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SACRED GROVES: SUSTAINABLE CONSERVATION VALUES IN FUTURE?

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ABSTRACT

Sacred groves are tracts of virgin forest distributed around the globe and they are recognized by various cultures, encoding different rules for their protection and it acts as a mini biosphere reserve by protecting several threatened plant and animal species.

INTRODUCTION

Traditionally protected areas are considered to be the cornerstones of protection of biodiversity and the best wildlife habitat. Protection of natural resources has been a part of the world's different cultures since time immemorial. Sacred groves are culturally protected areas that are devoted to ancestral and tree spirits. These groves are of significance from anthropology, botany and ecology. Due to religious beliefs and traditional rituals indigenous practices are associated with them and have been running through several generations (Mulder & Coppolillo 2005). Depending on the past, they can consist of multilayer, multispecies, very dense primary forests with semi-climax vegetation. Traditions of nature conservation formed around the world refer to specific examples from rich biodiversity countries where such traditions have been upheld, even today. Because of their long history, local tradition and the desire of local people to protect and preserve the natural sacred sites/groves; play a valuable role in the preservation of biodiversity (Doffana & Were 2019). The World still has many worship ways of

nature, passed from generation to generation. All types of lives considered sacred by cultural taboos and restrictions are inviolable by a variety of primitive religions (Tetlock 2003).

Sacred groves have been recorded in all continents except Antarctica (Bhagwat & Rutte 2006; Figure 1). Taboos growing influence the way human conduct themselves concerning the natural environment in many traditional societies throughout the world. While more research is needed on the role of sacred groves in landscape connectivity and how these traditional sites can be incorporated into current conservation practices, there are many threats to the life of sacred groves (Chandrakanth et al. 2004). Developing management approaches that encourage the conservation of these groves is therefore very important.

Religious values

The cultural and religious importance of these species is a factor promoting their sustainable utilization as well as conservation. Plants with socio-religious significance in connection with the gods or goddess of the groves or other religious practices in preserving the ecological equilibrium are very important (Anthwal et al. 2010). Such plants are becoming more important as the sacred species vary from community to community. Such common sacred species are *Ficus benghalensis*, *Ficus religiosa*, *Ocimum tenuiflorum* and *Madhuca longifolia* var. *latifolia*. This is of high cultural and medicinal significance throughout the Asian region and is linked to different faiths and beliefs among many tribes in Africa and the central Himalayas, and is closely linked to local ecological values.

Economic values

Some work on sacred groves refers to sacred groves' economic and livelihood values. Although taboo existed on cutting trees, traditionally a variety of non-timber forests were harvested from particularly large sacred groves. An abundance of medicinal plants, a wild relative of crops and many important species were reported from the sacred groves in different parts of India in various studies. Useful plant part(s) of such plants were essential to rural masses' primary health care, and sometimes their only origin, as in the case of forest dwellers (Ormsby & Ismail 2015; Adeniyi et al. 2018).

Ecosystem values

A large and intact grove represents a healthy forest ecosystem that renders valuable ecological services like, soil, water and biodiversity conservation, nutrient cycling and temperature regulation. Carbon sequestration per unit area of the grove is expected to be greater than adjoining secondary forests, understandably due to higher biomass. The area of a sacred grove plays a major role in ecosystem functioning and services (Figure 2). Small fragmented groves, just like fragmented forests, must have limited potential in rendering services compared to larger ones. However, at a local level, even these smaller groves have their ecological roles. The groves also enhance landscape heterogeneity (Khan et al. 2008; Thungon et al. 2016; Sen & Bhakat 2020).

Nutrient cycling

Nitrogen, potassium and phosphorous are major soil nutrients which are operated through biogeochemical cycles to meet up the nutrient demands of the organisms. Waikhom et al. (2018) found the linear

relationship between the species richness and diversity and litter production in sacred groves. They also concluded that grove system mimics the tropical rain forest in litter production pattern. It is the type of tree species, humidity, temperature as well as soil microbial community which controls the nutrient content of the litter and its release in the soil (Khiewtam & Ramakrishnan 1993).

Carbon sequestration

Forests are major carbon dioxide (CO_2) global sinks. In the form of photosynthetic products, plants store atmospheric carbon, standing biomass, leaf litter and also contribute to organic carbon in the soil. Unmanaged and old forests of growth have a better capacity for carbon sequestration than plantation and controlled forests. Due to their rich biodiversity, tree density and leaf litter deposition, sacred groves, often relics of ancient forests, can serve as good carbon sinks. In contrast, well-protected sacred forest sequesters far more carbon than other forest ecosystems due to its higher biomass (Lorenz & Lal 2009). In this direction, further studies are needed to illustrate the role of groves in carbon sequestration, so that policymakers can take steps to protect and restore the sacred groves in the sense of a world threatened by climate change.

Soil conservation

The grove's undisturbed vegetation cover plays a major role in the conservation of soil. As litter accumulates, organic material degrades, adding nutrients to the soil and the standing biomass. Most microorganisms, invertebrates, fungi, etc. will thrive in the process, and a vast array of non-indigenous species will be contained in the groves. The rich covering of leaf litter, humus, and dense roots network play a major role in preventing erosion, as well as in soil construction. It has been found that, due to efficient decomposition of leaf litter, deadwood as well as other remains, grove soil is usually rich in organic matter. Water flowing into the surrounding agricultural areas from sacred groves is regarded by village populations as a nutrient-rich (Jim 2003). Nevertheless, well-designed experiments are very necessary to support these beliefs.

Water conservation

It is found that the forests of sacred groves have a higher water yield and quality value than other types of landscapes. Ponds, streams or springs found in sacred groves serve as water sources for the area all year round, even when other sources of water are dry. On the other side, the vegetative cover and thick litter help to refill aquifers, increase the fertility of the soil, and avoid soil erosion and nutrient washout (Ray et al. 2015).

Sacred grove and landscape heterogeneity

The groves promote habitat heterogeneity and biodiversity by their inclusion in a mosaic of landscape elements such as utility forests, agricultural fields, grazing lands, plantations, human settlements etc. Several studies have shown that sacred groves play an important role in holding birds (Kühnert et al. 2019) and animal populations together with the tree cover (Nganso & Kyerematen 2012). It provides various microclimatic conditions which, compared to a forest reserve, nurture several distinct macrofungal (Brown et al. 2006) and lichen (Sen 2014) species. Sacred grove fragments give more intra-patch habitat diversity of different forms of life, such as cryptogams (Sanjeeva & Upreti 2004), epiphytes, shrubs and lianas, thus increasing the total diversity of regional species (Jamir &

Pandey 2003). Grove fragmentation also affects seed dispersal, regeneration, and unusual plant genetic diversity ultimately leads to decreases in populations of plants. The availability of pollinators and seed dispersal is adversely affected by fragmentation, which causes declines in the relationship between plants and animals (Aguilar et al 2006).

Presently, community-based biodiversity conservations are being surrendered to rapid Sanskritization and urbanization. The nature and extent of these threats may vary from country to country. Fortunately, before it is too late, the conservationist and communities have been able to attract the attention of the government and NGOs. The concerted efforts have made the citizens and leaders realize that development, progress and modernity can be more efficiently achieved by integrating the virtues of both modern and traditional systems. More research on the ecological values and the socio-cultural mechanisms about sacred groves is indeed the need of the hour to fully understand and realize their potential for biodiversity conservation in future.

CONCLUSION

Sacred natural areas, including sacred groves, are protected using conventional community-based conservation approaches that do not require government intervention. Conservation of sacred groves is imperative for many reasons: for preserving local and regional biodiversity; for preserving the socio-cultural integrity of local communities; and for the countless number of ecosystem services that these groves provide, such as erosion control, high-quality water maintenance, as well as serving as seed banks and carbon sinks.

Sacred groves, as community conserved areas, are significant and have contributed to biodiversity conservation, thus playing a key role in the ecosystem management. Understanding the total number, the expanse of the area, and the biodiversity of the groves, and the associated cultural beliefs and practices of local communities, can make it possible to appreciate the importance of conserving sacred forests and also to plan integrated approaches to biodiversity conservation at the landscape level. The wide distribution and abundance of sacred groves in the world's various ecosystems underlines the importance of inventory and research continuing. In numerous parts of the world there are still many secret sacred groves whose plant diversity needs to be registered in order to promote better protection and conservation of wild gene pools. To better understand the role of these forests in the conservation of biodiversity, further work on the ecology and underlying socioeconomic processes of sacred groves distributed in remote corners of the state is needed. Local societies have played a vital role in maintaining those forests for decades to come. Prioritizing the protection of these forests and funding for the indigenous communities that preserve them at this time is important.

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Figure 1: Dominant countries with sacred groves

Figure 2: A temple based sacred grove in India