of these aspects, the primary objective behind afforestation was to increase revenue collection with no environmental targets (Sivaramakrishnan, 1995). The first forest park of India was established in 1935 under the United Provinces National Park Act, 1935 (Ministry of Forests, 1935)- which is presently known by the name of Corbett National Park (Kandari & Singh, 1980); the interest was wildlife conservation.

6 | CONTINUITY OF FOREST RESTORATION IN POSTCOLONIAL ERA

Post Independence, there was no stark change(s) in the way forests were considered; the sole difference lays in the fact that instead of serving the purposes of the colonial government, forests were serving the mercantile and industrial bourgeoisie (Guha, 1983). India's postcolonial forest regulation and restoration strategies are often condemned for their inheritance of attitude from the British minds (Haeuber, 1993). Instead of replacing the colonial system of fiscal forestry with one focused on social and environmental goals, the Forest Departments of the newly autonomous Country based their policies upon colonial ideologies.

The National Forest Policy (NFP) of 1952 (Ministry of Environment and Forests, 1952) was independent India's first forest policy with three major objectives, enabling forests to support the rural households and economy, increasing forest productivity, and supporting forest-based industries. Afforestation was one of the measures to achieve these objectives (Ghosh, 2015). This policy promoted forests as a national-level natural resource, clearing the way for agriculture and commercial timber-monocultures to satisfy the growing demands of paper and wood industries of a newborn, self-governing country (Jewitt, 1995). For the first time, there was stress, through this policy, that at least 33% of the national land area should have forest cover (Bhattacharya, 2015). Kulkarni (1983) pointed that the NFP 1952 looked past commerce and industries by considering ecological and social processes like denudation in mountainous areas, erosion along treeless banks, and creating tree lands to maintain favorable climatic conditions for the sustenance of forest-dependent people; the intentions behind tree plantations were slowly changing from money to human wellbeing. The enunciation of this policy and its attempt to improve the microclimate through growing and sustaining trees was tinted through events like *Vana Mahotsava* to increase awareness and evoke the sense of obligation among people regarding preserving forests and planting new trees (Mamoria, 1967). Landlord-based tenure systems like *Zamindars*, *Jagirs*, and *Inams* were annulled, and the princely states were merged during this time resulting in additional degraded forestlands coming under direct government control (Singh, 2013). The Third Plan Progress Report 1963–1965 (1968) (Planning Commission, 1968) detailed that such forestlands were 'rehabilitated' with plantations of more valuable species through silvicultural interventions, espousing a sense of restoration. This policy also placed regulations on grazing like imposing fees and prohibiting shifting cultivation, referring to deterioration of forest health through these activities (Satpathy, 2015). The aegis of restoration, though changed from outright commercial to scantly ecological, did not consider the social element. Even using terms like 'scantly ecological' may invite repercussions from workers like (Saravanan 2007) who claimed that most five-year plans of afforestation around and after this policy was accelerated through commercialization, raising economic plantations in nondegraded and degraded lands.

The Indian Forest Service (IFS), part of the civil service intended to educate the environmental elites, was created in 1966

(Hannam, 2000). Weil (2006) remarked that compared to the colonial-era Imperial Forest Service, the principles changed from forest conservation to an emphasis on remunerative exploitation of the forests. Likewise, as (Grove 1998) felt that the environmental concerns for deforestation and climate change were more prevalent in the colonial time, he argued that excessive forest logging in ecologically fragile islands inspired colonial conservationists to take charge in founding the forest Department at that time. Drawing its roots with few changes from the British period (Hannam, 1999), the modern IFS's role is, therefore, contentious with respect to forest restoration. Large-scale plantations of *Eucalyptus* sp. were created between 1970 and 1990 after replacing the natural forests as well as in the wastelands (Bargali & Singh, 1991; Bargali et al., 1993). After 6 years, Wildlife (Protection) Act (WPA), 1972 (Ministry of Environment and Forests, 1972), was passed which was, in essence, dedicated to preventing poaching, yet it also added a ban on cultivating and planting endemic plants under Schedule VI (Mohanraj & Veenakumari, 1996).

In 1976, the National Commission of Agriculture (NCA) (Ministry of Agriculture and Irrigation, 1976) drafted a report, which explicitly prioritized the industrial timber needs with no direct investment in upgrading and involving forest-dependent people. NCA, 1976, underlined the importance of social forestry programmes outside the reserved and protected forests to provide for the needs of different stakeholder groups (Badola et al., 2015). Tewari and Singh (1984) argued that the social forestry that included afforestation in community lands was meant for dual purposes, uplifting the Nation's economy and rewarding the forest-dependent communities financially through employment. The property rights over forests were re-defined through NCA, 1976, while afforestation resolutions were devised like planting the degraded areas and public places like schools, roadsides, and river banks under social forestry (Rabha, 2014). There was an increase of 36.04 million ha forest 'area' from 1950–51 to 1976–77 despite large-scale tree felling by private owners since government orders (NFP 1952, NCA 1976) declared all forests as national property (Bhojvaid et al., 2016).

The perpetual dissociation of forest-dependent people with forests in the name of forest conservation and afforestation gave birth to social dissent. A famous incident was the *Chipko Andolan* (1972–1979) where the people, mostly women, from financially deprived classes hugged the trees when logging began through a governmental order to procure the land for business (Haigh, 1988). Even though forests are natural resources for every human, *Chipko Andolan* was identified as a women's movement signifying the role played by the socially recessive gender for forest conservation during that time (Tyagi & Das, 2017). Mawdsley (1998) commented that though this movement was limited to the Himalayan hills of Uttar Pradesh (now the State of Uttarakhand), it created widespread awareness of the forest conservation and restoration issues. The *Chipko* workers understood the importance of 'what the forest wants,' they believed that only specific trees should be grown in a particular geographical region such that the suitable needs for soil, water, and energy were fulfilled (Bhatt, 1990). Stirred from the *Chipko* movement in northern India, the *Appiko* movement was launched in the southern Indian state of Karnataka to stop commercial logging in the Western Ghats (Karan, 1994).

The Forest Conservation Act (FCA), 1980 (Ministry of Environment and Forests, 1980), was promulgated to regulate forest clearing by mandating the state governments to seek approval from the central government before taking any actions (Sarin, 2005). This act provided for 'compensatory afforestation,' this meant when forestland was transformed to other land uses, compensatory plantations were to be raised on a spatially similar nonforested land or double the area of degraded forestlands (Ravindranath et al., 2008). Compensatory afforestation was treated as additional plantation activity and not to be considered as a diversion of part of the yearly plantation programme (Narain & Maron, 2016). Nonetheless, there were inadequacies with its directives, lack of monitoring of sapling mortality, unregulated time durations, and absence of environmental audits (Parikh, 2018). A recent study by Balaji (2014) found that the FCA, in 1980, operated in an asymmetrical power setting that involved nonrecognition of pre-existing rights over forest and ambiguities in access to requisite information; forests were perceived only as trees taking no notice of their social values, ultimately turning into a disputed land. This observation can be supplemented with the redefinition of 'forests' and 'nonforest purposes' by the Supreme Court of India in 1995 where the verdict was to apply FCA, 1980 to all forests regardless of its ownership or legalities (Rosencranz & Lélé, 2008).

In the opinion of Hazra (2002), forest restoration (in India) can be achieved if there is consensus between the Government and forest dependent people, echoing India's National Forest Policy (NFP) of 1988 (Ministry of Environment and Forests, 1988). In light of this new policy, several states restricted tree felling in (fragile) ecological areas showing that the attitude towards forests was not confined to its commercial virtues (Ballabh, 2000). The NFP 1988 attempted to build linkages between forest and people, encouraging local participation in restoration (Ahuja, 2014). The term 'restoration' was employed in this forest policy where there was an emphasis to restore mines (section 4.4.2 of NFP 1988) with surveillance for granting mining leases (Maiti, 2013). The NFP, 1988, enlisted restoration and preservation of ecological balance and encouraging local community involvement among objectives to maintain environmental stability (Sundar & Selvam, 2007).

There was a steep curve of increase in the cumulative area under afforestation from the late 1980s to the early 1990s (Ravindranath et al., 2006). Joint Forest Management (JFM) began during this period. Social forestry (ordained through the NCA, 1972) proved to be the predecessor of this future endeavour of JFM in 1990 (Ravindranath et al., 2008). JFM was supposed to entail forest-dependent people protecting forests in return for usufructs (Deb, 2020). JFM was different from Community Based Forest Management (CBFM) in its ownership regimes, in JFM, government remained the legal possessor of the forests and forest-dependent communities managed forests jointly with a government agency, while CBFM entitled the communities as the owner and manager of the forests (Shi et al., 2016). JFM has been criticized for granting too much power to the representatives of forest departments (Menzies, 2004) yet is still viewed by many forest officers as a strategy to restore degraded forestlands (Hazra, 2002). Murali et al. (2002) raised a concern that the species chosen for plantations (mostly afforested) were not the result of consultations with

the local community and thus were mostly exotics like *Eucalyptus*, *Acacia*, and *Casuarina*. Another study indicated community discontent with the species choice in JFM stands with little or no decision-making rights of people in selecting the plant species (Bhat et al., 2000). Hence, JFM's ability to enhance biodiversity and natural regeneration on degraded forestlands remained dubious (Ravindranath et al., 2000). Although JFM's performance as a participatory forest management programme to increase the forest cover in India was recognized (Sreedharan & Matta, 2007); the applicability of the term 'restoration' was highly debated. Sundar (2000) critiqued inefficiency of JFM for its structural inequities with forest-dependent communities having no capacity in decision-making processes.

7 | TRANSFORMATIONS IN THE POSTCOLONIAL ERA (EG: EXPANDING ROLE FOR PEOPLE IN GOVT. FORESTS, CAMPA, BROADER TRANSFORMATIONS IN AGRARIAN RELATIONS)

It took around half a century for the independent Indian Government to revise the national interest in forest policies from the vendible production of timber to restorative management sufficing ecological and forest-dependent community needs. By this time, arbitrary tree plantations were a widespread practice to meet the prescribed forest cover of 33% at the national level as decided by the NPF 1952.

In 2006, the Forest Rights Act (FRA) (Ministry of Tribal Affairs, 2006) was contrived to address the historical injustice to the forest-dependent (and/or fringe) people by clarifying their rights (Badola et al., 2015). It was the result of frequent confrontations between the governmental agents and forest dependent people (Baumann, 1998). FRA, 2006, did not bear any links to forest restoration, but it was the first law to acknowledge the rights of the forest-dependent people on forests (Gadgil, 2007). Indirectly, FRA 2006 influenced forest restoration through recognizing the collective rights of the forest-dependent people to manage and use forests as common properties (Springate-Baginski et al., 2008). According to (Macura et al. 2011), JFM received more momentum through the FRA 2006 to restore degraded zones of the reserved forests through people's participation. The bureaucracy of the forest departments, however, impeded the execution of the FRA, 2006, on the ground (Bandi, 2013). In the interim, the Biological Diversity Act (BDA), 2002 (Ministry of Environment and Forests, 2002), was enacted to facilitate the conservation of biodiversity, sustainable interaction with the ecological actors, and impartial sharing of benefits from the biological resources (Prathapan et al., 2006); it was mostly applied to diversify the ecological richness with nothing about restoration.

As one of the eight Missions under the National Action Plan on Climate Change (NAPCC), National Mission for a Green India (NMGI) was launched by the centre in 2008 (Jha, 2012). This humongous ($US 7 billion) environmental intervention was developed in après of climate changes aiming to (restore and) afforest different ecosystems like moderately dense and open grasslands, mangroves, wetlands, croplands, and urban areas in the decadal period of 2010–2020 (Ravindranath & Murthy, 2010). The fundamental locus of NMGI lay with 'greening' in the context of restoration, climate change adaptation, and mitigation (Kaushiva, 2016). The State Forest Departments held the strong centralized control of forests through this mission, disdaining the participatory forest management (Jha, 2012). Vijge and Gupta (2013) praised the NMGI for its synergistic purview to mitigate climate change, protect biodiversity, and secure local livelihoods through its consequences. Contrary to that, critics claimed the NMGI was an over-ambitious effort promising better livelihoods and climate change mitigation but instead introduced inappropriate species by interfering with local ecologies and empowering forest departments at the expense of forest-dependent communities (Balooni & Singh, 2003). The quantified goals of NMGI (Negi et al., 2015) delivered a morbid obsession of 'greening' mostly driven by afforestation activities by the government agencies and lately, environmental non-governmental organizations (NGOs). Moreover, the NMGI planned a market-based model to mitigate climate changes by carbon trading (Bijoy et al., 2013). The architects of this mission curtailed the forest-dependent community's dialog with the forests by banning grazing and trading of firewood (Datta, 2016). Apart from these facets, the irrational 'greening' enthusiasm coupled with the colonially ingrained misunderstanding of grasslands (also, savannas, scrubby, and thorny forests) targeted these ecosystems with inappropriate restoration (Ratnam et al., 2016; Vetter, 2020). Large-scale tree plantations were the modus operandi of restoration where the easy-growing, low-maintenance exotic (and/or invasive) plant species were favoured (like *Prosopis juliflora* [Sw.] DC.) (Robbins, 2009).

The Compensatory Afforestation Fund Management and Planning Authority (CAMPA) commenced through the NMGI (Singh & Singh, 2014). CAMPA was positioned as a statutory body by the 2016 Compensatory Afforestation Fund Act (CAFA) where its main focus was to manage funds collected for afforestation under the FCA, 1980 (Parikh, 2018). The 'pass mark' of one-third forest cover of the Nation's total land area (and two-third of the area in hills) empowered the CAMPA as well (Rai et al., 2018). Forest-dependent people were left in the pursuit of restoration in case of CAMPA trampling their interests and rights as participants in the activities (Saxena, 2019). Another catch with CAMPA-based afforestation plantations was planting after the rotational felling by forest officials (Ghosh & Lohmann, 2019), debriefing the actuality of 'compensation.' In a study by Bhatnagar (2004), it was evaluated that the plantations through CAMPA in the study site were mostly monoculture and thereby, 'unacceptable' with 50% or more nonnative species. The notion of restoration had and has more or less been trapped within the walls of 'greening' with no or less heed to the ecosystem and its local inhabitants. CAMPA was criticized for its tendency to compensate for the aged carbon-rich forests with lower value monoculture plantations, which may have little restoration value.

Integration of trees in farmlands, agroforestry, has been an agrarian approach of restoration in some states of India (Saxena, 1997). Agroforestry has the potential to improve livelihoods through production of food, fodder, and firewood and, at the same time, mitigate climate change (Pandey, 2007). It was pioneered as a reforestative, conservation-aimed concept in the early 1990s to promote livelihood

alternatives (Smith, 2010; Nerlich et al., 2012). Agroforestry was a better alternative to monocultures and fosters higher diversity with native trees in the canopy (Chaudhary et al., 2016). Alavalapati et al. (2004) and Jose (2009) considered agroforestry as a measure to procure a wide range of goods like rubber, coconut, coffee or cacao, eradicate poverty, nurture soil fertility, improve carbon storage, water, and air quality. With respect to yields, Mutanal et al., (2007) revealed that mixed-species agroforestry of fast-growing tree species and tamarind have better yields than sole tamarind along with the potential to prevent soil erosion in Karnataka. Higher level of management and nonnative species pose are possible disadvantages of agroforestry (Mosher, 1984). Recognition of agroforestry's potential for carbon sequestration for climate change mitigation and ecosystem service provisioning have been high across different states (Sathaye & Ravindranath, 1998). Agroforestry can also contribute to restoring degraded nonforest lands, such as salinized lands studied by Gupta and Dagar (2016).

During the postcolonial period, another popular strategy was to increase green cover outside recorded forest areas, in areas formally designated by the colonial government as 'wastelands' (Kaur & Mittal, 2020). Although wasteland was originally a financial rather than an ecological designation (i.e., lands that did not generate revenue, not necessarily lands that were degraded), there were ventures to restore those lands with commercially viable afforestation (Balooni & Singh, 2003). The financing and budgetary constraints crippled the efforts (Balooni, 1999). Thus, the National Bank for Agriculture and Rural Development in India (NABARD) was instated to offer financial facility to afforestation programmes in the wastelands (Pradhan, 1990). The core interest in national forest policies being 'greening' was mirrored in these activities as well (Saigal, 2011). According to Balooni (2003), afforestation in the wastelands emphasized generating revenue either from timber harvests, carbon markets, or other techniques.

Like Social Forestry and JFM, Community-Based Forest Management (CBFM) also existed in selected parts of the Country but has received less attention than the former (Saigal, 2012). Singh (2008) concluded that appropriately managed CBFM can restore forest cover, provide carbon mitigation, and sustain rural lives. The devolution of power over forest resources signified CBFM where the forest-dependent community could decide on forest-oriented processes, be it regulation or restoration (Nayak, 2003). Disproportionate income backgrounds among the community members, however, incumber CBFM's proficiency in balancing local lives (Tole, 2010). On the other hand, it has proved to be an effective restorative approach for ecosystems like mangroves (Selvam et al., 2003).

8 | CONCLUSIONS

The evolution of forest restoration as a concept is overlooked in India. The present article explored such terra incognita to provide a 'saga' to the proponents of Indian forestry on the 'do's' and 'don'ts.' The

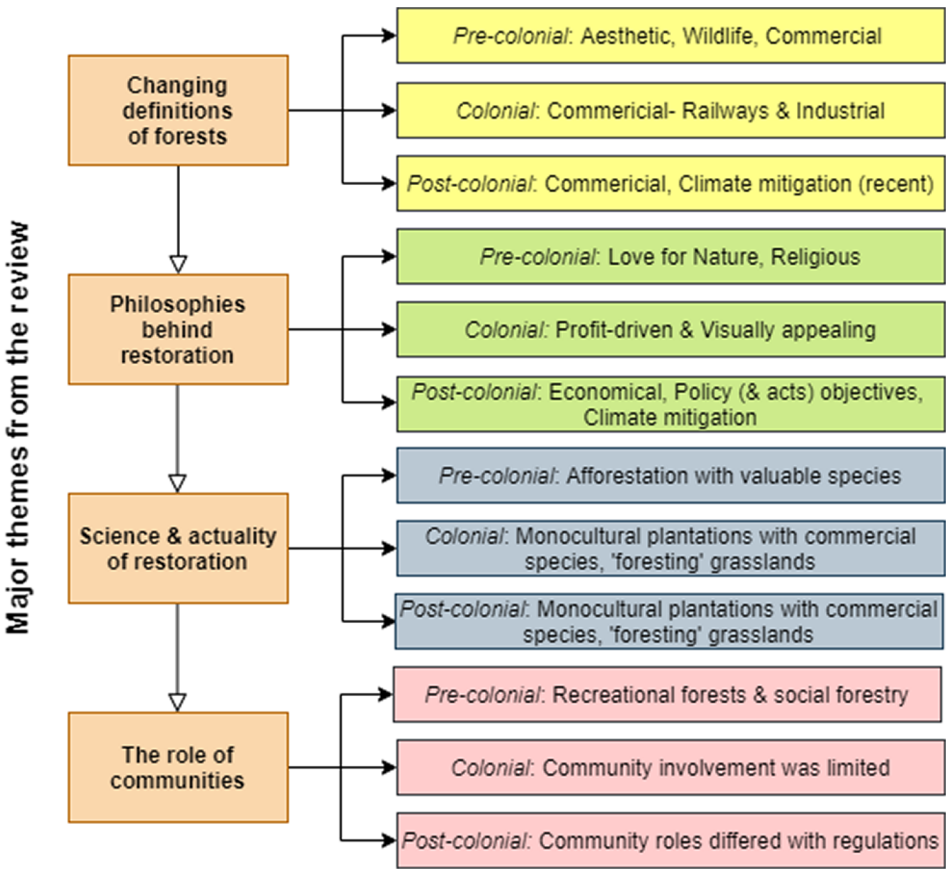

FIGURE 2 Major themes from the review [Colour figure can be viewed at wileyonlinelibrary.com]

evolutionary journey of forest restoration raised a few pertinent questions plaguing the present forest regulations like, 'Should we be bothered with the increase in forest cover or increase in forest area?" and "Are forestry-based interventions appropriate in every ecosystem-types?'

The major themes extracted from this study are changing definitions of forests, evolving philosophies behind the restoration, drifting role of forest-dependent people, and the contrast between science and actuality of restoration (Figure 2). At one point, restoration was the putative banner to gain financial benefits through commercial trees, and at another point, restoration was good enough to meet policy goals (like 33% forest cover). Beyond this aspect, there are opacities in implementing forest-based restoration enterprises, given that the scientific understanding and on-ground attempts of restoration are incongruous with each other. Integrating forest-dependent people with forests and restoration initiatives has been a debated idea since the idea of restoration is tightened with scientific expectations. This review article documents such knotted impressions of Indian forestry through more than 2000 years.

There was a shift in the Indian forest regulation from production to conservation (Ghosh & Sinha, 2016), advocated through global summits and treaties. Restoration *ipso facto* adheres to conservation, but the mistake happens when we envision restoration as a 'greening' endeavour. Mere greening does neither mimic forested tract's ecological services nor ensures long-term sustainability. Additionally, the organic relationship shared between the forest-dependent people and forests should never be ignored in restoration. The social science and science of restoration should balance between the needs of forest-dependent people and species appropriateness.

Indian forest governance had and has placed confidence on the colonial laws and practices even after 75 years of freedom. Leaving the blatant abuse of power by the State, even with drafting a new Constitution in 1949, the status quo of colonial power and abuse was piled on every commoner in the Country. A freeze of the situation in 1947 and rethinking of all 'grandfathered' colonial laws was needed to begin with a clean slate. Truly democratic exercises should decentralize central power to lower political strata like *Panchayati Raj* institutions, city/town borough, or ward level community organizations to begin anew.

To begin with, there should be a defined nomenclature like forests, grasslands, and ownerships. India State of Forest Report 2021 (Aggarwal, 2022) is a testimony to how these terms are misapplied. Annually, a massive area under grasslands is converted to tree-based forest plantations resulting from the obscurities in defining them. It is the need of the hour to ride on the correct 'green' side in the quest for restoration.

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CONFLICT OF INTEREST

The authors declare no competing interests.

AUTHOR CONTRIBUTIONS

Anirban Roy reviewed and analyzed the literature and drafted the manuscript. Anirban Roy and Forrest Fleischman conceptualized the content and design of the article. It was supervised by Forrest Fleischman. Both authors read, reviewed, and approved the final version of the manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Anirban Roy https://orcid.org/0000-0002-1284-736X
Forrest Fleischman https://orcid.org/0000-0001-6060-4031

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