Managing Biodiversity-based Goods and Services: How to increase benefits for mountain communities

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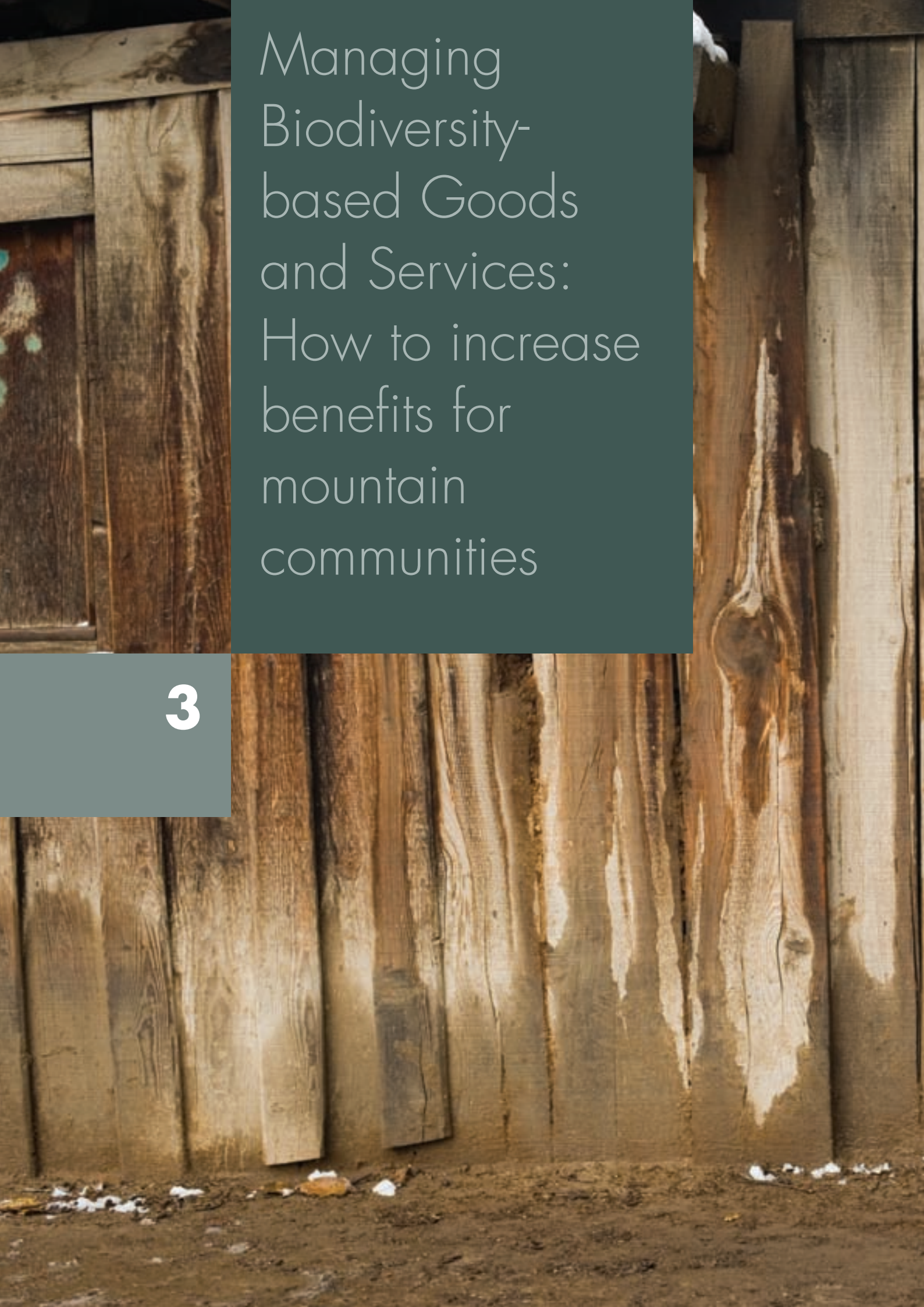


What is the value of economic benefits of ecosystem biodiversity in the Hindu Kush-Himalayas?

Traditional prayer wheel, Pangboche monastery, Nepal

The Millennium Ecosystem Assessment (MA 2005) describes ecosystem services as provisioning services (for genetic resources, food, fibre, fresh water, and so forth); regulating services (including the regulation of climate, water, and some human diseases); supporting services (includes productivity, soil fertility, and nutrient cycling); and cultural services (such as spiritual enrichment, recreation, aesthetic experience, and so forth).

People's livelihoods in the region are directly tied to the food, fibre, dyes, medicines, timber, fodder, and fuel provided by their ecosystem's biodiversity. The economic benefits of biodiversity are huge, but rigorous economic analysis is difficult. The services rendered by nature are not captured by conventional economic analyses, so evaluating them and assigning monetary values are not easy tasks. For example, one important provisioning service of the Hindu Kush-Himalayan region is providing water for 1.3 billion people – 20% of humanity. To date there has been no initiative to either quantify these benefits in economic terms or to share them with the custodians of the resources.

How have mountain societies traditionally managed biodiversity-based goods and services?

The knowledge base of mountain societies provides a holistic approach to 'nature and culture' in which both the tangible and intangible benefits of cultural diversity and biological diversity are mutually supportive of one another.

Traditional ecological knowledge has been used for harvesting resources and planting agricultural crops, as well as in the use of natural herbs and other materials for medicinal purposes, over hundreds of years.

Carrying fodder, Uttaranchal, India

"Peace can be defined as security and the secure access to resources that are essential for living. In this regard, climate change will have several implications as numerous adverse impacts are expected for some populations in terms of access to clean water, access to sufficient food, stable health conditions, ecosystem resources, and security of settlements."

Rajendra Pachauri, the Chair of the UN's Intergovernmental Panel on Climate Change, Nobel Lecture, Oslo, 10 December 2007.

How can traditional knowledge be used to address global change?

Hundreds of years ago, the present environmental threats did not exist. Today, traditional knowledge, as such, cannot overcome the challenges posed by these new threats. The ethnic-specific approach, with its time-tested values, should not be dismissed but it does need modification.

Linking traditional and formal approaches can help mountain communities to adapt to changing times. A hybrid system can contain either greater (incremental pathway) or lesser proportions (contour pathway) of traditional compared to formal knowledge as needed.

What environmental changes are degrading biodiversity-based goods and services?

Widespread poverty, poorly-managed subsistence activities, changes in land use and land cover, introduction or removal of species, population growth, roads, urbanisation, commercial exploitation, resource extraction, conflicts over resources, and unsustainable or poorly-managed tourism – all have adverse impacts on mountain biodiversity.

Species with narrow habitat ranges, especially those from higher elevations and/or with poor dispersal capacity, are particularly at risk. Globalisation, migration, global climate change, economic, and socio-political changes, all affect mountain biodiversity and the communities living in the mountains. When biodiversity resources are degraded, or access to them restricted, communities invariably suffer.

How can land-use and land-cover change affect biodiversity?

Changes in people's lifestyles such as that of nomads in highland rangelands; forest transition due to plantation and agroforestry; agricultural intensification; and tropical forest and lowland plantation economies lead to land-use and land-cover changes.

Hydrological processes are altered as a result and, as they contribute to carbon sequestration and nitrogen deposition, they are among the drivers of climate change. Biotic and species' diversity are adversely impacted by these changes and eventually affect the ability of biological systems to support human needs: the results could be economic or sociopolitical upheaval.

What factors are causing land-use/ land-cover changes in the Hindu Kush-Himalayan region?

Recent changes have taken place when traditional nomads, agropastoralists, and shifting cultivators have altered their lifestyles, but there is little information available on the overall trend of land-cover or land-use changes in the Himalayas. Scientists recognise that an overall forest transition is taking place in most Himalayan countries which includes plantation and forest recovery. Rangeland degradation is also widespread. Better data alone cannot predict future trends in land use. What is needed is a better understanding of change and interaction among different drivers, interlinkages between land-use systems along elevation gradients for ecosystem services, as well as feedback to coupled ecological-social systems.

Land use/cover in Himalayan highlands

(from the presentation by Xu Jianchu, based on various sources)

"What is needed is a better understanding of change and interaction among different drivers..."

India's new focus on Himalayan ecosystems - Towards addressing global climate change in India

In June 2008, the Prime Minister of India and the Prime Minister's Council on Climate Change announced India's National Action Plan on Climate Change outlining existing and future policies and programmes addressing climate mitigation and adaptation. This plan establishes an effective, cooperative, and equitable global approach based on the principle of common but differentiated responsibilities and respective capabilities enshrined in the United Nations Framework Convention on Climate Change. The plan identifies eight core 'national missions.'

These missions are: Solar, Enhanced Energy Efficiency, Sustainable Habitats, Water, Sustaining the Himalayan Ecosystem, Green India, Sustainable Agriculture, and Strategic Knowledge for Climate Change. The national mission on Sustaining the Himalayan Ecosystem aims to conserve biodiversity, forest cover, and other ecological values in the Himalayan region. This mission will simultaneously focus on multiple fronts by promoting an understanding of climate change, adaptation and mitigation, energy efficiency, and natural resource conservation and will achieve its key goals through multi-pronged, long-term and integrated strategies. It will evolve management measures for sustaining and safeguarding the Himalayan mountain ecosystems.

These measures will include enhanced monitoring of Himalayan ecosystems (especially glaciers and river systems); establishing an observational and monitoring network to assess freshwater resources and ecosystem health; promoting community-based management with incentives for protection and enhancement of forested lands; and overall strengthening of regional cooperation for the exchange of information with countries sharing the Himalayan ecosystem.

How are land-use and land-cover changes related to scale?

Assessing land-use change and its impact on biodiversity is scale dependent. On the largest scale there can be intense land-use and land-cover changes causing the smallest habitats and populations of organisms to suffer negative impacts.

On the intermediate and local scales, however, land-use and land-cover changes are site specific, dependent on history, national policies, and whether natural mountain biodiversity, agricultural biodiversity, or functional biodiversity are being measured. Positive and negative impacts can ensue.

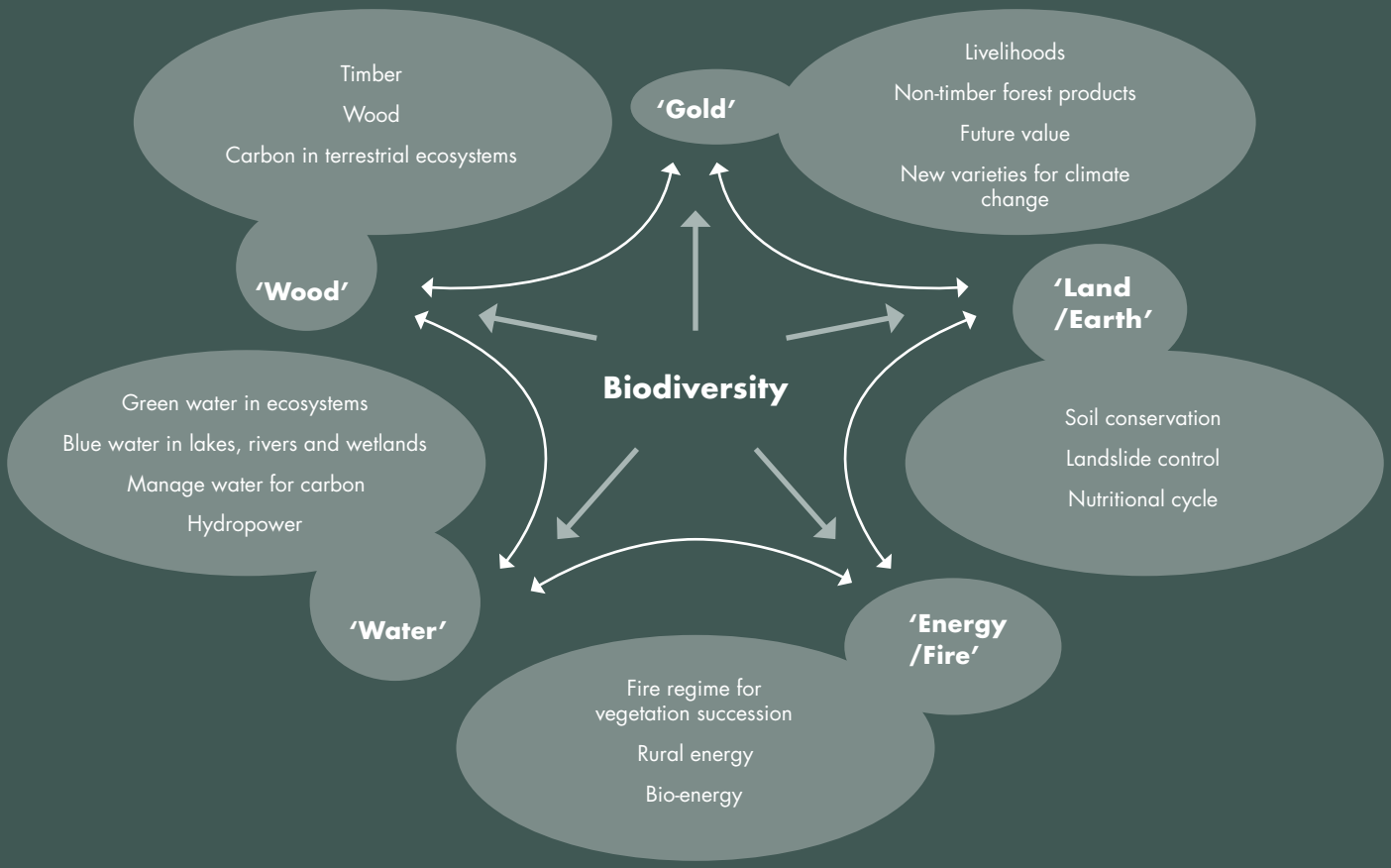
What role can mountain protected areas play in biodiversity management?

It is most notable that 39% of the Hindu Kush-Himalayan region has been set aside as protected areas. In spite of this, loss of biodiversity remains a challenge.

The role of direct and indirect drivers has already been outlined; however, whereas some of these drivers can be held at bay in protected areas, others, like climate change, are pervasive and can have an impact on species' persistence leading to the disproportionate distribution of species along ecological zones both within and beyond the borders of the protected areas.

Aspects of biodiversity

(Redrawn from the presentation by Xu Jianchu)



What role do wetlands play in managing biodiversity in the region?

Wetlands account for approximately 17% of the total area of the Hindu Kush-Himalayan region. They are critical links between terrestrial and aquatic ecosystems and are characterised by a high degree of primary productivity. Among the richest sources of biodiversity on earth, wetlands support community and ecosystem resilience, store and purify water, recharge groundwater aquifers, trap sediments, and improve water quantity and quality.

Wetlands can also play an important role in capturing and retaining melting snow or ice and, wherever possible, rainfall, releasing water progressively and therefore acting as suppliers and regulators of water for an entire basin. In some cases their associated peatlands act as carbon stores preventing the release of carbon into the atmosphere.

What implications does climate change have for wetland functions and biodiversity?

Himalayan wetlands are of global importance. Wetlands provide ecosystem services as well as facilitating atmospheric circulation, biodiversity, water and hydrological cycles, and beautiful landscapes. Climate change, by disturbing the ecological structure and function, could cause the loss of high-altitude wetlands, which would directly impact hydrological regimes and the wetland associated biodiversity. There could be serious ramifications in terms of an increase in natural disasters such as glacial lake outburst floods (GLOFs) and loss of livelihoods for wetland communities: unsustainable management strategies also pose threats.

What adaptation strategies will work in wetland areas?

An integrated multidisciplinary approach supported by an intensive capacity-building process involving wetland managers, policy planners, decision makers, and local stakeholders to enable effective wetland management and restoration could work in wetland areas. Research and policies should be linked to livelihoods and local knowledge.

Payment for ecosystem services is emerging as a tool to support wetland communities in conserving high-altitude wetlands. Best practices need to be identified and developed based on evaluation of current examples. Practitioners and policy makers should be engaged in funding research and in encouraging a development agenda that takes wetland communities and their livelihoods into consideration.

"An integrated multidisciplinary approach involving wetland managers, policy planners, decision makers, and local stakeholders could work in wetland areas."

"Understanding of the functioning of high-altitude wetlands and the relationship between climate change and water management will be essential."

What responses can best deal with climate change in wetland areas?

Apart from historical, structural approaches, integration of wetland ecosystem functions and services is a potential adaptation strategy against the emerging pressures of climate change. Wise use and conservation of wetlands provide an alternative to structural approaches. Understanding of the functioning of high-altitude wetlands and the relationship between climate change and water management will be essential. Research on hydrological data is important for understanding how the water sources of the wetlands are connected to river systems, and for their sustained maintenance.

At present, both worrying and positive trends are seen in siltation and debris-filled dams and reservoirs (for example, in Pakistan) and the potentially positive impacts from glacial melt, both of which imply a change in wetland types.