



ELSEVIER

Contents lists available at ScienceDirect

Global Ecology and Conservation

journal homepage: www.elsevier.com/locate/gecco

Conservation notes

Reshaping conservation incorporating Indigenous perspectives

Kamaljit K. Sangha^{a,*}, C. Madegowda^b, M. Balasubramanian^c^a Research Institute for the Environment and Livelihoods, Charles Darwin University, Darwin, Australia^b Ashoka Trust for Research in Ecology and the Environment, India^c Center for Ecological Economics and Natural Resources, Institute for Social and Economic Change, Bangalore, India

ARTICLE INFO

Keywords:

Adivasi people
Conservation
Forest management
Indigenous peoples and local communities (IPLCs)
Tribal people
Indigenous knowledge
Indigenous land management

ABSTRACT

Typically, conservation is achieved by excluding, evacuating, or legally dismissing the rights of local/native people from using protected areas, resulting in evictions, ongoing distress, and dejection among many Indigenous Peoples and Local Communities (IPLCs) worldwide. However, the Biligiri Rangaswamy Temple Wildlife Sanctuary (BRTWS) in the Western Ghats offers a unique example of conservation where local tribal people, *Soligas*, have persisted and been living with tigers, elephants, bears, leopards, and other wild animals for millennia. In the past, they managed the forest which, under the colonial and later modern conservation policies, has been restricted and penalised. However, *Soligas*' continuous existence in the Sanctuary suggests that people's knowledge and skills must be contributing to enable them to co-exist with wild animals. Our integrated analysis of ecological, socio-cultural, and policy aspects and experience of working with *Soligas* in the BRT landscape typifies the importance of locals' knowledge in managing the forest — urging the need to recognise and support IPLCs' work for achieving conservation as well as socio-economic outcomes. This Note highlights the necessity to understand, recognise, and embrace IPLCs' knowledge systems from a conservation context. Emerging future economic opportunities through Nature-based Solutions, if developed equitably, sustainably, and in culturally appropriate ways in line with IPLCs' aspirations and responsibilities, can benefit both wildlife and people, while reducing wildlife conflicts and delivering multiple-faceted conservation outcomes globally.

1. Introduction

With growing recognition of nature and nature's services to people and their economies in recent years the need to reverse nature's degradation is becoming central to many organisations' businesses (DasGupta 2021; Intergovernmental Platform on Biodiversity and Ecosystem Services [IPBES] 2019). The United Nations Global Biodiversity Framework [GBF] during the 15th Conference of the Parties, in 2022, set the targets to protect 30 % of land and water by 2030 (30×30 target; <https://www.cbd.int/article/cop15-cbd-press-release-final-19dec2022>). Guided by these targets, efforts to prevent further decline, protect biodiversity, and limit an increase in average global temperature are considered high-priority action areas for several global organisations such as IPBES, the Convention on Biological Diversity (CBD); International Union for Conservation of Nature (IUCN), many State governments, Non-Government Organisations (NGOs), and Indigenous organisations across the globe (WYSS Campaign for Nature, 2020). A key question is how to effectively conserve nature and the remaining biodiversity while meeting the growing needs of human population.

* Corresponding author.

E-mail address: Kamaljit.Sangha@cdu.edu.au (K.K. Sangha).

<https://doi.org/10.1016/j.gecco.2024.e03197>

Received 31 March 2024; Received in revised form 8 September 2024; Accepted 8 September 2024

Available online 10 September 2024

2351-9894/© 2024 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

An effective and logical way to conserve biodiversity, in the contemporary Anthropocene, is actively involving people in conservation in contrast to the prevailing exclusionary, colonial approach, called Fortress Conservation. Particularly, Indigenous Peoples and Local Communities (IPLCs) across the globe over millennia have played a key role by living with nature that includes some high-value conservation areas, most of which are now declared as Protected Areas (PAs) (WYSS Campaign for Nature, 2020). India is no exception to this where *Adivasi* people ('*adi*' means original and '*vasi*' means inhabitants) comprise 10.2 million people, i.e. 8–9 % of the total Indian population. In the process of establishing PAs since India's colonial past and later independence in 1947, many *Adivasi* have experienced evictions, displacements, and violations of their land rights, disruptions to culture and traditional knowledges and skills under different government regulations such as the Forest Conservation Act (1927) which was revised in 1980 and the Wildlife Protection Act (1972) (Rai et al., 2021). Whereas, living with nature has been an integral part of *Adivasi* living over millennia, and in so doing, they have developed specific knowledge and skills over time to manage the forests which contribute to delivering ecosystem services not just for them but also for the wider global public (Rai et al., 2021; Balasubramanian and Sangha, 2021; Madegowda and Rao, 2017; Madegowda, 2013; Ramakrishnan, 2005). However, to date, there is little recognition of *Adivasi* or more broadly IPLCs' role in managing the natural landscapes in India and many other countries, despite growing recognition worldwide although mainly through international platforms led either by the UN or some NGOs (WWF et al., 2021; IPBES, 2019; Reyter and Veit, 2017; Rights and Resources Initiative, 2015; Dawson et al., 2021; 2023).

In this article, we illustrate conservation from an Indian Indigenous community's perspectives of living with tigers and other wild animals within a famous global biodiversity hotspot, the Western Ghats, offering insights into how people managed the area in the past, live with wildlife, and suffered under the colonial policies and the Fortress Conservation approach. We further offer Nature-based Solutions (NbS) that can afford a win-win situation for people and government authorities for managing forests, delivering conservation outcomes, and enhancing the socio-economic situation of local communities.

2. Methodology and site description

The Western Ghats of India, covering an area of 164,280 km², along with the island of Sri Lanka, represents one of the 36 global biodiversity hotspots, and are listed as a world heritage site by UNESCO in 2012 for its exceptionally high level of biological diversity and endemism. Within the Western Ghats, the Biligiri Rangaswamy Temple Wildlife Sanctuary (BRTWS)—commonly called the BRT Hills, was declared a Wildlife Sanctuary in 1974, and now covers an area of 574 km² (Fig. 1). In 2011, this sanctuary was declared a

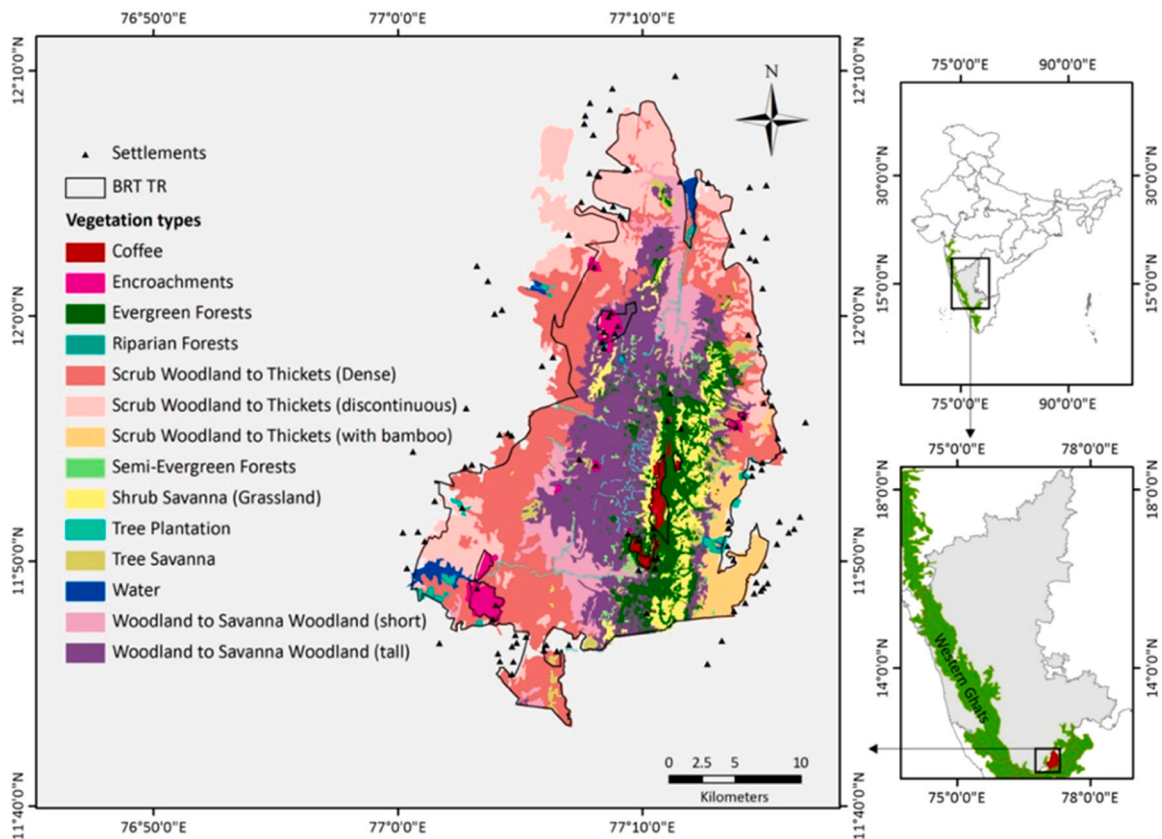


Fig. 1. The Biligiri Hills region with *Soligas* settlements (triangular dots) within the Western Ghats (subset maps of the Western Ghats in India on the right side) (Source: Mallegowda et al# 2015).

Tiger Reserve. Currently, the Sanctuary is home to about 70 tigers, >300 elephants, and many other animals such as deer (*Axis axis*; *Rusa unicolor*), bison (gaur; *Bos gaurus*), and leopard (*Panthera pardus fusca*), among other unique flora and fauna.

Soligas, the local tribal people, are an integral part of the BRT landscape and have been living within the area for millennia (Madegowda, 2013). They are called ‘the children of Bamboo’ meaning they have originated from Bamboo. They used to practice hunting and shifting agriculture, but this has changed under the current conservation regimes. There are about >40,000 people who live in and around the Sanctuary including the nearby towns and villages. Since colonial times, and in particular the establishment of the Wildlife Sanctuary in 1974 and later Tiger Reserve in 2011, many *Adivasis* have experienced evictions. To date, more than 1,000 tribal families live within and near the BRTWS, comprising ~12,500 people (Balasubramanian and Sangha, 2023). However, about three-fourths of the population had to leave the region due to external pressure.

For this research, we analysed the existing literature on conservation, and related policies, and interacted with *Soliga* elders via workshops and informal interviews and observations, to understand and integrate information from social, political and conservation perspectives. The online search with Booleans such as biodiversity, forest management, weeds and pests, socio-economics, and cultural values in combination with ‘*Soligas*’, ‘Western Ghats’, and ‘Biligiri Rangaswamy Wildlife Sanctuary’ (and Biligiri Hills), using Google Scholar and Web of Science (including the research database containing thousands of journals and other sources at our institute library), only revealed 10–15 articles. So, we relied on our experience in the region, especially C. Madegowda a researcher from the local community, to identify the key researchers and their publications, and then applied a snowball approach to find other relevant sources of literature. Hence, our literature search has been limited to mostly known sources who have either worked in the region and/or published focusing on *Soligas*, the BRT Hills and the overall Western Ghats. For policy analysis, we searched the Government of India and other related websites (see [Supplementary Material](#)).

Several reports have been published, but mostly concentrating on either the ecological, political or socio-economic issues of forest use and management (Ministry of Environment and Forests MoEF, 2011; MoEF, 2013; Ramesh, 1989; Sundaram and Hiremath, 2012; Mallegowda et al., 2015; Madegowda and Rao, 2013; 2017 and others). In this Note, we integrate these issues to understand the people’s role in forest management, analyse the impact of current policies, and suggest potential solutions. In addition, in late 2022 and 2023, we held workshops with *Soliga* elders to discuss their concerns and views on managing the forest and since then have had several informal conversations and meetings with senior members, including the 2nd author C. Madegowda. Overall, literature review, workshops, informal meetings, authors’ experience working in the field over 15–20 years and observations have informed the research presented here.

3. Current policies and legislation affecting *Soligas* and their conservation efforts in the BRT Hills

To protect biodiversity and associated high-value conservation areas, the Government of India has passed various laws and legislations since its independence in 1947, mostly following the colonial conservation approach (Rai et al., 2019; 2021). One of the most



Image 1. *Soligas* living within the BRT region, Western Ghats.

critical and guiding legislation is the Forest (Conservation) Act 1927, developed by the British for their own benefit including harvesting timber to generate revenue, whereas the use of fuelwood by tribal people was prohibited. This Act affected the most forest-dependent tribal communities, by giving power to the British Government to declare any land covered with trees as government forest and make their own rules to manage. It diminished people's millennia-old rights to use, value or manage forests, including village forests, and forcefully evicted people and banned any human/cultivation activities that many local and tribal communities historically carried to sustain their livelihoods (see [Supplementary Material](#)). Much later, the 1927 Act was revised in the form of the Forest Conservation Act 1980, which narrowly focused on conservation and brought in restrictions on State governments for using forests for non-forest purposes unless permitted. This Act protected four types of areas: reserved forests, protected forests, village forests and private forests but with little or no consideration of tribal or *Adivasi* communities.

Only the National Forest Policy 1980 and the Forest Rights Act 2006 are the key legal instruments that have recognised tribal communities' connections or more appropriately, their dependence for livelihoods on forests. These two policy instruments have allowed for Non-Timber Forest Products (NTFPs) collection, while equally encouraging *Adivasi* communities to find alternative livelihoods. There is a lack of understanding or realisation among the policymakers and forest management authorities that *Adivasi* people while sustaining their livelihoods from the forest also have much broader cultural and spiritual two-way relationships with their landscapes that contribute to people's well-being as well as to the management of the forest ([Balasubramanian and Sangha, 2021](#)). Currently, *Soligas* have very limited rights to manage the forest, if any ([Rai et al., 2021](#)). However, *Soligas*' involvement in the management of the forest can deliver multiple benefits including many ecosystem services (e.g. air quality, carbon and water regulation) for the local and wider public. Such an involvement will enhance locals' cultural and spiritual connections that play a critical role in their well-being as well as in passing on intergenerational forest knowledge ([Sangha, 2021](#); [Sangha and Russell-Smith, 2017](#); [Ramakrishnan et al., 2005](#)).

3.1. The impact of forest policies & legislation on *Soligas*

Since the introduction of conservation-related legislation in the 1970s in India, *Soligas* have experienced serious evictions and restricted access to land and forest resources in the BRT region ([Madegowda, 2013](#); [Agnihotri et al., 2021](#)). In the 1970s, about 70 % of the *Soligas* were forcefully removed from the reserve with the implementation of the Wildlife Protection Act in 1972. Their huts were burnt. Now these people have no access to land. The remaining 30 % survived in the deep interior parts of the BRT Hills and along the tracks in the forest (details in [Madegowda, 2013](#); [Rai et al., 2019](#)). Over the years, these people have been fighting for their rights to access land. The Government policies and initiatives have been focused on developing alternative livelihood opportunities, and establishing permanent settlements for *Soligas*, called 'Podu', providing a collective place for the community—each family with just one small room and some with a small piece of land ([Madegowda and Rao, 2013](#)). Currently, there are 61 *Podus*, out of which 19 are located within the tiger reserve and the remaining 42 are distributed at the periphery or adjoining areas of the Sanctuary ([Fig. 1](#); [Madegowda and Rao, 2013](#); [Mallegowda et al., 2015](#)). In 2011, declaring the area as Tiger Reserve further imposed restrictions on *Soligas*. For example, the NTFPs that *Soligas* used to collect previously were banned and then tendered to outsiders which resulted in resentment, economic crisis and threatened *Soligas*' livelihoods ([Madegowda, 2013](#); [Madegowda and Rao, 2013](#)).

During this struggle over the years, there are many lessons to learn from *Soligas*, especially their persistence and collective efforts to access land since the 1980s. Due to tribal people's struggle across India, the Forest Rights Act was passed in 2006 allowing the *Adivasis* [The Scheduled Tribes and Other Traditional Forest Dwellers' Recognition of Forest Rights] to have a bundle of rights including access to land, NTFPs, fishing, grazing, cultural and conservation rights ([Madegowda, 2013](#); [Chemmencheri, 2013](#)). However, these rights are not automatically granted to tribal communities; people are required to apply for permits which can be a time-consuming process. For



Image 2. *Soligas* local shop in the BRT region.

Soligas, only after protests and liaising with various government authorities and NGOs (e.g. The Ashoka Trust for Research in Ecology and the Environment [ATREE], Vivekananda Girijana Kalyana Kendra, and Zilla Budakattu Girijana Abhivrudhi Sangha) over the years, people were able to regain their individual and community rights in 2010. For land, only those who stayed within the forest after evictions could regain their rights to 1-2 acres of land, which is unequally distributed among a few individual families, with many yet left landless (Madegowda and Rao, 2017).

With the implementation of the Forest Rights Act (2006), the collection and sale of NTFPs by *Soligas* empowered them to work and earn some income while living inside the Sanctuary, as informed by the workshop participants. The Government established the Large-scale Adivasi Multipurpose Cooperative Societies (LAMPS), and now *Soligas* sell their NTFPs to LAMPS through a local shop in the village, owned and operated by them where locals can sell their products to visitors (Image 2). This has especially helped women in the community to be actively involved in the local economy by collecting, cultivating and selling local produce (homegrown crops and NTFPs) (Balasubramanian and Sangha, 2023). During workshop discussions, it was suggested that currently, about 50–60 % of the population collects NTFPs for their livelihoods, and some work outside the region in nearby towns on daily wage labour. Along with the collection of NTFPs, the cultivation of coffee, pepper, and other cash and non-cash crops has also become an important source of income (Madegowda and Rao, 2017). However, the current government initiatives focus on developing alternative livelihoods but ignore that overall tribal well-being extends much beyond livelihoods. For this, the emerging conservation-related economies that can afford great potential are yet to be explored.

4. Transformation of current conservation approaches is required

At present, the Wildlife Sanctuary/Tiger Reserve is in poor condition, with the spread of invasive weeds such as *Lantana camara* over 80 % of the area. This seriously impacts wildlife, especially tigers and elephants for their habitat and provision of food (Agnihotri et al., 2021; Rai et al., 2021), and the availability of NTFPs and cultural and spiritual services for *Soligas* (as informed by the workshop participants).

During workshop discussions, participants suggested that they traditionally managed the BRT area by applying mosaic litter burning and swidden agriculture at a small, fine scale level (Agnihotri et al., 2021). People used to clear land to cultivate for 2–3 years which helped a variety of grass species to colonise after abandoning the area—serving as a food source for many herbivores and consequently carnivores, especially tigers (Madegowda, 2013; Agnihotri et al., 2021). Another example that participants mentioned of traditional forest management is when collecting NTFPs they leave some behind for wildlife—applying cultural norms and rules. Worshipping various elements of nature with hundreds of sacred sites across the landscape is also another common ritual. Workshop participants reported that they have a fine-scale knowledge of the landscape knowing where tigers and elephants mostly live and walk, and where to find bees for honey or particular trees. They specifically emphasised their two-way relationship with the BRT landscape - for obtaining NTFPs and other benefits from the forest, and in return, they care for the forest as part of their responsibility (also evident among other IPLCs; Sangha and Russell-Smith, 2017)—an important difference from the mainstream population where the emphasis is on obtaining services to maximize profits but not on being responsible for returning to nature. Incomprehensively, such mainstream thinking is also evident in the global ecosystem services frameworks developed by the MEA (2005) and IPBES (2016).

From a scientific perspective, Indigenous peoples' cultural practices and norms for managing the area equate to modern environment management – the terminology used in conservation science (Sangha and Russell-Smith, 2017). As revealed during workshops, elders have specific skills to suggest what animal is approaching and in what mood (angry, calm, etc.), using the sound of birds and other animals particularly monkeys, how to live in and respect the forest, and what customs and rituals to follow to keep the community safe (workshop participants shared their stories on each of these topics). Following traditions, *Soligas* worship the tiger as 'Huliverapa'. Wild boar, elephants, snakes, and other wild animals are also worshipped, belonging to different clans. There are specific animals for each of the six clans or 'Kulas'. Hence, together *Soligas* embrace almost all the wild animals in the Sanctuary. *Soliga* elders say:

"We are part of the animals. We're living with tigers for centuries. We know tiger and elephant behaviour and they know ours. We know their smell and sound, and we do not go to those places. Lots of birds ring alarm bells so we move to different areas. Monkeys and langurs give call sounds. These are life skills. We look after the forest and leave somethings for the animals, for example, we do not take all the honey, we leave some there for the animals. We worship tiger, elephant and bison."

There are hundreds of sacred and cultural places embedded within the Biligiri landscape for which people hold ongoing relationships through various customs, cultural practices, ceremonies and norms (authors' observations and discussions with workshop participants; Mandal et al., 2010; Madegowda, 2013). The importance of such cultural norms is that people hold an intimate relationship with the wildlife and other natural elements of the landscape. Such infused co-existence of *Soligas* with the BRT landscape, especially tigers, challenges the contemporary, predominant, notion of conservation where typically human-focused benefits and values dominate, and exclusion principles are applied resulting often in serious human-wildlife conflicts.

Using *Soliga*'s example, we argue that local people managing the forests that they live in, with support from government and non-government authorities, can help achieve faster and better conservation outcomes. Globally, IPLCs managing 32 % of lands contribute to delivering several ecosystem services (the benefits that humans derive from nature) to the public (WWF et al., 2021; Sangha, 2020). Key examples of various ecosystem services include the provision of fresh and clean air and water to the nearby highly populated areas, especially in the case of *Soligas* the people in Bengaluru; and regulation of water and climate; eco-tourism; and the prevention of wildfires, landslides and soil erosion to protect the residential and cropping areas downstream, saving enormous costs both to the private and public agencies (Balasubramanian and Sangha, 2021; Ministry of Environment and Forests MoEF, 2011; MoEF, 2013). Balasubramanian and Sangha (2021) estimated the economic value of ecosystem services from five protected areas in the Western

Ghats at US\$ 612 million/yr (values in 2021), in addition to a significant source of income for the state governments. *Soligas* residing within the region, having fine-scale knowledge of the landscape and skills to manage the area, offer a significant opportunity benefiting the public, state governments including forest and tribal/indigenous welfare departments and emergency management agencies for reducing the risk of natural hazards. A two-way relationship between *Soligas* and the Sanctuary landscape (including wildlife) and the provisioning of a range of ecosystem services to the wider public need to be acknowledged and understood to achieve desirable outcomes, both for *Soligas* and conservation.

Based on our experience working with *Soligas*, we recommend a collaborative, inclusive, equitable, and systematic approach to conservation, including *Adivasi* people and their value systems in management while developing culturally appropriate incentivising mechanisms. Given the growing emphasis on preserving 30×30 of land and water by 2030, there are feasible economic opportunities for IPLCs (Sangha et al., 2024). These opportunities, if designed and implemented in collaboration with locals, offer cost-effective solutions to socio-economic and ecological problems. Establishing a fair, ground-up, incentivising scheme for the delivery of ecosystem services such as protecting biodiversity or eradicating weeds, and providing resources and access to land to locals to manage the natural landscape affords significant benefits for the State Governments and the general public. These benefits at the local scale include employment and on-land learning of traditional knowledge, managing weeds and pests; sustaining wildlife through provisioning food and habitat; supporting people's subsistence living including the collection of NTFPs and cultural and spiritual connections; and providing knowledge and skills to future generations to continue practising sustainable living in the BRT Hills in harmony with tigers, elephants, and other animals.

Globally, IPBES, UNEP, and UN-led Finance Initiative and several other organisations have highlighted the need to significantly invest in nature-based solutions (NbS) and economies to protect biodiversity (IPBES, 2019; WWF et al., 2021). The natural landscapes with IPLCs residing within the area, practising traditional knowledge and demonstrating the ability to manage the forest, can be prioritised for future NbS-related investment. Incentivised NbS, if appropriately developed in consultation with IPLCs, will create ongoing, culturally appropriate economies for *Adivasi*/tribal communities and protect biodiversity (Sangha, 2020, 2023; Sangha et al., 2022). Such an integrated approach will also help realise 10 (i.e. 1,2,3,4,5,6,8,10,13,15) out of the 17 UN Sustainable Development Goals along with the protection of biodiversity whilst enabling IPLCs to lead their lives in their own ways.

Ethical statement

Kamaljit K Sangha works as an Ecological Economist at Charles Darwin University, Australia. She brings enriched, trans-disciplinary, on-ground land management perspectives from her experience working with local communities in India and Indigenous peoples in Australia.

Dr C. Madegowda is a well-known 'Soliga' researcher who works with ATREE and belongs to the BRT landscape and has vast, on-ground experience and understanding of various ecological, social, economic and policy issues that people experience in the study area.

Bala Subramanian works as an Environmental Economist at ISEC, India. His main interest is understanding the economics of forest ecosystem services in relation to human well-being, climate change and biodiversity conservation.

The views expressed in this article are purely based on authors' research and understanding of working with people in the study area.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

Data Availability

Data will be made available on request.

Acknowledgements

This work is conducted in collaboration with *Soliga* elders, we are very grateful for their input, sharing knowledge and concerns for living in the BRT hills. The local ATREE (Ashoka Trust for Research in Ecology and the Environment) branch provided us with accommodation and food, and the help rendered by their staff is highly acknowledged.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.gecco.2024.e03197](https://doi.org/10.1016/j.gecco.2024.e03197).

References

- Agnihotri, S., Madegowda, C., Si, A., 2021. Tiger becomes termite hill: soliga/solega perceptions of wildlife interactions and ecological change (doi). *Front. Conserv. Sci.* 2. <https://doi.org/10.3389/fcosc.2021.691900>.
- Balasubramanian, M., Sangha, K.K., 2021. Integrating capabilities and ecosystem services approaches to evaluate indigenous connections with nature in a global biodiversity hotspot of Western Ghats, India. *Glob. Ecol. Conserv.* 27, e01546.
- Balasubramanian, M. and Sangha, K.K., 2023. Valuing ecosystem services applying indigenous perspective from a global biodiversity hotspot, the Western Ghats, India. *Front.Ecol.Evol.*11.1026793. doi.10.3389/devo.2023.1026793.
- Chemmencheri, S.R., 2013. Decentralisation, Participation and Boundaries of Transformation: Forest Rights Act, Wayanad, India. *Commonwealth Journal of Local Governance* <https://doi.org/10.5130/cjlg.v12i0.3264> (0012), 51-68. doi:<https://doi.org/10.5130/cjlg.v12i0.3264>.
- Dasgupta, P., 2021. The economics of biodiversity: the Dasgupta review. Treasury, the UK Government.
- Dawson, N.M., Coolsaet, B., Sterling, E.J., Loveridge, R., Gross-Camp, N.D., Wongbusarakum, S., Sangha, K.K., Scherl, L.M., Phan, H.P., Zafra-Calvo, N., Lavey, W.G., Byakagaba, P., Idrobo, C.Jn, Chenet, A., Bennett, N.J., Mansourian, S., Rosado-May, F.J., 2021. The role of Indigenous peoples and local communities in effective and equitable conservation. *Ecol. Soc.* 26 (3) <https://doi.org/10.5751/ES-12625-260319>.
- IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services), 2019. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. URL: <https://doi.org/10.5281/zenodo.3831673>, in: Brondizio, E.S., Settele, J., Díaz, S., Ngo, H.T. (Eds.), IPBES secretariat, Bonn, Germany, p. 1148.
- IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services) (2016). Summary for policymakers of the methodological assessment of scenarios and models of biodiversity and ecosystem services. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, pp. 36.
- Madegowda, C. (2013). A study on lifestyle of Soliga tribes at Biligiri Rangaswamy Temple Wildlife Sanctuary - a social work perspective [doctoral dissertation]. University of Mysore, Mysore, India.
- Madegowda, C., Rao, C., 2013. The ban of non-timber forest products collection effect on Soligas migration in Biligiri Rangaswamy temple wildlife sanctuary, India. *Sociology*, 105, p.114. *Sociology* 105 114-.
- Madegowda, C., Rao, C., 2017. Impact of forest policies and the economy of the Soliga tribals in Biligiri Rangaswamy Temple Wildlife Sanctuary, South India. *J. Hist. Archaeol. Anthropol. Sci.* 112-123.
- Mallegowda, P., Rengaian, G., Krishnan, J., Niphadkar, M., 2015. Assessing habitat quality of forest-corridors through NDVI analysis in dry tropical forests of South India: implications for conservation. *Remote Sens.* 7 (2), 1619-1639. (<https://www.mdpi.com/2072-4292/7/2/1619>).
- Mandal, S., Rai, N.D., Madegowda, C., 2010. Culture, conservation and co-management: Mapping Soliga stake in biodiversity conservation in Biligiri Rangaswamy Temple Wildlife Sanctuary, India. In: Verschuuren, B., Wild, R., McNeely, J., Oviedo, G. (Eds.), *Sacred Natural Sites: Conserving Nature and Culture*, 328. Earthscan, London, Washington DC.
- Ministry of the Environment and Forestry (MoEF), 2011. Report of the Western Ghats, Ecology Expert Panel, Part 1. Published by the Government of India. URL: <https://www.yumpu.com/en/document/read/24551250/report-of-the-western-ghats-ecology-expert-panel>, accessed in June 2022.
- MoEF, 2013. Report of the high level working group on Western Ghat, Volume 1. Published by the Government of India. URL: <http://uttarakannada.nic.in/docs/Publication/HLGWESTERNGHATSVOLUME1.pdf>.
- Rai, N.D., Benjaminsen, T.A., Krishnan, S., Madegowda, C., 2019. Political ecology of tiger conservation in India: Adverse effects of banning customary practices in a protected area (doi). *Singap. J. Trop. Geogr.* 40 (1), 124-139. <https://doi.org/10.1111/sjtg.12259>.
- Rai, N.D., Devy, M.S., Ganesh, T., Ganesan, R., Setty, S.R., Hiremath, A.J., Khaling, S., Rajan, P.D., 2021. Beyond fortress conservation: The long-term integration of natural and social science research for an inclusive conservation practice in India (doi). *Biol. Conserv.* 254, 108888. <https://doi.org/10.1016/j.biocon.2020.108888>.
- Ramesh, B.R., 1989. Evergreen forests Biligirirangan hills (Ecology, Structure and Floristic composition). PhD Thesis, University of Madras, India.
- Ramakrishnan, P.S., Bhoohj, R., Saxena, K.G., Chandrashekara, U.M., Depommier, D., Patnaik, S., Toky, O.P., Gangwar, A.K., Gangwar, R., 2005. *One Sun: Two Worlds: An Ecologica Journey*. Published by the Man And Biosphere Programme, UNESCO. Oxford and IBH Publishing.
- Reytar, K., Veit, P., 2017. 5 Maps Show How Important Indigenous Peoples and Local Communities Are to the Environment (<https://www.wri.org/print/57261>). World Resources Institute, Washington DC, USA.
- Rights and Resources Initiative, 2015. Who Owns the World's Land? A global baseline of formally recognized Indigenous and community land rights. Washington, DC: RRI.
- Sangha, K.K., Ahammad, R., Russell-Smith, J., Costanza, R., 2024. Payments for ecosystem services opportunities for emerging nature-based solutions: integrating indigenous perspectives from Australia. *Ecosyst. Serv.* 66, 101600.
- Sangha, K.K., 2021. Cultural Ecosystem Services—Key to Address Pressing Environmental Concerns of Climate Change and Biodiversity Decline. In: *Reference Module in Earth Systems and Environmental Sciences*. Elsevier.
- Sangha, K.K., 2023. Indigenous Fire Management contributing to the UN SDGs: a case study from Northern Australia. In: Filho, W.L. (Ed.), *SDGs in the Asia and Pacific Region*. Springer.
- Sangha, K.K., Gordon, I.J., Costanza, R., 2022. Ecosystem services and human wellbeing-based approaches can help transform our economies. *Front. Ecol. Evol.* 10 <https://doi.org/10.3389/fevo.2022.841215>.
- Sangha, K.K., 2020. Global importance of indigenous and local communities' managed lands: building a case for stewardship schemes. *Sustainability* 12 (19), 7839.
- Sangha, K., Russell-Smith, J., 2017. Towards an indigenous ecosystem services valuation framework: a north Australian example. *Conserv. Soc.* 15, 255-269.
- Sundaram, B., Hiremath, A.J., 2012. Lantana camara invasion in a heterogeneous landscape: patterns of spread and correlation with changes in native vegetation. *Biological Invasions* 14, 1127-1141.
- WWF, UNEP-WCMC, SGP/ICCA-GSI, LM, TNC, CI, WCS, EP, ILC-S, CM, IUCN, 2021. The State of Indigenous Peoples' and Local Communities' Lands and Territories: A technical review of the state of Indigenous Peoples' and Local Communities' lands, their contributions to global biodiversity conservation and ecosystem services, the pressures they face, and recommendations for actions Gland, Switzerland.
- WYSS Campaign for Nature, 2020. The path to conserving 30% of the planet by 2030: Perspectives from Indigenous and local conservation leaders. A Report by WYSS Campaign for Nature. URL: https://static1.squarespace.com/static/5bbe12b6e5f7d12a614c4a2d/t/5ea717dd97f453204831a64d/1588009191135/Indigenous-Led+Conservation+Report_Online.pdf.