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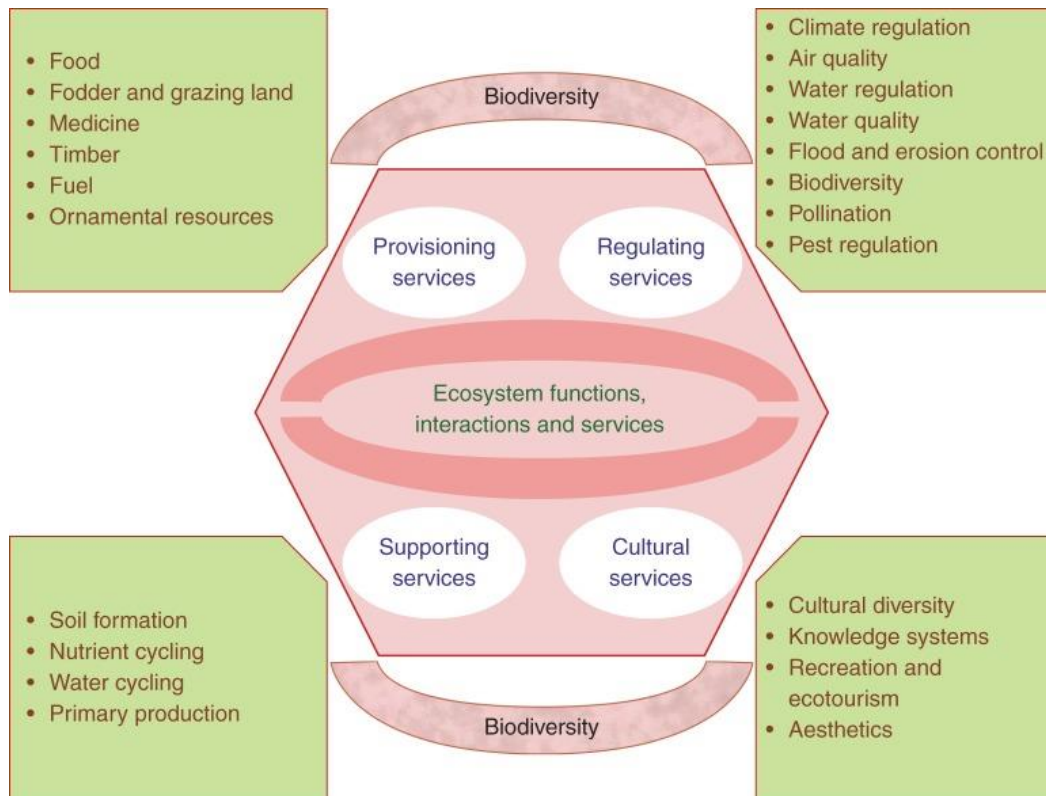
Loss of Plant Biodiversity and Measures to Sustain the Biodiversity for Ecological Balance

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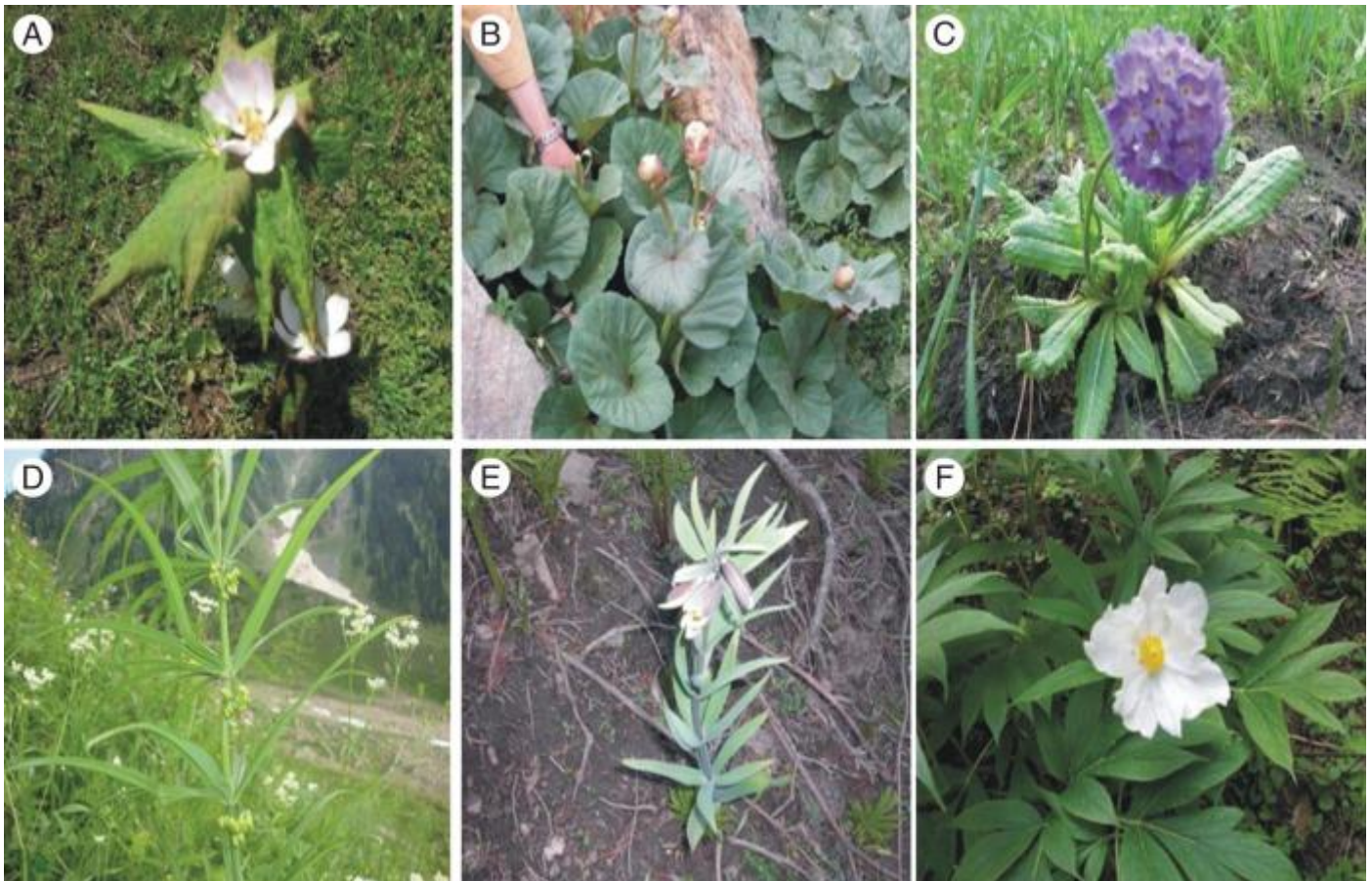
ABSTRACT: Biodiversity or Biological diversity is a term that describes the variety of living beings on earth. In short, it is described as a degree of variation of life. Biological diversity encompasses microorganisms, plants, animals, and ecosystems, such as coral reefs, forests, rainforests, deserts, etc. Biodiversity also refers to the number or abundance of different species living within a particular region. It represents the wealth of biological resources available to us. It's all about sustaining the natural area made up of a community of plants, animals, and other living things that is being reduced at a steady rate as we plan human activities that are being reduced by habitat destruction.



KEYWORDS: biodiversity, ecological, balance, sustain, ecosystem, plants

I. INTRODUCTION

Biodiversity loss includes the worldwide extinction of different species, as well as the local reduction or loss of species in a certain habitat, resulting in a loss of biological diversity. The latter phenomenon can be temporary or permanent, depending on whether the environmental degradation that leads to the loss is reversible through ecological restoration/ecological resilience or effectively permanent (e.g. through land loss). The current global extinction (frequently called the sixth mass extinction or Anthropocene extinction), has resulted in a biodiversity crisis being driven by human activities which push beyond the planetary boundaries and so far has proven irreversible.[1][2][3]

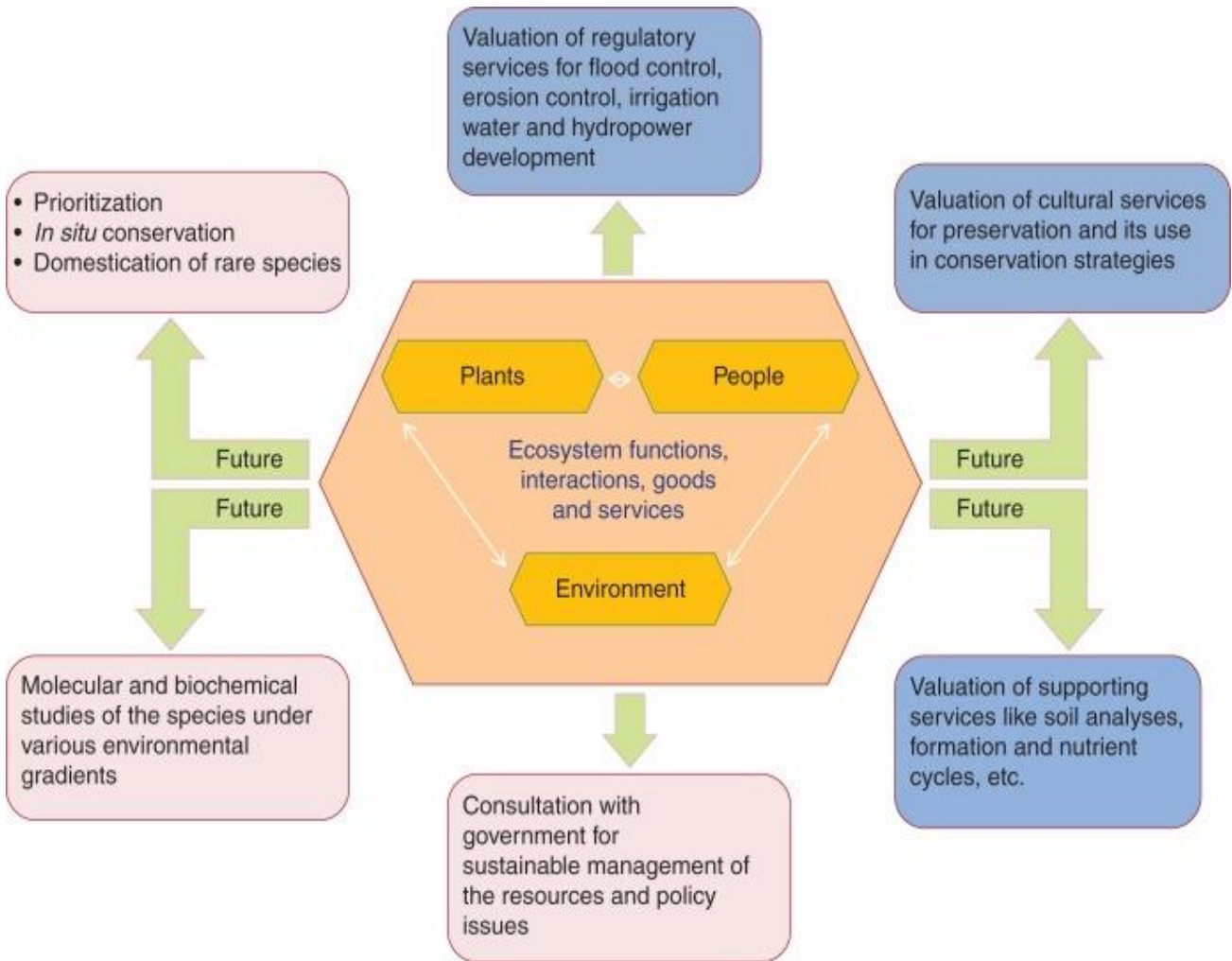


Six of the more important plant species used for traditional medicine in the western Himalayas.

(A) *Podophyllum hexandrum* , (B) *Rheum australe* , (C) *Primula denticulata* , (D) *Polygonatum verticillatum* , (E) *Fritillaria roylei* , (F) *Paeonia emodi* .

Even though permanent global species loss is a more dramatic and tragic phenomenon than regional changes in species composition, even minor changes from a healthy stable state can have dramatic influence on the food web and the food chain insofar as reductions in only one species can adversely affect the entire chain (coextinction), leading to an overall reduction in biodiversity, possible alternative stable states of an ecosystem notwithstanding. Ecological effects of biodiversity are usually counteracted by its loss. Reduced biodiversity in particular leads to reduced ecosystem services and eventually poses an immediate danger for food security, but also can have more lasting public health consequences for humans.[4]

International environmental organizations have been campaigning to prevent biodiversity loss for decades, public health officials have integrated it into the One Health approach to public health practice, and increasingly preservation of biodiversity is part of international policy. For example, the UN Convention on Biological Diversity is focused on preventing biodiversity loss and proactive conservation of wild areas. The international commitment and goals for this work is currently embodied by Sustainable Development Goal 15 "Life on Land" and Sustainable Development Goal 14 "Life Below Water". However, the United Nations Environment Programme report on "Making Peace with Nature" released in 2020 found that most of these efforts had failed to meet their international goals.[5,6,7]



Plants define the habitat of a site, providing structure, shelter and food as well as contributing to the overall biodiversity. They include flowering plants (trees, shrubs, grasses and herbaceous plants), as well as the gymnosperms (which include conifers), ferns and related species, and also the bryophytes (mosses and liverworts). While plant diversity is well represented in rural areas, development pressures have reduced the amount of greenspace in urban and peri-urban areas, resulting in a poorer diversity of plant communities. However, there are still many small pockets of greenspace within the built environment with a rich diversity of plant species, and other areas where improvements to greenspace could encourage the establishment of plants.

Management of urban greenspace directly influences the micro-environment and can create conditions favourable to a range of plants, which in turn can increase habitats for, and therefore the diversity of, other species groups. [8,9,10]

Ways you can help sustain terrestrial biodiversity

What Can You Do?

Sustaining Terrestrial Biodiversity

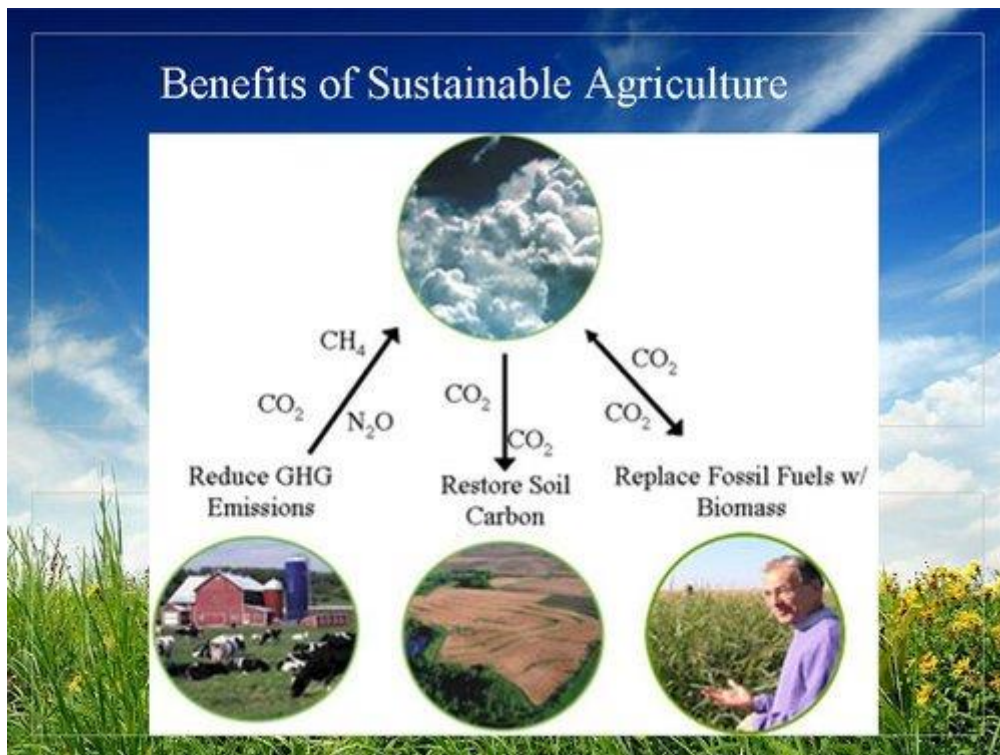
- Adopt a forest
- Plant trees and take care of them
- Recycle paper and buy recycled paper products
- Buy sustainably produced wood and wood products
- Choose wood substitutes such as bamboo furniture and recycled plastic outdoor furniture, decking, and fencing
- Help to restore a nearby degraded forest or grassland
- Landscape your yard with a diversity of plants that are native to your area

Local authorities in the UK are committed to the Local Biodiversity Action Plan process and to promoting species biodiversity within rural, peri-urban and urban habitats. Planning within urban environments can be particularly complicated, as there is a need to balance the requirements of an expanding human population with the conservation of a range of species.

The UK Biodiversity Action Plan sets out the UK Government's broad strategy for conserving biodiversity. It includes measures to promote biodiversity conservation in woodlands. Within the plan, 391 species have been identified as being either in rapid decline or globally threatened, and Species Action Plans have produced for these priority species. Species Action Plans detail the status, threats, and targets for conservation and recovery for each species, and identify organisations tasked with carrying out the actions.

Areas of habitat for plant species within the urban and peri-urban environment have become fragmented and isolated through land-use change, particularly with the spread of settlements and transport infrastructure in recent years. As a result, there has been a general decline in biodiversity over the wider countryside.[11,12,13]

Plant diversity can often be increased at the local scale by changing or diversifying the management of a site, for example by using less-intensive mowing regimes to encourage butterflies. To encourage particular habitats to develop, the environmental conditions of the site must first be identified as suitable: soil conditions (nutrients, moisture, pH) and factors such as drainage.



Many species have seed-dispersal mechanisms and will, in time, reach a site. New sites will be rapidly colonised by species with wind-dispersed seeds – these are often a good nectar source and will attract insects. But some species, particularly woodland herbs, may not be able to reach a site, especially if it is a long way from other sites. In this case, or if habitat is not developing as quick as hoped, seeding or planting may help.[14,15]

Long-term strategies to improve plant biodiversity can be considered over a larger geographical area by examining the spatial distribution of plant biodiversity. Areas with a rich plant composition can act as sources for dispersal to other areas. Successful colonisation of new sites can be encouraged by ensuring that greenspace creation and appropriate management are undertaken in areas identified within the dispersal range. This approach has been examined for ancient woodland indicator species within urban, peri-urban, and rural areas (see Case studies). Ancient woodland indicator species include: Barren strawberry, Pignut, Sweet woodruff, Bluebell, Primrose, Wood-sorrel, Common cow-wheat, Ramsons (wild garlic), Wood speedwell, Dog's mercury, Sanicle, Wood spurge, Early dog-violet, Tutsan, Yellow pimpernel, Herb Paris, Wood anemone.

II. DISCUSSION

Plants play a key role in ecosystems. They are a source of food and medicinal compounds while also providing raw materials for many industries. Rapid deforestation and industrialization, however, threaten plant biodiversity. In turn, this threatens the ecosystem.

Biodiversity of plants ensures a resource for new food crops and medicines. Plant life balances ecosystems, protects watersheds, mitigates erosion, moderates climate, and provides shelter for many animal species. Threats to plant diversity, however, come from many angles. The explosion of the human population, especially in tropical countries where birth rates are highest and economic development is in full swing, is leading to human encroachment into forested areas. To feed the larger population, humans need to obtain arable land which leads to massive clearing of trees. The need for more energy to power larger cities and economic growth results in the construction of dams, the consequent flooding of ecosystems, and increased emissions of pollutants. Other threats to tropical forests come from poachers who log trees for their precious wood. Ebony and Brazilian rosewood, both on the endangered list, are examples of tree species driven almost to extinction by indiscriminate logging.[16,17]

Solutions: Sustainable Forestry

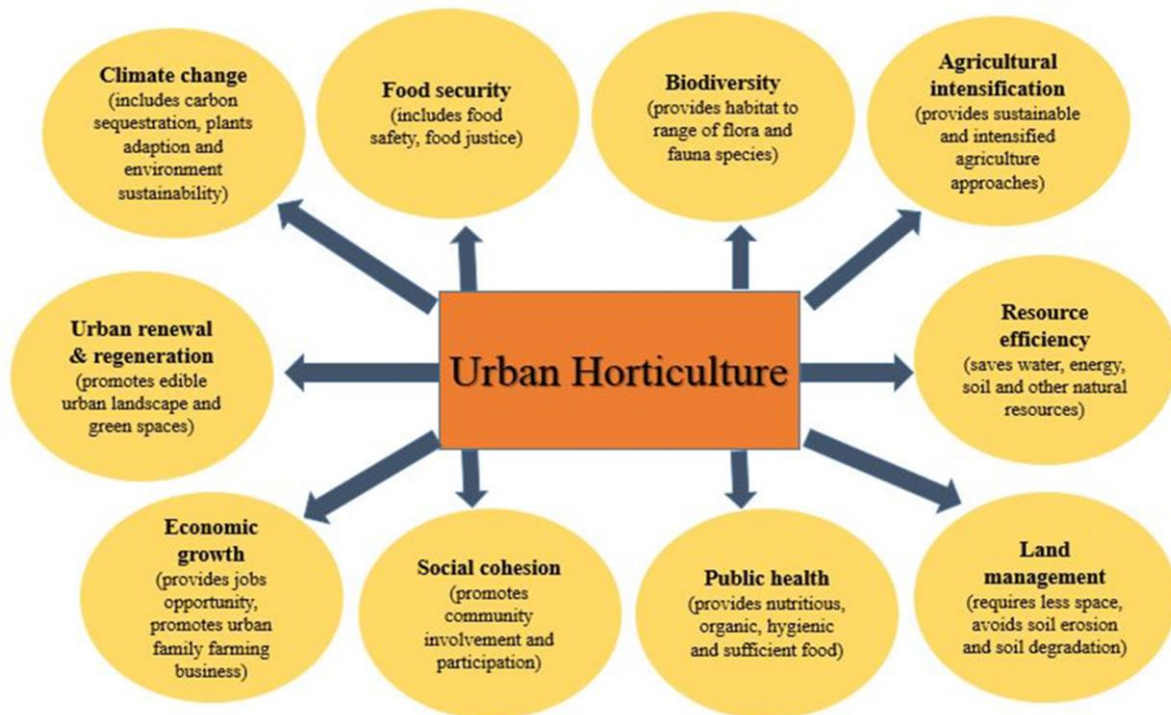
- Identify and protect forest areas high in biodiversity
- Rely more on selective cutting and strip cutting
- No clear cutting on steep slopes
- No logging of old growth forests
- Sharply reduce road building into uncut forest areas
- Leave most standing dead trees and fallen timber for nutrient recycling
- Plant tree plantations primarily on deforested and degrade plant land
- Certify timber grown by sustainable methods



The number of plant species becoming extinct is increasing at an alarming rate. Because ecosystems are in a delicate balance and because seed plants maintain close symbiotic relationships with animals, whether predators or pollinators, the disappearance of a single plant can lead to the extinction of connected animal species. A real and pressing issue is that many plant species have not yet been cataloged; their place in the ecosystem is unknown. These unknown species are threatened by logging, habitat destruction, and loss of pollinators. They may become extinct before we have the chance to begin to understand the possible impacts resulting from their disappearance. Efforts to preserve biodiversity take several lines of action, from preserving heirloom seeds to barcoding species. Heirloom seeds come from plants that were traditionally grown in human populations, as opposed to the seeds used for large-scale agricultural production. Barcoding is a technique in which one or more short gene sequences, taken from a well-characterized portion of the genome, are used to identify a species through DNA analysis.[18,19]

III. RESULTS

Conservation of the unique biodiversity of mountain ecosystems needs trans-disciplinary approaches to succeed in a crowded colloquial world. Geographers, conservationists, ecologists and social scientists have, in the past, had the same conservation goals but have tended to work independently. New criteria are offered for prioritizing species and habitats for conservation in montane ecosystems that combine both ecological and social data. Mountain ecosystems are hot spots for plant conservation efforts because they hold a high overall plant diversity as communities replace each other along altitudinal and climatic gradients, including a high proportion of endemic species.



It is necessary to know about (1) plant diversity in mountain ecosystems with special reference to the western Himalayas; (2) ethnobotanical and ecosystem service values of mountain vegetation within the context of anthropogenic impacts; and (3) local and regional plant conservation strategies and priorities. Bringing sustainability into the use and management of plant resources in mountain areas is a challenging task, especially in remote mountain ranges such as the Himalayas, Hindu Kush and Karakoram where there are both geographical and geopolitical constraints. These mountain ranges are also located in geopolitically immature and democratically young countries such as India, Nepal, Pakistan and Afghanistan where, in the majority of cases, policy-makers and politicians pay little regard to the scientific evidence on plant biodiversity and threats to its survival when taking decisions related to natural resource management. In addition, parts of these geopolitical territories have faced various political or tribal conflicts and unrest, e.g. the Hindu Kush mountains in Afghanistan. Such unrest reduces the opportunity for documentation of existing biodiversity and the implementation of conservation management. Plant diversity decreases with a reduction in the monsoon effect as one moves from south-east to north-west in the Himalayas. Other factors responsible for this decline are the increase in altitudinal and latitudinal gradients. In general the Himalayan vegetation ranges from tropical evergreen species in the south-east to thorn steppe and alpine species in the north-western parts. The dominance of an endemic flora in the western Himalayas, especially at high elevations, indicates the high conservation importance of these ecosystems. [20,21]

IV. CONCLUSION

This review emphasizes the need for sustainable utilization of plant biodiversity in order to maintain provisioning ecosystem services on the one hand and indigenous traditional knowledge which enables these uses on the other hand. The anthropogenic impacts on the vegetation require an assessment of the conservation status of all plant species and of the indicator, rare and endemic species in particular. We have demonstrated how an ethnoecological approach towards biodiversity conservation can be linked to quantitative ecology. This is a novel, integrative approach involving knowledge obtained from phytosociological classification, ordination, distribution, richness, diversity, ecosystem services and ethnobotanical perceptions of conservation. The article illustrates how this approach can be used to identify the conservation status of plant species, from the perspective of both ecological criteria (i.e. endemism, endangerment and rarity) and the traditional knowledge of local people. Future work should address the long-lasting consequences of the loss of plant biodiversity for the sustainability of ecosystem services other than just provisioning services, i.e. also regulatory, supporting and cultural services. [22,23]



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