

Poverty, development, and Himalayan ecosystems

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Abstract The Himalayas are rich in biodiversity but vulnerable to anthropogenic pressures. They are also host to growing number of rural poor who are dependent on forest and ecosystem services for their livelihood. Local and global efforts to integrate poverty alleviation and biodiversity conservation in the Himalayas remain elusive so far. In this work, we highlight two key impediments in achieving sustainable development in the Himalayas. On the positive side, we also highlight the work of Ashoka Trust for Research in Ecology and the Environment (ATREE), a research organization based in India that seeks to integrate biodiversity concerns with livelihood security. For impediments, we draw on two examples from the Darjeeling district, India, in Eastern Himalayan region to illustrate how development organizations are failing to simultaneously address poverty and environmental issues. Based on the success of ATREE, we then propose a conceptual framework to integrate livelihood generating activities with sustainable and equitable development agenda. We recommend developing a Hindu-Kush Himalayan Ecosystem Services Network in the region to formulate a strategy for further action. We conclude by offering measures to address the challenge of integrating livelihood and environment issues through this network.

Keywords Development · Ecosystem services · Himalayas · Poverty · Protected areas

INTRODUCTION

With global challenges such as population growth, doubling of food demand by 2050, and loss of ecosystem services, it has become urgent to integrate poverty alleviation and environment protection in biodiversity-rich regions (Adams et al.

2004; Bawa et al. 2008; Butchart et al. 2010; UN 2012; Fisher et al. 2013; Zhang et al. 2013; Wratten et al. 2013). Global efforts to address poverty and environmental degradation are led by the United Nations—through setting the millennium development goals (MDGs) (UN 2000). However, MDGs are falling short of their targets in most of the countries (UN 2013). The key to equitable and sustainable development in biodiversity rich but economically poor regions is to improve the incomes of rural poor without impacting the ecosystems (Bawa et al. 2008). Himalayas, are one of the 34 global hot-spots of biodiversity supports over one-fifth of the human population both directly and indirectly in the Hindu-Kush Himalayan (HKH) region (Pradhan et al. 2012; Rasul 2014a). The HKH region extends 3500 km over eight countries (Fig. 1; Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan). India and China, the two major stakeholders in the HKH region, have economically productive activities which rely on the natural resources and ecosystem services provided by this region (Bawa et al. 2010). These ecosystem services also form the basis of religious and cultural aspirations of the local population.

This region is rich in biodiversity but is vulnerable to anthropogenic pressures. Population growth in HKH region countries have seen massive increase since 1950, and likely to continue growing beyond 2050 (Fig. 2; UN 2014). In the HKH region, there are a growing number of rural poor who are dependent on forest and ecosystem services for their livelihood (Chaudhary and Bawa 2011). Most of the biodiversity in this region is managed in protected areas. There are 488 protected areas in HKH region spread across eight countries (Fig. 3; Chettri et al. 2008). The region is highly diverse and harbors a rich variety of gene pools and species (25 000 species of angiosperms, 75 000 species of insects, 1200 species of birds, and many ‘wild’ relatives of crops) and hosts four of the 34 global hot spots of

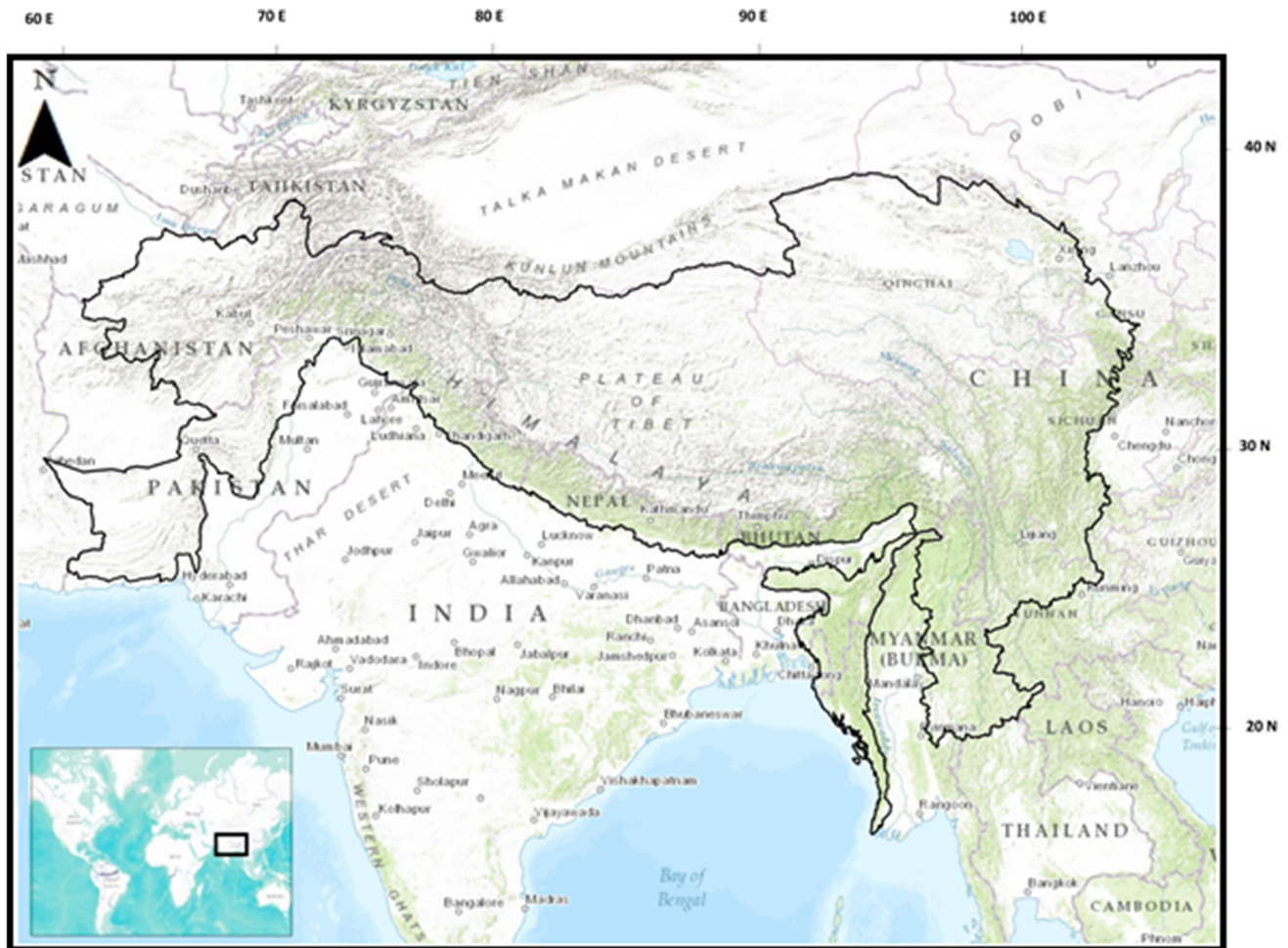


Fig. 1 Map showing the Hindu-Kush Himalayan (HKH) region extending 3500 km over eight countries from Afghanistan in the west to Myanmar in the east

biodiversity (Wikramanayake 2002). Some of the iconic animal species include snow leopard, red panda, tiger, musk deer, one horn rhino, etc.

Increasing demands by a large number of forest dwellers often leads to conflict over resource use between the rural poor living at the periphery of protected areas and the state (Pretty 2002). This issue of poverty, loss of biodiversity, and declining ecosystem services remains largely unaddressed in the Himalayan region, despite some degree of success in managing ecosystems at agriculture and forest interface by Ashoka Trust for Research in Ecology and the Environment (ATREE), an Indian research organization (Kamal et al. 2012; Bawa et al. 2012). Based on these successes, our proposal is to integrate livelihood generating activities with sustainable and equitable development agenda and develop a Hindu-Kush Himalayan Ecosystem Services Network in the region. This network based on an ecosystem services approach can help to formulate strategy for further action. This approach integrates ecological, social, and economic dimensions of the benefits that humans derive from ecosystems (MEA 2005).

This paper is organized as follows. First, we discuss two major factors that are key impediments in equitable and sustainable development. Second, we highlight how development organizations in their efforts to promote economic development fail to simultaneously address poverty and ecosystem services. We do this by citing two examples from the Darjeeling district, India, which is a part of the Eastern Himalayan biodiversity hotspot. Third, we specify the need to create a network by developing a conceptual framework that integrates environment and economic development. We then discuss how this network can provide a platform to simultaneously address poverty and environmental degradation and facilitate sustainable development.

FACTORS AFFECTING EQUITABLE AND SUSTAINABLE DEVELOPMENT

MDGs promote integration of poverty reduction and biodiversity conservation worldwide (UN 2000). However,

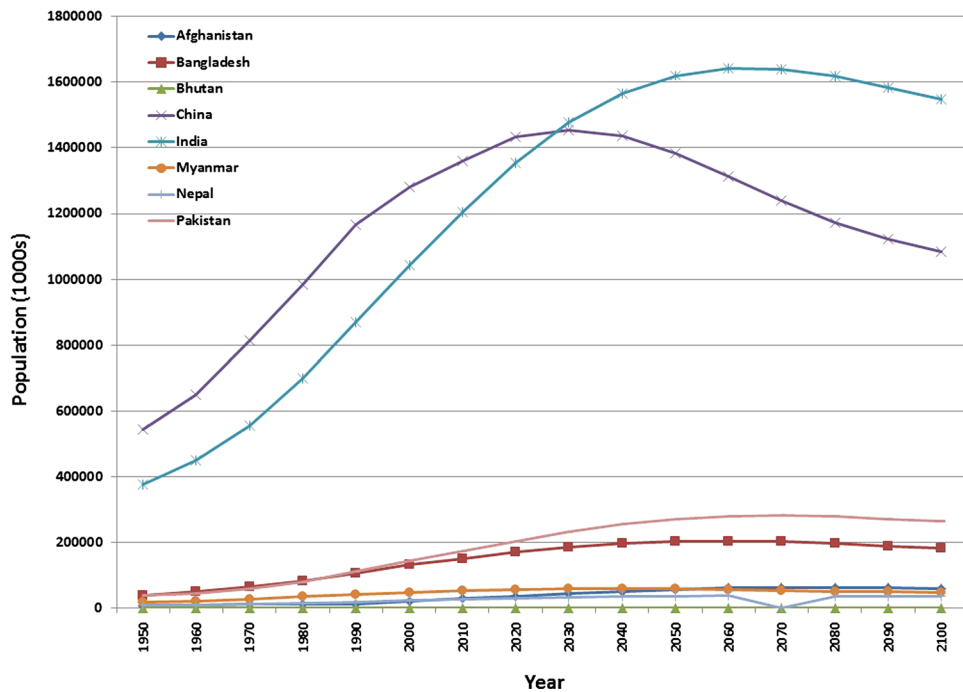


Fig. 2 Population growth in eight countries in the Hindu Kush Himalayan region from 1950 to projected 2100, based on estimates by United Nation Statistics (UN 2014)

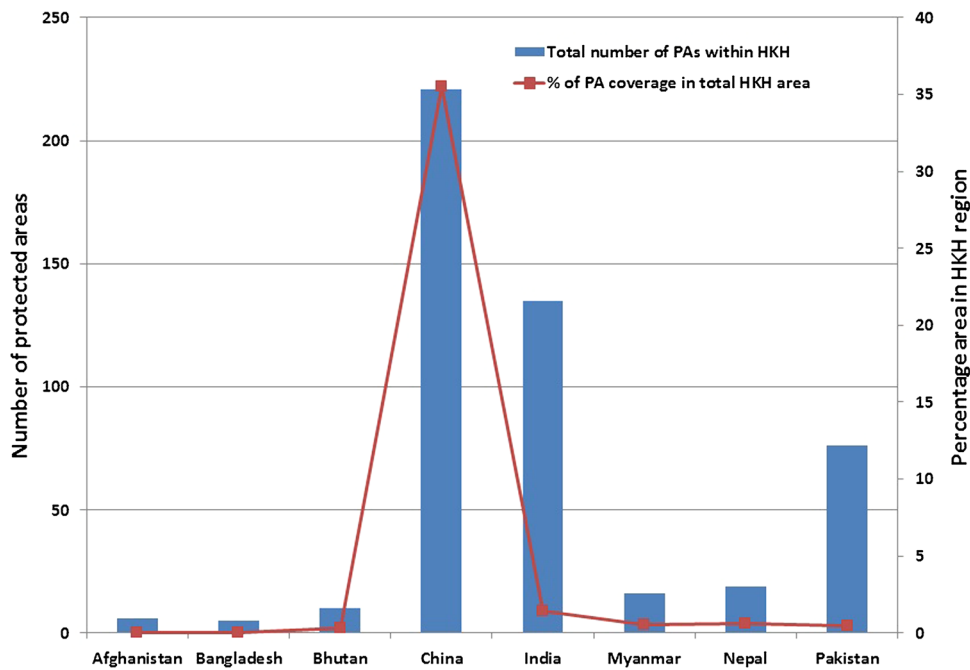


Fig. 3 Number of protected areas in eight countries and percentage area that falls within the Hindu-Kush Himalayan region

such attempts have not been highly successful as more than 1 billion human beings continue to live under poverty (UN 2013), and biodiversity continues to erode (Butchart et al. 2010) as MDGs project draws toward end in 2015.

Continuation of such efforts at global level will help to eradicate poverty by 2030, in several developing countries. Two key factors that affect equitable and sustainable development are as follows: (i) failure to simultaneously

address economic and environmental problems in the developing world (Adams et al. 2004) and (ii) lack of an ecosystem services approach and a network that can provide strategic directions to address poverty and environmental degradation (Perrins et al. 2011).

Failure to simultaneously address poverty and environment

Extreme poverty and biodiversity loss are spatially linked (Sachs et al. 2009) and are currently the two foremost issues at global level (UN 2012). Since extreme poverty and biodiversity hotspots are generally co-located, any intervention to alleviate poverty and address biodiversity loss requires understanding of the dynamics of ecosystem services on which livelihood of local communities depend (Adams et al. 2004; DeClerck et al. 2006; Barrett et al. 2011). Yet, ecologists have played limited role in global efforts to address poverty in biodiverse regions of the world (DeClerck et al. 2006). Development organizations such as the World Bank and the International Monetary Fund (IMF) provide funding for poverty alleviation programs on the basis of ‘*return on investment*’ and consider economic indicators as a measure of success (World Bank 2009). However, due to lack of economic activities in remote and biodiversity-rich regions it is often difficult to assess cash incomes of rural poor. More importantly, assessments by cash income are only one measure; a comprehensive assessment requires understanding various factors that lead to poverty (Cohen 2010). Ideally, it should involve integration of the poverty alleviation efforts with protection of ecosystems and forest resources on which livelihood of people depends.

Lack of ecosystem services approach and a network

The second factor is the lack of ecosystem services approach and a network of scientists, communities, and policy makers in the developing world that can facilitate the people-centric agenda for poverty alleviation while addressing environmental issues (Bawa 2012). Governments are the key stakeholders that collaborate with global organizations to reduce poverty and environmental degradation. It has, however, been observed that governments in developing countries lack resources to implement big programs and often large welfare activities do not yield desired results (Strange and Bayley 2008). This situation might be due to misappropriation of the funds, mismatch of priorities, or simply lack of political will (Strange and Bayley 2008). Global development organizations that aim to fight poverty and address environment or biodiversity conservation mostly follow development models based only on economic growth (Adams et al. 2004). They assume that environmental realization will follow.

However, local people in remote and biodiversity-rich areas often have different needs, priorities, cultural requirements, and attachment to the ecosystems (Bawa et al. 2008). The welfare schemes may not be aligned with their needs as they do not have the capacity to negotiate with the policy makers. Neither do they have resources or means to argue their case for equitable and sustainable development.

In the next section, we elaborate by providing two examples from the Darjeeling district, a part of the Eastern Himalayan region in India. We discuss how global organizations and governments are failing to respond to simultaneously address the poverty and environmental issues.

ECONOMIC DEVELOPMENT IN HIMALAYAS

We highlight the case of the Darjeeling district in West Bengal, India, which is a part of the Eastern Himalayan biodiversity hotspot. This north-eastern region accounts for 11 % of India’s faunal and 10 % of its floral biodiversity. Human population is increasing rapidly in this district (14 % increase in last decade; Government of India 2013). This district has a large proportion (46.4 %) of poor families (with per capita income less than US \$ 1.25 a day) compared to national average of 32.7 % in India (SECC 2011). However, poverty assessments based on cash income are generally an incomplete measure; a more comprehensive poverty assessment requires understanding multidimensional aspects and various factors that lead to poverty (Cohen 2010). Multidimensional poverty assessment includes basic needs and measures of well-being (Cohen 2010). Focusing on cash incomes of the rural dwellers does not shed any light on the intricate links between their livelihood and ecosystems. It also does not suggest how livelihoods can be improved. Understanding these linkages allows specific measures to be adopted which can enhance ecosystem services and improve livelihood of rural poor (Sandhu and Sandhu 2014). There are two key protected areas near Darjeeling—Singalila National Park and Sanchel Wildlife Sanctuary which are home to both floral and faunal native biodiversity. We provide two examples from this area describing, (i) how economic activities lead to change in ecosystems and thereby impact local community and (ii) how jurisdiction issues affect development perspectives and can lead to perverse outcomes.

Economic activities and ecosystem change

Economic activities in the region are being promoted by development organizations in partnership with corporates,

to develop projects such as small hydro power station, using environment technology under clean development mechanisms (CDM; UN 1998). CDM projects are promoted by the United Nations Development Programme (UNDP) and are supported by the United Nations Framework Convention on Climate Change (UNFCCC) to create carbon offsets (UNFCCC 2006) and to mitigate the impacts of climate change. Development organizations anticipate that such economic activity will lead to employment generation for the rural poor, and an additional benefit could be achieved through sharing income from selling carbon credits in market.

A small hydro power project based in Lodhama village located at the periphery of a Singalila National Park in the Darjeeling district is one such project—established under this scheme. In this project, water is diverted from stream flowing through the village. One potential consequence of this is lower biodiversity in the stream (IUCN 2001; SANDRP 2012). Stream flow is considered as the major determinant of habitats in streams which in turn determines species composition (Hughes and Noss 1992; Dudgeon 2000; Bunn and Arthington 2002). Reduction in flow in stream can thus impact local riverine fish, frogs and toads (for example, *Amolops formosus*), and several native

medicinal (*Terminalia bellerica*, *Terminalia chebula*, *Embellica officinalis*, *Azadirachta indica*, *Aegle marmelos*, *Ocimum sanctum*) and flowering plants (*Oroxylum indicum*, *Holarrhena antidysenterica*)—found in the region (WWF 2006; Kar et al. 2006; Subba 2012). Decreased stream flow also leads to less water availability for irrigation which leads to drying of crops (Fig. 4). This affects livelihood of the rural poor (per capita cash income is US 16–34 c per day; Sandhu and Sandhu 2014) who are dependent on agricultural income from their limited farmland. This village gets no share of the power generated from the water resources or any other benefit from this project. On the other hand, a power-generating business is earning revenue from the sale of electricity. As this is a CDM project, they are offsetting carbon pollution for an associated multinational company (MNC) which continues to generate pollution offsite. Biodiversity loss at the site and continued pollution offsite is certainly not the desired outcome for the UNDP or UNFCCC. In its submissions to the UNFCCC, the concerned business organization has taken all measures and addressed ‘social and environmental concerns’ to fulfill the regulatory requirements. Under such conditions, it is difficult to anticipate social or environmental issues that may emerge or are starting to



Fig. 4 Conflict in sharing water resources in the Himalayas. Stream water is diverted to a small hydro power plant (a CDM project) by a pipeline in the Darjeeling district, India. (Photo H. Sandhu)

arise as villagers are being isolated from the rest of the world on the basis of economic ‘*power*.’ These villagers are already among the poor according to their socio-economic status. Inequities resulting from resource control in the name of economic development further take away their right to utilize stream water sustainably for their food crops that fetched them their meager livelihood.

This project is not yielding any improvement in incomes of the rural poor as they are not employed in the project due to lack of technical skills or even as casual basis. Moreover, diversion of stream water for power generation leads to water stress and negative impacts on agricultural productivity, stream biodiversity, and associated ecosystem services. This project is one example in the region where environmentally and socially responsible projects planned by development organizations may result in undesired outcomes, where incomes of rural poor do not improve and the natural environment continues to decline.

Jurisdiction and development perspectives

In the second example, we highlight how absence of regulatory framework can lead to perverse outcomes. In Darjeeling district, there are a number of forest villages located at the periphery of protected areas (Fig. 5a, b; Sandhu 2012). Forest villages were established by the forest department of the State Government for forestry operations under section 28 of the Indian Forest Act, 1927 (Government of India 1927). These villages include land for cultivation and other uses, permitted by the Government. Residents of forest villages remain deprived of access to most development programs because the land on which these villages are located is recorded as forest. No agency other than forest departments can undertake any development work on forest land, and so most of these settlements remain outside the jurisdiction of any local government or development agency. With limited opportunities to earn livelihood elsewhere, most of the inhabitants depend either on subsistence farming or forest ecosystem services (they extract non-timber forest products, medicinal plants, fuelwood etc.) to support themselves. In addition, there is no coherent approach by local government and development agencies or networks that can facilitate their inclusion in the development process. In absence of these, the inhabitants continue to live under poverty despite many development programs at the state and national level.

The current development process fails to address chronic poverty and loss of biodiversity. Instead, the lack of a comprehensive approach exacerbates these issues. We offer some measures to address these two factors to reprioritize development agenda for poverty reduction and address environment degradation in the Himalayas. In the

next section, we advocate the development of a network which can address factors affecting economic and environmental development and provide a framework under which this network can facilitate equitable and sustainable development.

CONCEPTUAL FRAMEWORK FOR THE HINDU-KUSH HIMALAYAN ECOSYSTEM SERVICES NETWORK

To address the accelerating socio-economic and environmental costs of ecosystem change in the Himalayas, it is vital to understand the natural processes, drivers of change in ecosystem services and their consequences (MEA 2005; Rasul 2014a). The issues and challenges in Himalayas are complex and require transboundary cooperation among eight countries; this cannot be effectively managed without an integrated approach (Rasul 2014b). Our proposal is to utilize ecosystem services approach to design effective policies, actions, and responses for human well-being in the HKH region (MEA 2005; Bawa 2013). This requires a coherent network that brings together people-centric institutions, scientists, policy makers, and local stakeholders to formulate strategy for further action (Fig. 6). Some of the organizations operating in the region (Eastern Himalayas) are integrating poverty and biodiversity concerns in their framework. One example is Ashoka Trust for Research in Ecology and the Environment (ATREE), Bengaluru, India which is a leading Environment Think Tank in Asia (<http://www.atree.org/>; Bawa et al. 2008, 2012). Its North-East project based in Darjeeling hills is addressing ecosystem degradation and poverty alleviation by integrating economic, social, and ecological perspectives into conservation and livelihood strategies. Economic benefits include increase in annual income of households and self-help groups (SHGs) through skill training, diversification of livelihood options, agricultural interventions, and marketing of agricultural products. Ecological interventions include efficiency in use of fuel wood and monitoring ecosystem services.

This region also hosts a regional intergovernmental learning and knowledge sharing center—International Centre for Integrated Mountain Development (ICIMOD; www.icimod.org/) which serves eight regional member countries of the Hindu-Kush Himalayas and is based in Kathmandu, Nepal. Our proposed network can be integrated through the framework of ICIMOD to bring expertise in research, development, and local stakeholders to adopt ecosystem services approach to resolve some of the issues identified above. There are other examples, where such multi-country approach has been used, such as the Mekong River Commission (MRC; www.mrcmekong.org/) which

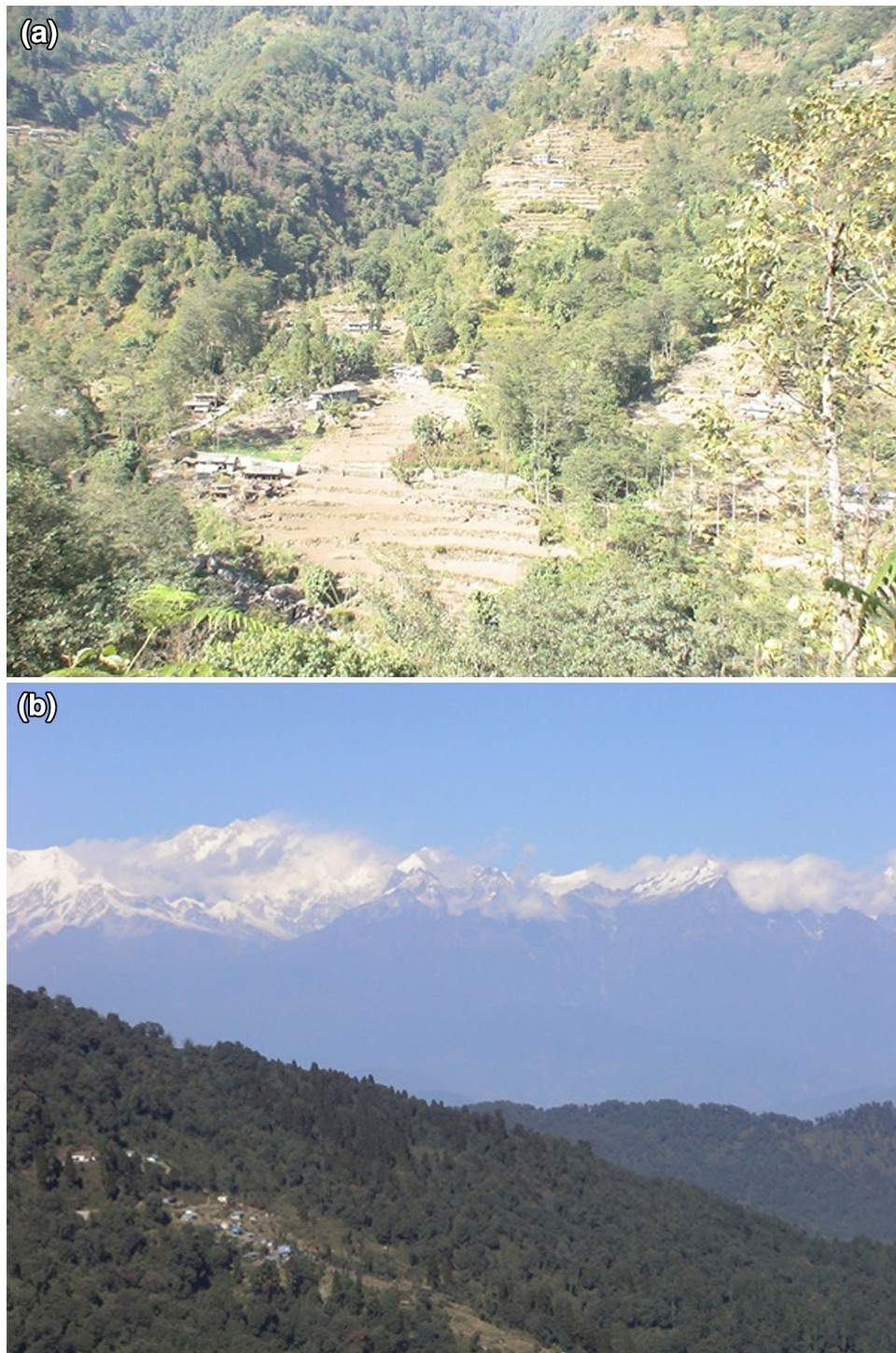


Fig. 5 Area showing forest villages which located at the periphery of protected areas in Darjeeling, India. **a** Area of a forest village showing agricultural land near the Singalila National Park. **b** Area showing forest village near Sanchel Wildlife Sanctuary, against the backdrop of Himalayan ranges (Kanchenjunga Mountains) (Photos H. Sandhu)

extends in four member countries; Cambodia, Lao PDR, Thailand, and Viet Nam. This network has resulted in many joint initiatives to manage nature and the environment in the region. The focus of MRC network is now changing from

large infrastructural projects to people-oriented equitable development (MRC 2014). We emphasize similar approaches with the development of a wider transboundary network that can encourage development projects to be more

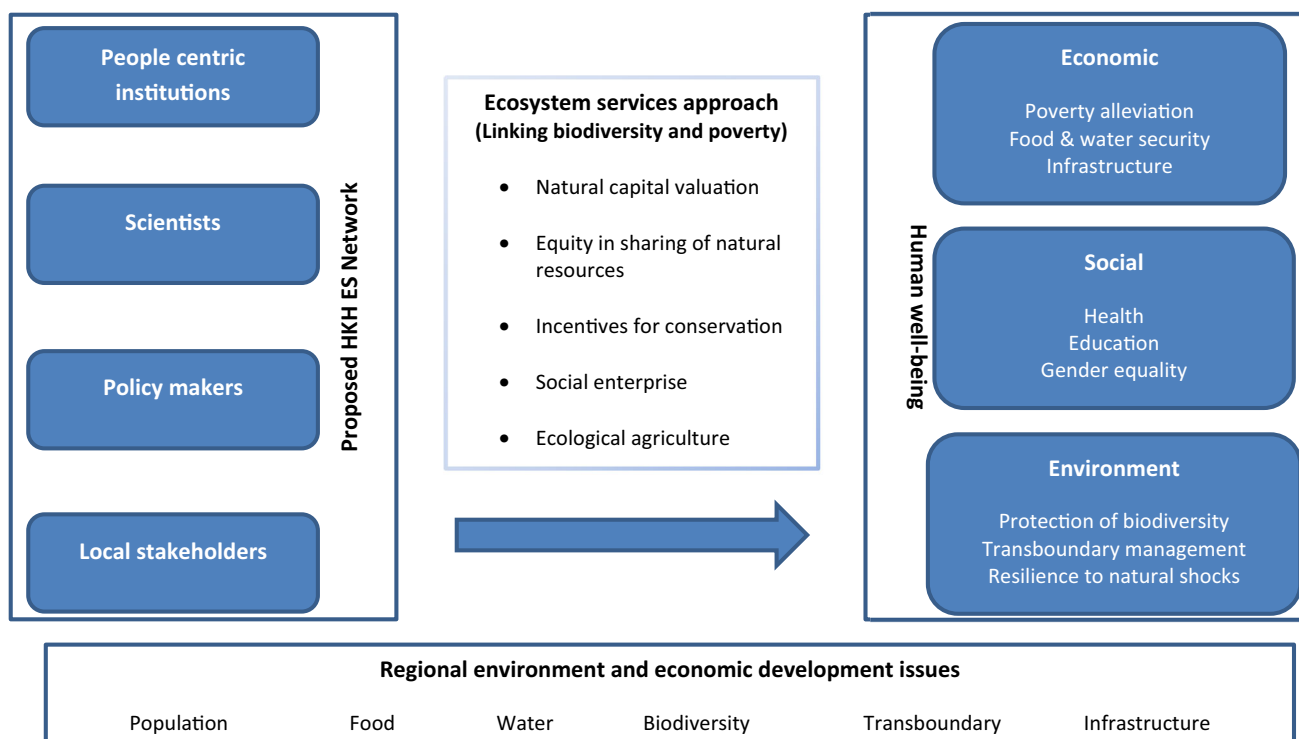


Fig. 6 Conceptual framework of the proposed Hindu-Kush Himalayan Ecosystem Services Network of institutions, scientists, policy makers, and local stakeholders. It demonstrates how adoption of ecosystem services approach may resolve some of the local environment and economic development issues and result in human well-being

inclusive in economic, social, and environmental aspects (World Bank 2012). This may result in addressing poverty and environmental issues more effectively as opposed to the approach currently being used in the Darjeeling district. Some directions for the conceptual framework of such network are outlined below.

Research and engagement facilitator

Such hybrid network (which focuses on both research and engagement) can not only facilitate science-policy interface but also have potential to reach poor at the grass roots (Bawa et al., 2008; Bawa 2012). This network can also enable inclusion of local people in the development process and avoid perverse outcomes due to jurisdiction issues as observed by forest dwellers in the Darjeeling district. Such a network can thus demonstrate the link between ecosystems and human well-being by adopting ecosystem services approach for development in the HKH region (Sandhu and Sandhu 2014).

Eight countries in this region share natural resources such as water and biodiversity. The massive river systems in HKH region support irrigation in agricultural areas, provide drinking water to rural and urban population, and generate electricity that runs the economic engines in South Asia. River system benefits extend from Afghanistan in the

west to the Mekong region in South East Asia. Biodiversity in this region supports the livelihood of a large number of inhabitants who are directly dependent on forest and its ecosystem services. It also forms the basis of industries such as pharmaceutical, genetic resources for seed crops, handicrafts etc. Sharing of common resources often leads to conflicts between countries in this region due to lack of complete understanding of the magnitude of natural capital and ecosystem services (Bawa et al. 2010). This proposed network can provide a platform to fulfill this gap by providing an assessment of natural resources and the value of ecosystem services. This will help to shape development policies by integrating ecosystem services approach for economic development in the region.

Investment for inclusive development

The network can provide strategic directions for investment in sustainable economic development, poverty alleviation, and enhancing ecosystem services. Another explicit benefit will be that the network can facilitate science-policy interactions and move toward sharing natural resources across borders in the region (Rasul 2014b). Inclusive development requires shift in investment model from *return on investment* to *equitable development* in building infrastructure and social enterprises in the region.

This will require support from international organizations such as the World Bank, International Monetary Fund, business investors, and integration with existing intergovernmental organizations such as ICIMOD (Rasul 2014a).

Address transboundary issues

A transboundary approach is required to address issues that are common in the HKH region. The network can help achieve some positive outcomes multilaterally by sharing the benefits of natural resources in eight countries. Transboundary approach can not only help achieve benefits but also mitigate impacts due to food insecurity, floods, droughts etc. (Rasul 2014b).

As global community—under United Nations—moves from the MDGs to Sustainable Development Goals, the HKH Ecosystem Services Network (or similar other networks) can be financed through the Green Economy Initiative (GEI) of the United Nations Environment Program (UNEP 2011; Barbier 2012). Outcomes of such networks can contribute toward the UNEP's new ecosystem assessment body—Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES; Perrings et al. 2011). This network can target regional environment and economic development issues and help achieve equitable human well-being as demonstrated in the conceptual framework (Fig. 6). This will include integrated approach to achieve positive economic (poverty alleviation, food and water security etc.), social (health, education, gender equality etc.), and environment (protection of biodiversity, resilience against hazards etc.) outcomes for the society in the region.

CONCLUSION

We emphasize the need to integrate poverty reduction and environment protection by understanding the social aspects through the lens of equity, justice, and sustainability (UN 2012). As the world resources are depleting elsewhere, the struggle for scarce and biodiverse resources in the Himalayan region may result in conflicts across social-political domains, and enlarge the divide between rich and poor in the region (Sandhu and Wratten 2013). Therefore, promotion of equitable and sustainable development in the biodiversity-rich regions needs to be strengthened by networks such as the proposed Hindu-Kush Himalayan Ecosystem Services Network—which can facilitate dialog and action in this direction. These networks can help avoid perverse outcomes when development organizations fail to integrate both poverty reduction and environment protection in an integrated manner. Such partnership-based solutions can shift the ongoing conversation from whether

the rural communities are *culprits* or *victims*, toward their active involvement as *partners* in economic, social, and environmental sustainability in biodiversity-rich regions of the world.

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