

Enhancing the Ecosystem Services of the Hindu Kush-Himalayas – Climate Change Challenges and Opportunities

Eklabya Sharma, Programme Manager, Environmental Change and Ecosystem Services, ICIMOD, esharma@icimod.org



Paro valley landscape, Bhutan, showing a variety of ecosystem components

Human ‘well-being’ is a multifaceted quality that encompasses good life, health, good social relations, security, and freedom of choice and action, all of which ultimately depend on sustained ecosystem services.

Ecosystem services can be subdivided into four types: (a) supporting – for example primary production, nutrient cycling, and soil formation; (b) provisioning – for example food, wood, fibre, fuel, and freshwater; (c) regulating – for example climate, flood, disease, and water purification; and (d) cultural – for example aesthetic, spiritual, educational, and recreational (MA 2005). Until recently, ecosystem services were available in sufficient abundance in the Hindu Kush-Himalayan (HKH) region. However, growing demand is leading to rapid degradation and depletion of such services. Ecosystem services need to be enhanced for the well-being of mountain people and downstream beneficiaries, as well as to ensure the sustainable supply of such services to the world and future generations.

Climate change, land use change, and population dynamics are the major drivers of environmental change in the HKH region. These drivers have influenced

ecosystem services and, in many cases, have had a negative impact on the livelihoods of mountain people and increased their economic and environmental vulnerability. Although the sources of these drivers are both internal and external to the region, their effect on human well-being and natural resource availability and use are mutually reinforcing. Mountain people are particularly vulnerable to such changes; equally, although less apparent, these changes impact on entire river basins and even globally.

Challenges arising from climate change

Scientific evidence indicates strongly that global climate change is indeed taking place and will have practical ramifications on local ecosystems (IPCC 2001; IPCC 2007). Studies in Nepal and China have shown that temperatures are rising and at a higher rate in high altitude areas (Chaulagai 2006; Liu and Chen 2000).

The natural ecosystems in the HKH region have undergone dramatic changes over the past 50 years. For the most part, ecosystem services have been degraded. The impacts of this on poor people has been more severe as access to resources has been either reduced or disturbed. As countries develop, the demands people put on their ecosystems change. In the HKH countries, between 47 and 83 per cent of people earn less than \$US 2 per day, and between 17 and 36 per cent earn less than \$US 1 (World Bank 2006). The HKH region is home to some of the poorest people, the majority of whom belong to a diversity of ethnic groups and minorities; their well-being is highly dependent on maintaining and improving ecosystem services. Environmental change also influences the livelihoods of those who live in downstream areas.

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Ecosystem services are in jeopardy and action must be taken to ensure they are sustained. However, in the next few decades, even the most stringent mitigation efforts will not avert further impacts of climate change and the alteration of ecosystem services. This makes adaptation essential, particularly in addressing near-term impacts. IPCC (2007) recommends a mix of strategies including mitigation, adaptation, technological development, and research. Sustainable development can contribute to reducing vulnerability to climate change by enhancing adaptive capacity and increasing resilience. Thus responses should focus on adaptation strategies and coping mechanisms.

Most of the HKH range lies at high altitudes and mid-latitudes (30-50°N). These areas are highly sensitive to climate change. Mitigation and adaptation methodologies should respond to cultural and ecological zone specific sensitivities. For example, a recent study shows that afforestation in high altitude and mid-latitude areas contributes to global warming by inducing biophysical effects, while landscapes with grasslands and croplands have a cooling effect (Bala et al. 2007). So, in high altitude and mid-latitude areas of the HKH, rangelands are the natural climax vegetation, and these (rather than forests) should be promoted. Mitigation and adaptation measures have to be supported by scientific and technological findings in customising international know-how and methodologies.

Enhancing ecosystem services in the HKH region

The HKH region encompasses a wide spectrum of ecological zones with a diverse socioeconomic potential. It contains all or part of 4 of the world's 34 biodiversity hotspots (Himalaya, Indo-Burma, Mountains of South-

West China, and Mountains of Central Asia), and contains a unique array of plants and animals of global importance (CI 2005). Furthermore, the glaciers, wetlands, rangelands, and forests of the HKH sustain many rivers, which are the lifeline of downstream provinces and countries. These landscapes provide valuable ecosystem services, not only in the form of the supply and purification of water, but also provisioning, supporting, and regulating services such as plant-based production, soil retention, climate regulation, and carbon sequestration, and as reservoirs of pollinators, natural predators, and others. The well-being of 150 million people within the HKH mountains and a further 1.3 billion people downstream is inextricably linked to the natural resources in the HKH region and the services that the region provides.

The HKH area is globally recognised for the ecosystem services that it provides. Conventions and global agreements such as the Convention on Biological Diversity, the Ramsar Convention on Wetlands, Convention to Combat Desertification, Convention on Migratory Species, Framework Convention on Climate Change, Male Declaration, and Kyoto Protocol all address the issue of sustaining ecosystem services. ICIMOD's regional member countries are party to these conventions and agreements, showing the region's commitment to global agendas.

Many environmental programmes are being implemented in the HKH region which, while adhering to global commitments, should use adaptation and mitigation mechanisms to improve ecosystem services. They include programmes related to participatory forest management, co-management of rangelands, watershed management, protected area management for biodiversity conservation, and the wise use of wetlands and water, as well as programmes employing the river basin approach to conservation and the more recent landscape management approaches. Approximately 35% of the area of the HKH region is under some form of protected management, and this could be used to promote coping mechanisms and adaptive strategies, for example to ensure the conservation of the large number of endemic species found in the region and thus continuation of provision of the tangible and intangible benefits and the services related to biodiversity.

Internationally, the Millennium Ecosystem Assessment (MA) was carried out between 2001 and 2005 to assess the consequences of ecosystem change for human well-being and to establish a scientific basis for actions to enhance the conservation and sustainable use of ecosystems. A conceptual framework for ecosystem services was developed by the MA process (MA 2005) but needs to be adapted for effective use in the HKH region.

There is a need to strengthen the capacities (formal and informal) of people and institutions to address the emerging issues related to ecosystem services in the region. Ecosystem services work demands greater multi-disciplinarity and more integrated approaches. Examples of equi-table payment schemes for eco-system services are scarce in the region and more pilot studies are required. Guidelines, policies, and legal instruments specifically supporting ecosystem services have to be developed to enhance the accrual of benefits to the region.

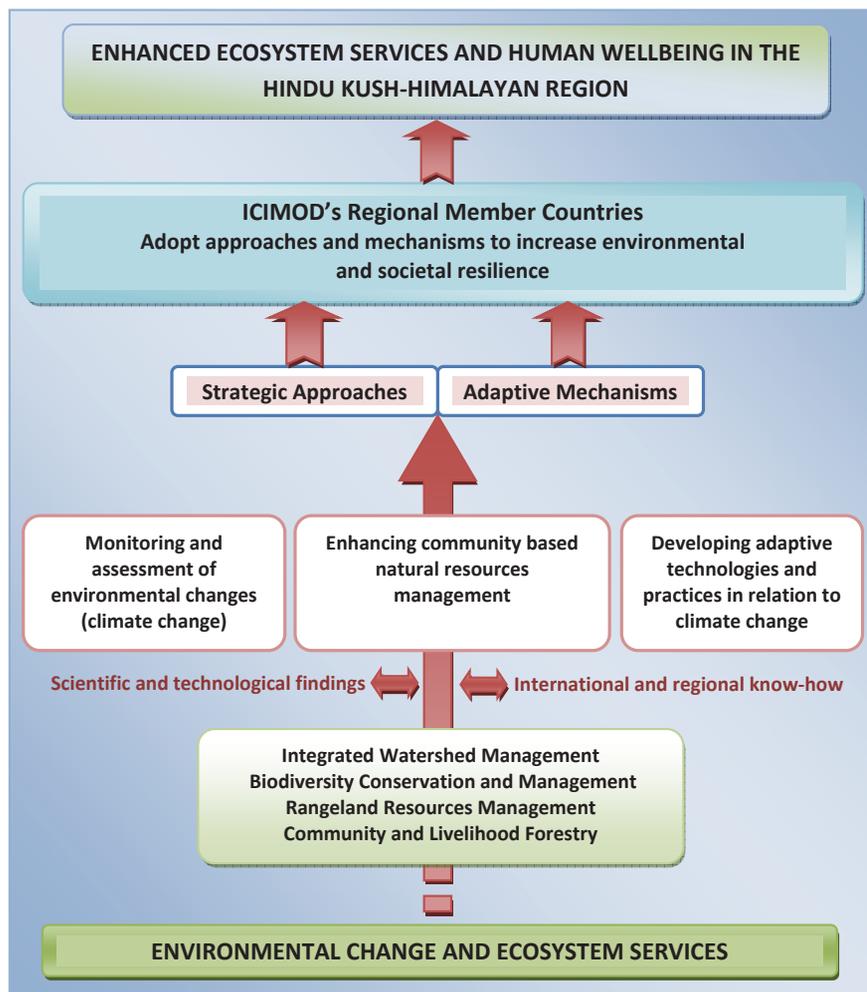
ICIMOD's programme

ICIMOD and its partners realise the urgent need to increase the environmental and societal resilience of the region. ICIMOD's new strategic plan includes a strategic programme on Environmental Change and Ecosystem Services that focuses on issues addressing environmental change, adaptation to climate change, and sustaining ecosystem services.

More specifically the programme intends to

- investigate environmental change through monitoring of ecological and socioeconomic changes, and analyse the consequences of this change for the livelihoods of mountain people and these living downstream;
- find suitable allies to transfer and adapt international know-how and participate in regional collaboration especially on adaptation to the effects of climate change, upstream-downstream relationships, and validation of the supply of ecosystem services, including freshwater and carbon sequestration, for the benefit of communities; conserve and manage biodiversity as our natural heritage and a resource for livelihoods and ecological resilience; and
- work on enhancing ecosystem services by helping to sustain the services that mountain areas provide to the downstream population and the world at large in regulating climatic conditions, and facilitate the development of adaptive technologies, appropriate policies with decision support systems, and innovative payment or compensation mechanisms for ecosystem services.

In operational terms, ICIMOD intends to work on the monitoring and assessment of environmental change, enhancing community-based natural resources



ICIMOD's programme to enhance ecosystem services

management, and adapting to environmental change through programmes on integrated watershed management, biodiversity conservation and management, rangeland resources management, and community and livelihood forestry.

References

- Bala, G.; Caldeira, K.; Wickett, M.; Phillips, T.J.; Lobell, D.B.; Delire, C.; Mirin, A. (2007) 'Combined Climate and Carbon-cycle Effects of Large-scale Deforestation'. In *PNAS*, 104(16):6550-6555
- CI (2005) *Global Biodiversity Hotspot Maps*. Washington DC: Conservation International
- Chaulagai, N.P. (2006) *Impact of Climate Change on Water Resources of Nepal: the Physical and Socioeconomic Dimensions*, PhD Dissertation. Flensburg (Germany): Flensburg University
- Liu, X.; Chen, B. (2000) 'Climatic Warming in the Tibetan Plateau during the Recent Decades'. In *International Journal of Climatology*, 20:1729-1742
- IPCC (2001) *Climate Change: Synthesis Report. A Contribution of Working Groups I, II and III to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge and New York: Cambridge University Press
- IPCC (2007) *IPCC Summary for Policymakers: Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability, IPCC WGII Fourth Assessment Report*. Cambridge and New York: Cambridge University Press
- MA (2005) *Millennium Ecosystem Assessment: Ecosystems and Human Well-Being: Synthesis*. Washington: Island Press
- World Bank (2006) *World Development Indicators*. Washington: International Bank for Reconstruction and Development/The World Bank