



Women's Leadership in Preserving Uttarakhand's Biodiversity: Harnessing Traditional Knowledge

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Abstract: The role of women in safeguarding biodiversity is undeniably significant, particularly within the intricate fabric of Indian society where they serve as custodians of invaluable wisdom and traditional knowledge. Delving deeper, we intend to delve into biodiversity conservation practices within the hilly terrains of Uttarakhand. This symbiotic relationship emerges from their deep-rooted connection to natural resources, their profound familiarity, and an intimate bond with the environment. Our focus lies on examining the crucial role of rural women who have been instrumental in grassroots environmental conservation efforts. This phenomenon has gained momentum alongside the growing awareness of environmental conservation efforts. This phenomenon has gained momentum alongside the growing awareness of environmental preservation, extending its reach to national and international spheres. Their tireless contributions underscore the imperative of acknowledging and empowering women in conservation endeavors, thus ensuring the enduring sustainability of Uttarakhand's distinctive natural heritage.

Keywords: traditional knowledge • women's contribution • biodiversity conservation practices

Introduction

Biodiversity encompasses the vast array of life on Earth, including plants and microorganisms, totaling around 8.7 million species globally (Mora et al., 2011). It serves as the foundation of life, providing essential resources such as food, shelter, oxygen, and medicines, while also contributing to climate stability and recreational opportunities. Uttarakhand, renowned for its landscapes and cultural diversity, boasts rich biodiversity, housing rare and endangered herbal and aromatic plants, leading to its designation as a Herbal State (Juyal and Sati, 2010). Traditional knowledge systems play a crucial role in biodiversity conservation, particularly in rural areas, where practices rooted in cultural beliefs promote sustainable environmental stewardship. These practices include sacred forest designations, conservation areas, and cultural taboos against

resource exploitation (Langoton & Rhea, 2005; Berkes, 2008). Women in Uttarakhand hold a special connection to the environment, serving as both caregivers and custodians of traditional knowledge, playing pivotal roles in farming and forestry (Grain, 2000; Owen et al., 2008). Despite gender disparities in labor and decision-making, women have emerged as key stakeholders in forest conservation efforts (Rawat and Chandra, 2015). Research indicates that women are disproportionately affected by environmental degradation, leading to grassroots movements for conservation (Gaard and Gruen, 2005). Uttarakhand's women, driven by cultural and religious beliefs, have made significant contributions to environmental conservation, preserving both nature and heritage. By integrating traditional wisdom with modern conservation practices, they exemplify the



synergy between cultural heritage and environmental sustainability, paving the way for eco-friendly initiatives on local, national, and international scales. Their efforts highlight **Study Area:** Uttarakhand state lies between 28° 44' & 31° 28' N Latitude and 77° 35' & 81° 02' East longitude. Situated on the southern slopes of the Himalayas, the northern part of the state is in the greater Himalayan ranges and the southern part is in the foothills. The state is divided administratively into thirteen districts, eleven of which are mountainous and comprise around ninety-three percent of the state's total territory. This area has great strategic significance since it borders both China and Nepal. Himachal Pradesh borders Uttarakhand to the northwest, while Uttar Pradesh borders it to the south. This area is ecologically fragile, and due to its unique ecological setting, this region was marginalized from the rest of the fertile agricultural plain areas of India for a long time. This state is a natural reservoir as the region is rich in flora and fauna. The rich biological diversity is closely associated with various cultural groups of the region. These cultural groups have developed a unique ecological knowledge for the use and

the potential for collaboration between traditional knowledge and contemporary conservation strategies in safeguarding biodiversity for future generations. conservation of biodiversity (Kala 2007, 2020). The population of the state is 10.1 million people comprising 51% males and 49% females, with 70% of the population living in rural areas. Among all the states of India, Uttarakhand is the 20th most populous state where 0.83% of the country's population lives on 1.63% of land area. The state is home to five major tribal groupings and their numerous sub-tribes.

Methodology

The present study is based on secondary information gathered from available literature regarding women's contribution to environmental conservation. We search for research articles, reports, books, and proceedings using platforms such as Google Scholar, ResearchGate, and Springer Link. These sources included both published and unpublished materials. Discussion is also based on authors' own perspectives on the subject matter

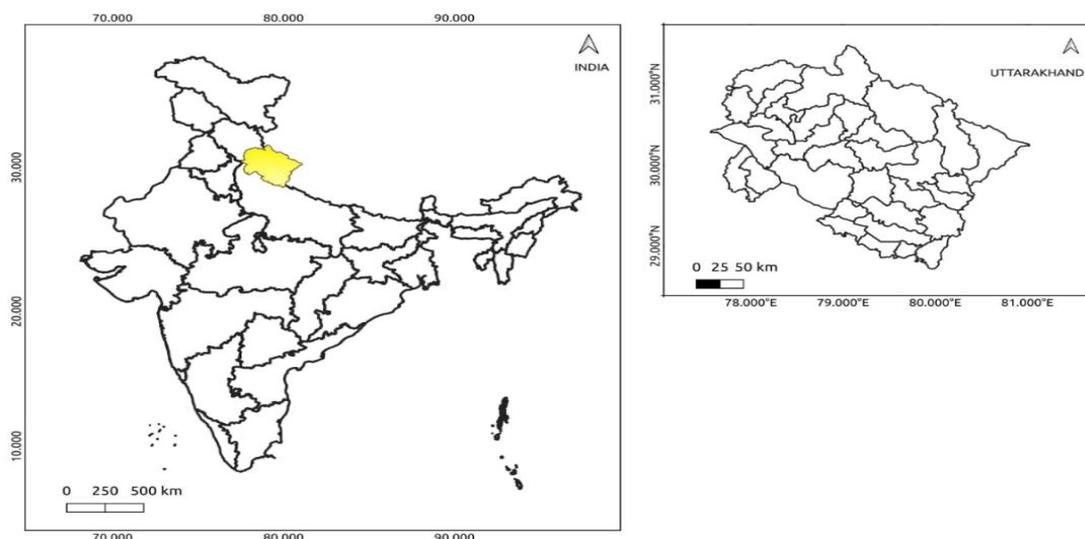


Fig 1. Study Area Uttarakhand India



Results and Discussion

Mountain Women as a Reservoir of Traditional Wisdom:

In the mountain area, where people depend on the sustainable use and responsible management of the region's natural resources for their livelihood, women play an especially vital role. They are not only the main caregivers but also the custodians of traditional knowledge culture and biological diversity (Negi and Rawat, 2010). Over generations, women in these mountainous regions have been actively engaged in preserving natural resources. They have effectively demonstrated their knowledge in utilizing land, water, forests, and other natural resources. They Possess extensive traditional knowledge related to forest management and agriculture practices (Howard 2003; Chambers and Momsen, 2007). Rawat and Chandra (2015) reported that women farmers in the Rawain Valley have a remarkable knowledge, how the unique traditional methods that have developed over the years for collecting, preparing, and storing seeds. Seeds are stored in various containers such as tumri (hollowed gourd shells), bhakars (wooden boxes), Kuthars, and occasionally in covered ringal (bamboo) baskets lined with cow dung. Typically, seeds are mixed with cow dung (gobar) ash or walnut leaves and sometimes coated with oil to stay off insects and pests. Most crop seeds are still prepared at home by women or exchanged within the village or with the nearby villages where women have family connections (natal kinship or maite). Numerous research findings indicate that traditional seed management and exchange customs, notably facilitated by women (Aumeeruddy Thomas and Shengji 2003), fulfill 80-90% of seed needs (Table 1). Women hold extensive knowledge regarding the uses of many plant species for food, medicine, and other applications, and are the primary users and managers of subsistence resources. They also play a vital role in food production and family welfare (Byers and

Sainju,1994). The utilization of ash and soil as indigenous pesticides is documented in various sources (Mehta et al.,2012). Women are playing a significant role in the revival of traditional water sources in Uttarakhand. Local communities have recognized the importance of restoring naulas and dharas. They achieve this by planting saplings of broad-leaved tree species, which helps recharge the groundwater. This knowledge and action are essential for preserving the ecosystem. Moreover, Women hold crucial roles in Himalayan forest management, overseeing tasks such as gathering grass, fodder leaves, firewood, and water. Their profound understanding of the ecosystem is evidenced by customs rooted in reverence and affection for their forests, exemplified by the presence of temple groves in every village, serving as gene pools and shielded from wildlife. Their sustainable production methods encompass settled and shifting cultivation, alongside controlled food gathering, hunting, and fishing practices (Upama Saikia, 2021).

Women – The Herbalist: 80% of people worldwide receive basic healthcare from plant-based medications, according to the World Health Organization (2002). In India, as reported by Uniyal and Shiva (2005), around 65% of the population depends on the traditional system of medicine. The use of plants for medicinal purposes is widespread, especially in areas lacking modern healthcare services, such as tribal regions, forests, and villages in India (Sandhya et al., 2006). Women in the on them for their daily requirements, including fuel, fodder, and various forest products. Rural women in the Himalayas are the only ones who play a vital role in knowing the properties of plants and how they can best be utilized.



Table 1. Women use plant parts and other materials used for seed/grain protection in Uttarakhand Himalaya

S.No	Materials use for Pest Control	Crops	Type of Material
1.	Peach (<i>Prunus persica</i>); Leaves	Cereals and pulses	Seeds and grains
2.	Neem (<i>Azadirachta indica</i>); Leaves	Cereals, oil seeds, and pulses	Seed and grains
3.	Timur (<i>Zantozylum armatum</i>); Leaves	Cereals, oil seeds, and pulses	Seed and grains
4.	Walnut (<i>Juglens regia</i>); Leaves	Cereals and pulses	Seed and grains
5.	Turmeric (<i>Curcuma longa</i>); Leaves	Cereals and pulses	Seed and grains
6.	Lemon (<i>Citrus limon</i>); Leaves	Cereals and pulses	Seed and grains
7.	Wooden ash	Wheat, barley, and rice seed material	Seed
8.	Cow dung ash	Cereals	Seed
9.	Cow dung + cow urine	Cereals and pulses	Seed

Source: Mehta et al 2012., Indigenous methods of seed conservation and protection in Uttarakhand Himalaya.

Women in Uttarakhand are actively involved in the collection of medicinal plants such as Kuth, Kutki, Atis, Chora, Panja, Guggul, guchchhi, Jhula, and various types of edible forest products. They do this both for their own consumption and to generate income through trade. Some people bring raw wood materials from the forests for crafting agricultural tools, furniture, and household implements (Rawat, VS and J Jalal,2011; Rawat, VS, YS Rawat, and Shah, 2010). Therefore, their knowledge is must be considered as an essential component of all efforts to conserve and develop in rural areas.

Involvement of women in Environmental movements like Chipko, Maiti, and Raksha sutra:

As environmental crises escalate, women are taking on a crucial role in environmental conservation. Women are very close to nature and they are more sensitive to the degradation of the environment as they mostly depend upon nature for management of the household and conservation of resources for their family. Despite being often perceived as a marginalized group, women wield considerable influence in advocating against environmental degradation through movements combating deforestation and in the conservation of water resources. In Uttarakhand, the Chipko movement serves as a notable example where women (Gaura Devi

and Bachni Devi) led an ecological campaign to protect trees from being felled by embracing them (Misra and Tripathi, 1978; Jain, 1984). Subsequently, the Maiti and Rakshasutra movements further underscored the significance of environmental preservation. In Maiti, Women plant trees at their maternal homes during the time of the wedding ceremonies when they leave their own homes, symbolizing care and protection for the trees. In Rakshasutra women tied rakhis or sacred thread to protect trees as a mark of their protection and environment preservation. In this Andolan, women participated in large numbers. The founder of Maiti environmental movement was Shri Kalyan Singh Rawat (1994). Under this, if a girl is married in a village of Garhwal, then at the time of farewell, the bride and groom are given a fruitful plant by taking the bride and groom to a certain place plant by Vedic mantras and the bride irrigates it with water. As per his desire, the groom also gives the Maiti sisters money. Which is used in environmental reform work. Thus planting a sapling at the time of their marriage, they not only leave behind a precious memory but play a pivotal role in safeguarding Mother Earth. This movement later expanded to Gujarat, Rajasthan, Himachal Pradesh, Etc. The Raksha sutra movement commenced on August 10-11,



1994, with approximately 300 women coming together to tie threads around trees. This initiative began in the Riyala forest of Tehri located at an altitude of 10,000 meters. The movement was led by Suresh Bhai, who tied the sacred thread - Rakhi around trees, symbolizing the sentiments of the Raksha Bandhan festival. They protested against the government's decision to cut down 135 trees, taking a stand against forest officials. Some of the slogans associated with this movement they were "Forests survive, the nation survives and every village thrives". The movement successfully protected native tree species such as Mauor, Kali, Buransh, and Muranda. The movement that began on August 10-11, 1994 involved women from Tehri and Uttarkashi districts. It prevented commercial logging in approximately 12 lakh hectares in these two districts between 1994 and 2000. This movement played a crucial role in the watershed areas of the Bhagirathi, Yamuna, and Bhilangana rivers in 1995.

Prabha Devi's efforts in Rudraprayag, Uttarakhand, led to planting 500 trees, including oak, rhododendron, and reetha, addressing declining groundwater by planting water-retentive species like Baanj. These trees contribute to the community's sustenance by restoring groundwater, giving cow feed, and assisting with local agriculture.

Participation of women in Van panchayat: Van panchayats, or village forest councils, are grassroots institutions crucial for managing and conserving forests in Uttarakhand, particularly in the ecologically fragile Himalayan region. Initially, women's participation, in these councils was limited due to entrenched gender norms. However, there has been a notable shift towards gender-inclusive participation, partly driven by legal changes and heightened awareness of the benefits of diversity. Legislation now reserves 50% of Van panchayats management committee seats for Scheduled Castes (SC) and Scheduled Tribes (ST) individuals. This marks a significant milestone in recognizing

women's important role in natural resource management, unprecedented in Indian history. The increased presence of women, including as heads of Van panchayats, has brought about positive changes. Women leaders facilitate easier access to forest resources for female members, they prioritize local employment over hiring labor from outside the village, thereby stimulating economic opportunities within the community. Under women's leadership, there is greater transparency in fund utilization, with women unafraid to question expenditure. Women members are actively involved in decision-making processes, ensuring their voices are heard in project implementations. Additionally, women's sarpanches enforce rules more fairly, imposing penalties for violations without resorting to abusive behavior. These reservations not only provide more opportunities for women but also have the potential to further empower them, leading to more equitable and sustainable forest management practices in Uttarakhand

Challenges faced by mountain women in biodiversity conservation: Research has shown that mountain women in Uttarakhand often have limited access to land, water, and forest resources. Due to the fast depletion of forest cover, she has to walk long distances every day in search of water, fuel, fodder, and MFP (Minor Forest Produce). If we calculate the distance covered by her in a year, we will find that she covers 3000 to 4000 km in a year by getting involved in food, fodder, and foraging activities. Gender inequality is another aspect of mountain areas. Few studies (Schmink and Gomez-Garcia 2015; Germain et al. 2018) reported males always underestimate the knowledge of women. Pant and Pandey (2007) reported that women indulged in most of the household activities in any committees in the village and any type of decision-making process. In the Himalayan area, women are not involved in decision-making but bear much more responsibility.

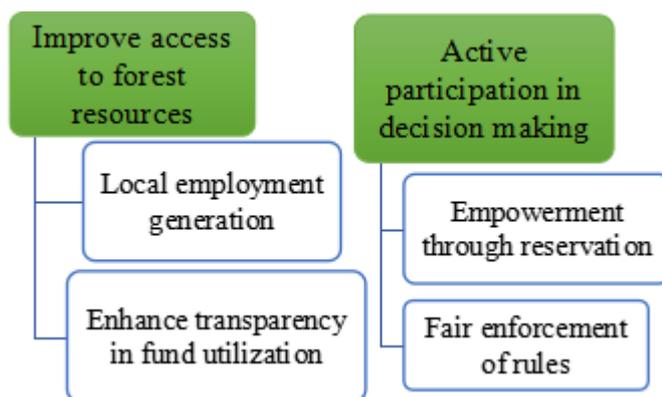


Fig 2. Positive aspects of women increasing leadership in Van Panchayat

The CBD mentions the role of women in biodiversity, but the role of women in policymaking is still underestimated. Women face the increasing challenges of climate change, including unpredictable weather patterns and ecological shifts, impacting their conservation efforts. Studies, such as Denton (2002), point towards the role women, more particularly rural women, play in

environmental and natural resource management, which has a large intersectionality with climate change adaptation and sustainable development. However, such notions of women’s agency in climate action are often limited due to existing socio-cultural norms that inhibit women’s role and access to tangible and intangible resources, and more often than not perpetuate existing vulnerabilities.

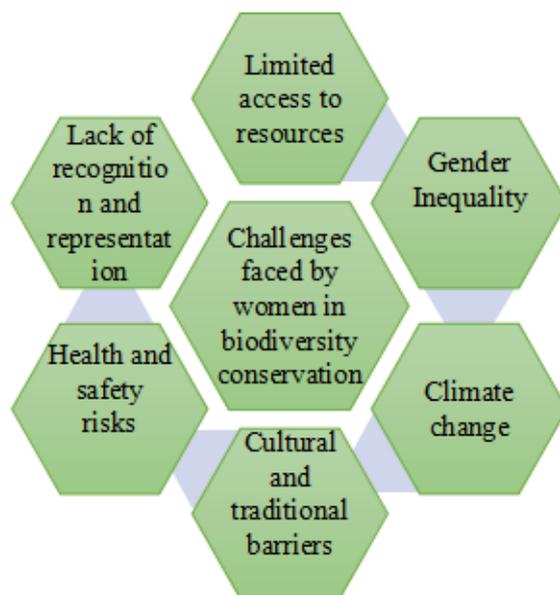


Fig 3. Challenges Faced by women in biodiversity conservation

Poverty, lack of education, and limited economic opportunities can impede women's ability to engage in effective conservation initiatives. Lack of Recognition and

Representation Mountain women's contributions to biodiversity conservation are often overlooked or underrepresented in policy and decision-making forums.

Conclusion



In conclusion, this study emphasizes how important it is for women to use their traditional wisdom to protect Uttarakhand, India's biodiversity. Women regularly participate in organic farming, seed preservation, sustainable resource management, and other related fields, despite their frequent undervaluation. Their participation protects the region's unique ecology while also enhancing their social and economic standing. Strategies for conservation that are inclusive and successful must acknowledge and take into account the contributions made by women and their traditional knowledge. To effectively conserve Uttarakhand's biodiversity, policymakers and conservationists should give priority to gender-sensitive and community-driven initiatives. This study highlights the significance of appreciating and honoring women's contributions to a robust and peaceful cohabitation between human societies and the natural environment.

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