

# Payment for Ecosystem Services for Balancing Conservation and Development in the Rangelands of the Indian Himalayan Region

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*The concept of ecosystem services is important for understanding human-environment relationships and designing environmental policy interventions. Recently, 'payment for ecosystem services' (PES) has emerged as a policy solution for balancing the goods (mainly derived by individuals) and services (derived by society) from natural ecosystems. Previous experience with incentive-based approaches suggests that it is unlikely that a PES approach will always be able to simultaneously improve livelihoods and increase ecosystem services, and that no single policy fits a range of scenarios. Therefore, to implement a successful PES strategy, the social, economic, and environmental contexts need to be considered in order to determine the policy outcomes. The rangelands of the Indian Himalayan region (IHR) provide important regulatory and buffering services to a large number of people on the Indian subcontinent; the provisioning services they provide are the backbone of the local economy. Rangelands are influenced by policies in at least four sectors: forests, agriculture and animal husbandry, rural development, and land use. The imposition of several policies and acts that are at times contradictory or overlapping has led to conflicts of tenurial rights, unclear land records, faulty land use practices, and resultant degradation of the rangelands in the IHR. With the growing awareness of the crucial ecosystem services provided by the high-altitude rangelands, and their potential role in mitigating climate change-related impacts, future sectoral policies need to converge and focus on maintaining the integrity of these ecosystems so as to ensure the flow of goods and services. This paper deals with the prospects for implementing a PES approach in the IHR rangelands and possible strategies for effective implementation.*

**Keywords:** climate change; Indian Himalayan region; payment for ecosystem services; policy analysis; rangelands

## Introduction

Rangelands occupy a considerable area in the Hindu Kush Himalayan (HKH) region, extending across much of the alpine region, the cool temperate and sub-alpine hill grasslands, woodlands, and interfaces between human habitation and surrounding grazing lands. The rangelands in the Indian Himalayan region (IHR) extend across the states of

Jammu and Kashmir, Himachal Pradesh, and Uttarakhand, and the high-altitude areas of West Bengal, Sikkim, and Arunachal Pradesh, covering nearly 35% of the geographical area. The major categories of rangelands in the IHR include warm temperate grasslands, sub-alpine and cool temperate grassy slopes, alpine meadows of the Greater Himalaya, and the steppe formations of cold arid regions or alpine dry scrub (Rawat 1998). The proportion of rangelands in the western Himalayas is much higher than in the eastern Himalayas as a result of the higher latitude, and colder and more arid environment. The eastern Himalayas have only a small area under rangelands as a result of the warmer, more humid forested environment. Irrespective of location, the rangelands in the Himalayan region are closely associated with the local culture and livelihoods, but are also extremely fragile and susceptible to degradation and environmental change. The IHR falls within the biogeographic zones of the Trans-Himalaya and Western and Eastern Himalaya, and contains six biotic provinces (Rodgers and Panwar 1988). The rangelands vary in their climatic and geographical features, as well as their support of pastoral communities.

Recently, understanding and recognition of the multiple functions, ecosystem services, and goods provided by rangelands has increased. Rather than being considered simply as a source of fodder for livestock production, rangelands are now acknowledged for their importance for biodiversity conservation, provision of niche products, carbon sequestration, and soil and water conservation. Rangelands provide important provisioning, regulatory, and buffering services such as livestock production, fuel and fodder, water and climate regulation, and nutrient cycling. The rangelands of the Hindu Kush Himalayan region (HKH) provide livelihood security to about 30 million pastoralists and agropastoralists, and ecosystem services to around 1.3 billion people living downstream (Shaoliang and Sharma 2009).

Conservation and effective management of rangeland ecosystems for sustaining services requires innovative approaches and enabling policies. Payment for ecosystem services (PES) is one of the approaches that can be considered for the management of rangelands. In this paper we assess the scope and challenges of implementing a PES approach for the management of rangelands that would blend anticipation, adaptation, and preparation for future environmental challenges, such as escalating population, climate change, a shrinking natural resource base, and natural disasters, while recognizing the multiple functions of the rangelands. The paper emphasizes the need for redesigning institutions and policies at the various levels of governance.

## Ecosystem Services of the Rangelands

Traditionally, the rangelands have been used for livestock rearing and as hunting grounds, ensuring food security and survival of local communities. Though rangelands all over the world provide similar regulatory and buffering services, their economic importance depends on the socioeconomic system in which they are embedded. Goods and services provided by the rangeland ecosystem are supported by ecological processes of succession, migration, adaptation, competition, disturbance, soil formation, and erosion, and various natural

processes. According to Hart (1999), the core rangeland ecosystem processes form the basis of the natural capital, extractable ecosystem goods, and intangible ecosystem services, on which social and economic capitals are built. The Millennium Assessment (MA 2005) has provided a comprehensive list of goods and services obtained from natural resources, while Maczko and Hidingier (2008) described the potential dividends derived from the goods and services of the rangeland ecosystems.

The goods and services provided by the rangelands of the IHR (Table 26) are unique to the region. Both the local and downstream communities are beneficiaries of rangeland ecosystem services. The provisioning services are the most crucial services for the wellbeing and survival of the local communities that depend on the rangelands, especially the pastoral communities. The most important provisioning service provided by the IHR rangelands is livestock production, which includes meat, skin, wool and hair, and milk products. These services benefit communities at both local and regional scales. The benefits provided by the rangelands of climate control, water regulation, flood mitigation, erosion regulation, and carbon sequestration occur at a global scale and also benefit downstream communities. Non-timber forest products (NTFPs) produced in the rangelands, especially medicinal and aromatic plants and valuable fibre (e.g., wool), are highly sought after in the downstream and global markets. The primary producers and collectors of these products receive a relatively low share of the returns due to insufficient knowledge of market chains, lack of processing facilities, and inadequate quality control (Choudhary et al. 2011; Hoermann et al. 2010). There is significant scope to generate more income locally by supporting mountain people to generate new livelihood options and add value to the existing high-value products and services. However, despite the monetary benefits of marketable services of the rangelands, the local communities often do not get the major share of these benefits, due to failures of information, marketing, and policy. As a result, the local communities and institutions lack motivation to conserve the rangelands.

**Table 26: Ecosystem services provided by the rangelands of the IHR**

Provisioning services	Regulating services	Cultural services	Supporting services
Forage for livestock	Climate regulation	Spiritual, religious, historical	Nutrient cycling
Livestock products/derivatives (dairy products, meat, fur, wools, horns, skin, and hides)	Water regulation	Recreational	Water cycling
NTFP (including medicinal plants)	Flood mitigation	Aesthetic	Primary production
Fuelwood	Erosion regulation	Educational	
Fresh water	Carbon sequestration	Symbolic	
Fresh air			

Source: adapted and modified from MA (2005)

## Challenges to Sustainable Management of Rangelands in the Indian Himalayan Region

There are two main categories of rangelands in the IHR: 1) temperate and sub-alpine hillside grasslands and village grazing lands, which are semi-natural and anthropogenic in nature as in many other parts of the world (Lambin et al. 2001), and 2) alpine moist and arid pastures in the Greater and Trans-Himalaya, which are natural ecosystems governed by climatic factors. The first category is believed to be of relatively recent origin (Whyte 1976; Yadava and Singh 1977; Rawat 1998; Blench and Sommer 1999), and has developed through reduction of forest cover, introduction of cattle, fire, and the widespread impact of humans over the last 10,000 years.

The recent rapid increase in human and livestock populations in the Himalayan region has led to increased pressure on the natural resources (Mishra et al. 2001; Awasthi et al. 2003; Harris 2010). In the Indian Trans-Himalayas, even the most remote pasture is utilized for livestock grazing (Bhatnagar et al. 1999). Overstocking seems to be a classic case of the tragedy of the commons, as livestock is individually owned while the land is communally grazed (Mishra et al. 2002). Recent socioeconomic changes have probably contributed to high levels of overstocking. Some of the challenges to sustainable management of rangelands in the region are described in the following sections.

### Breakdown of traditional rangeland management systems

The entire IHR is undergoing rapid development. The ecologically fragile environment of the Himalayas is under pressure from construction of dams, roads, mining activities, and other biotic pressures, leading to loss of forest and pasture areas (Ram and Singh 1994). The existing mountain development policies, for example in Himachal Pradesh, are non-holistic, non-compatible, non-coherent, non-complementary, and non-community-oriented, and barely address the key principles and issues (Gulati and Gupta 2003; Hussain et al. 2008). Income insecurity of the herding communities following the shift to a cash economy, as well as the lure of a modern life, has forced many herders to find alternative employment and move to urban areas (Bhasin 2011). In addition, there has been a sudden influx of people from adjacent states and neighbouring countries, e.g., as construction workers, staff of development programmes, and refugees (Goodall 2007). Construction of infrastructure such as roads in remote areas has increased accessibility and the ability to overexploit rangeland resources; sedentarization of herders, increased tourism pressure, and overpopulation of livestock in many pocket areas have led to a breakdown of the traditional rangeland management system (Namgail et al. 2007).

### Overgrazing

Overgrazing has caused the near complete loss of edible plant species in the Himalayan pastures, and the pastures are now heavily infested with weeds such as *Stipa*, *Sambucus*,

*Aconitum*, *Cimicifuga*, *Adonis*, and *Sibbaldia* (Misri 1995; Suttie et al. 2005; Saberwal 1996; Kala and Rawat 1999; Singh et al. 2000; Maikhuri et al. 2001; Nautiyal and Kaechele 2007; Kaur et al. 2010). It has been estimated that the increased cover by unpalatable species has resulted in a 20–50% decrease in the quantity of herbage production in the Himalayan grasslands, and a 10–15% decrease in the quality, compared to the potential (Patil and Pathak 1978).

## Impacts of climate change

The direct impacts of climate change on the Himalayan rangelands are seen in changes in evaporation and runoff, vegetation composition and diversity, above-ground productivity and decomposition rates, carbon sequestration effects, increased risk of fire disasters, drying-up of wetlands/peatlands, submergence of pastures close to glacier lakes, and changes in wildlife habitats (Du et al. 2004; Shaoliang and Sharma 2009; Baker and Moseley 2007).

## Information failure

The first and foremost factor that hinders effective management of rangeland resources is the information failure that arises from the lack of accounting of ecosystem services, and lack of understanding of how and at what rates the services are produced. In the absence of proper estimates of the stock of ecosystem services, and the fluctuation of services under a scenario of climate change and globalization, it is difficult to determine the net present value of the future flow of services. Confusion regarding the monitoring indicators (what will be monitored, inputs, state of the ecosystem, outcomes) also presents a challenge. Information failure can be dealt with by maintaining national statistics on the extent, conditions, and optimal livestock production function of rangelands through the National Natural Resource Management Systems set up by the Government of India. The information from the National Mission on Strategic Knowledge on Climate Change should also be integrated into this data base.

## Market failure

Rangeland goods and services are seen as free goods, which can make proxy pricing difficult. Due to the diversity of resource users, and lack of communication and coordination among them, common resources tend over time to become open access resources, and the rules and norms for sustainable management become ineffective, leading to degradation (Hardin 1968). People living away from the rangelands benefit from their conservation in the form of ecosystem services (e.g., water and carbon sequestration) without having to pay anything, creating a scenario of market failure.

## Intervention or policy failure

Lack of a common vision and mandate in the IHR among the development agencies and conservation departments controlling the rangelands and other natural resources, local people, and civil society organizations has created a classic case of policy failure. The

traditional single media focus (air, water, waste, forests) of past and present environmental laws and policies has not been able to secure provision of resources. This has led to the emergence of the concept of environmental laws and policies, with significant consideration given to sustaining ecosystem services and goods. Existing intersectoral policies often conflict and contradict with each other's objectives, resulting in changes in land use practices that affect ecosystem services. Ensuring that land use policy decisions do not inadvertently degrade ecosystems and their capacity to provide services for human welfare is a major challenge for the policy makers (TEEB 2010).

Services and policy interactions are mutual, one is dependent on and affected by changes in the other (TEEB 2010), but the scale at which ecosystem service changes happen as a result of policy decisions is both non-linear and unpredictable. The provisioning services provided by ecosystems have been central to economic and financial decisions and transactions, whereas services which cannot be translated into direct tradable goods have been largely ignored by policy makers until recently. As ecosystem services are neither fully captured by the markets nor adequately valued in monetary terms, they do not receive due importance in policy decisions (Costanza et al. 1997; Costanza et al. 1998; Bernard et al. 2009; TEEB 2008). Assigning a market value to ecosystem services proves useful when measuring trade-offs between society and nature when natural resources can enhance human welfare in a sustainable manner (Pagiola et al. 2004; Dasgupta 2009, 2010; DEFRA 2010; UK National Ecosystem Assessment 2010). Existing markets have 'failed' to conserve ecosystem services because they lack mechanisms to compensate resource users and thus do not send signals that encourage participants to use and manage natural resources sustainably (Whitten and Shelton 2005; Arifin and Hudoyo 1998). There are many other proximate factors, such as demand on existing services, the opportunity costs of conserving services, and unclear property rights, which add to the complexities of understanding the value of ecosystem resources and result in overuse of the common property resources (Gunningham and Young 1997; Collins and Whitten 2007; Bromley 1990; de Groot et al. 2009). As a result, there is suboptimal investment in conservation and management leading to ecosystem deterioration (MA 2005).

## Scope for implementing PES in the Indian Himalayan Rangelands

Of the various strategies that have emerged recently to address declining rates of ecosystem service provision, payment for ecosystem services (PES) has become one of the more widely accepted tools (Patterson and Coelho 2009). PES is a voluntary, conditional agreement between at least one 'seller' and one 'buyer' over a well defined environmental service or a land use presumed to produce that service (Wunder 2008). The scheme is based on the assumption that valuing and paying for ecosystem services will help to solve the externalities resulting from market failure (Engel et al. 2008). Such payments, already underway in many parts of the world, benefit the providers of the ecosystem services, mostly poor landholders or disadvantaged communities, and can contribute to poverty alleviation (Pagiola et al. 2004).

PES thus provides an opportunity for 'win-win' scenarios, leading to its wider acceptance among conservation practitioners and policy makers in developing countries (van Wilgen et al. 1998; Miles and Kapos 2008). However, previous experience with incentive-based approaches suggests that it is unlikely that a PES approach will always be able to simultaneously improve livelihoods and increase ecosystem services, and that no single policy is right for every scenario. Therefore in order to implement a successful PES strategy, the social, economic, and environmental contexts need to interact with policy design and together determine policy outcomes.

As for other ecosystems, implementation of PES schemes for rangelands faces two types of challenge: 1) technical challenges, which are related to the difficulty of identifying and valuing ecosystem services; and 2) legal and institutional challenges, which are concerned with the governance and effectiveness of PES for the specific needs of biodiversity conservation (Nsoh and Reid 2013). The technical challenges arise due to lack of data or information on the ecosystem services, their ingrained complexities, opportunity costs, and studies on willingness to accept or pay by the people/local communities. The lack of studies on the intrinsic complexity of ecological functions, and the relationship between ecosystem functions, services, and human welfare, also poses a challenge for PES schemes (Brouwer et al. 2011; Farley et al. 2011; Muradian et al. 2013). Most ecosystem services and goods are considered free, and most of the time it is difficult to develop a proxy price for the ecosystem services, thus making the payment mechanism challenging. Further, the impact of factors such as globalization and climate change on the stock and flow of ecosystem services is unknown and uncertain. Another technical challenge is that of defining a relevant population (stakeholders) dependent on the services, and the beneficiaries of the PES schemes. Property rights distribution issues in the case of common property resources or government-owned land often present an institutional or policy challenge to PES. Confusion regarding the funding process for the PES mechanism presents the major challenge.

All the challenges mentioned above have a temporal and spatial scale element. The geographical scale disparity between ecological processes and decision-making institutions further complicates the PES mechanism. The costs to the local communities of conserving the rangelands are complex and difficult to estimate, and can be disproportionate to the benefits of the services as a result of the geographical scale at which the costs and benefits of the services are distributed. Some policies have impacts that last for long periods, while others may last forever due to irreversible changes, and this often presents a challenge to managers and policy makers on how to simultaneously ensure biodiversity conservation and community wellbeing through PES.

### Regulation of property rights

Earlier legislative measures, such as the Indian Forest Policies of 1894 and 1952 and the Indian Forest Act of 1927, governed as they were by colonial and commercial interests, failed to address equitable access to the Himalayan resources. These legislative measures brought

the land resources under government rule and ownership, alienating local communities. The National Commission on Agriculture 1976 recommended promoting a social forestry programme to meet the need of user groups and provided for differential institutional arrangements for different stakeholder groups outside the limits of the reserved and protected forests; this is reflected in the 1988 forest policy and the policies framed thereafter.

Regulation and clarification of property rights (ownership and use rights) is considered crucial for dealing with the issue of market failure arising due to the notion of 'free goods' and 'easy access'. Notwithstanding, property rights, particularly usage rights of local communities, have remained ambiguous in almost all policies, although the Forest Conservation Act 1980 and National Environment Policy 2006 provide for legal recognition of traditional entitlements of forest dependent communities, as provisions made under the Forest Conservation Act of 1980 are not allowed to interfere with the rights of local communities, such as nistar rights (land set apart to meet the requirements of fuel, fodder, timber, and other necessities) (Ramanathan 2002) or concessional use rights provided under the Indian Forest Act 1927.

The Indian environmental and forest policy has been modified from time to time to adapt to the changing political-economic conditions. It has contributed substantially to minimizing environmental degradation and maintaining the ecological integrity of natural systems. While the policies of the production era were focused largely on the marketable goods provided by the natural ecosystems, such as timber and NTFPs, the protection era policies were largely regulatory and focused on a 'hands off' approach as far as natural ecosystems were concerned. In the policies promulgated during these two periods, the informatory and market instruments remained at the back. The only market instrument addressed was the levying of duty on timber and forest produce in the Indian Forest Act 1927. A clear mention of ecosystem services and well defined rules to protect and enhance them came only with the National Environment Policy 2006. All subsequent action plans and programmes of the Government of India have stated that the sustainability of ecosystem goods and services is their primary agenda. However, the need to focus on the Himalayas as a separate and unique ecosystem, based on their ecological characteristics and human interface, was not addressed until the National Action Plan on Climate Change in 2009, which has a 'National Mission for Sustaining the Himalayan Ecosystem' as one of its eight missions. With the growing awareness of the crucial ecosystem services provided by these ecosystems, and their potential role in mitigating climate change related impacts, the emerging policy focuses on maintaining the integrity of the ecosystems and thus ability to provide regulatory and buffering services.

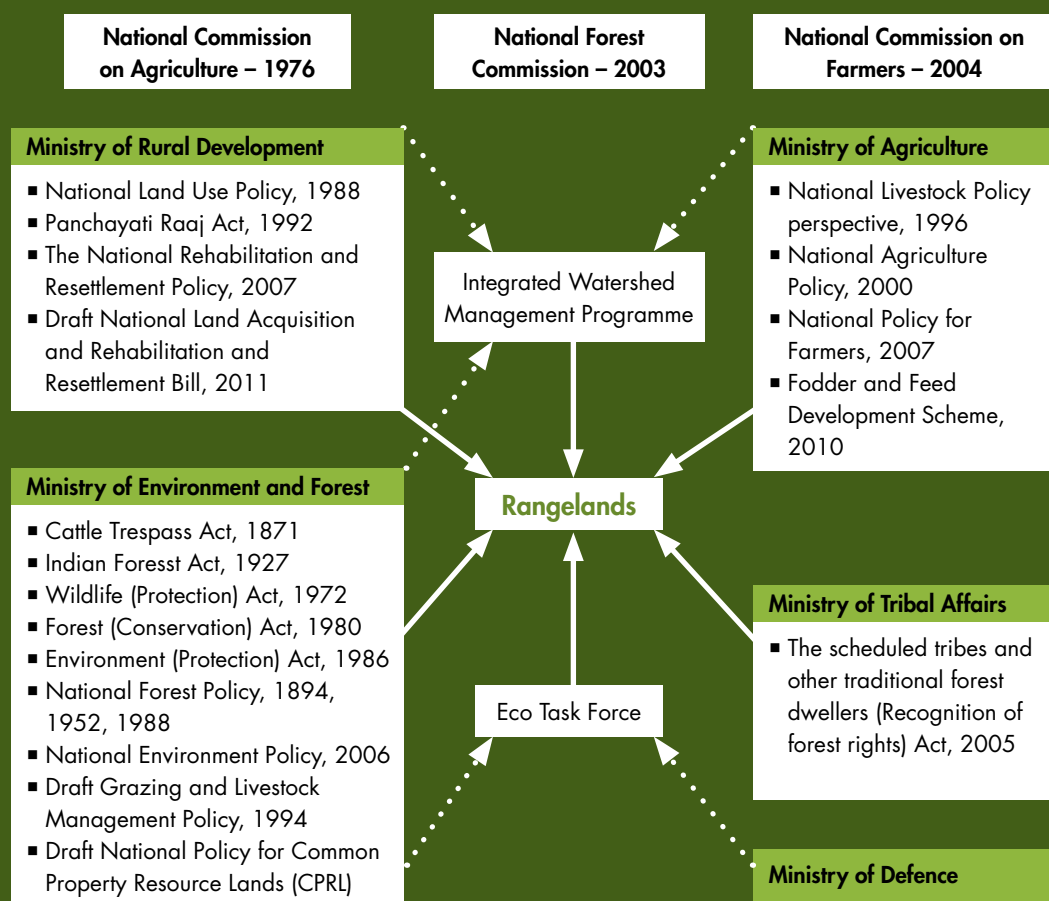
## Analysis of Indian Policy for PES for the IHR

The Indian national policies and legislative measures recognize the Himalayan rangelands as a unique complex system that provides ecosystem goods and services. The policies and measures include regulatory measures such as taxes, tolls, fees, permits, administrative charges, formulation of management plans, and setting of standards; encourage the use of market-based instruments, such as provision for consistent pricing, value chain analysis,



subsidies, and quality control; and have provision for persuasive instruments, such as dissemination of information, training and extension, education, and research. The Government of India's (GoI) national policies on natural resources have substantially contributed to minimizing environmental degradation and maintaining the ecological integrity of natural systems. However, the policies have not given adequate attention to rangelands, especially Himalayan rangelands, as a separate and unique ecosystem based on their ecological characteristics and human interface, although the issues of other ecosystems such as wetlands have been adequately addressed. Figure 25 shows the major policies and legislation that impact the IHR. The IHR is influenced by policies in at least four sectors: forests, agriculture and animal husbandry, rural development, and land use. However, rangelands are considered as 'common land' or 'wasteland' which can be used for tree plantation or easily diverted for other uses. Robust traditional institutions used to exist in the IHR to ensure their sustainable management, however, as a result of rapid socioeconomic and political transformation, these institutions have mostly become defunct. The imposition of

Figure 25: Policies and legislation controlling the Indian rangelands



several policies and acts, which are sometimes contradictory and overlapping, has led to a lack of clear tenure for local communities, confused land records between the revenue and forest departments, and other such issues of land rights and responsibilities. All these factors have accelerated the pace of rangeland degradation in the IHR.

## Trends in Indian legislation related to ecosystem services

The overall trends in the legislation related to ecosystem services can be summarized as follows:

- **Production era (1927–1972):** During this period, forest management was closely linked with commercial interests since the ‘need for realization of maximum annual revenue from forests’ was considered vital and the relevance of forests to meet the needs of development and foreign trade were given prominence in management.
- **Protection era (1972–1988):** This was the period when the realization of forest and wildlife degradation was highlighted by conservationists in India and influenced by global debates and measures to provide legal protection to flora and fauna in their natural habitat.
- **Community participation era (1988–2006):** The Indian Forest Policy of 1988 represented a complete turnaround in the government’s position on local people and forests and was the start of community participation in forest and wildlife management. The policies and acts formed during this era recognized and legalized the links between human welfare and ecosystems.
- **Climate change and globalization era (2006 onwards):** It was only with the promulgation of the National Environment Policy 2006 that impacts of climate change were addressed in policy.

## Conclusion and Way Forward

The analysis shows that Indian legislative measures and policy have been mainly regulatory in nature. It is only in the recent era of climate change and globalization that all three instruments (market, information, regulatory) are being addressed, albeit the focus remains regulatory. Market instruments are particularly weakly represented in the legislation and policies. PES has not yet been taken up as a part of any policy. Policies are inconsistent and promote overstocking and unsustainable use, which in the long term could hamper the ecosystem services. The informatory, regulatory, and market instruments need positive synergistic interactions. A policy portfolio approach combining several measures would be the best choice for ecosystem conservation.

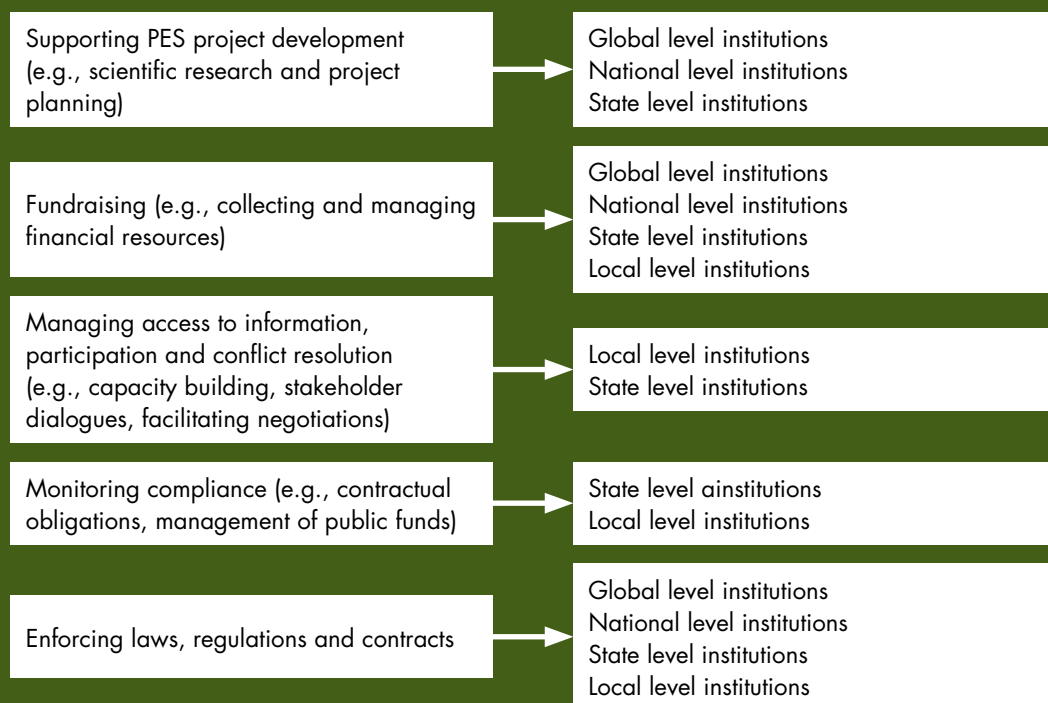
The major challenges for ecosystem services are measurement, bundling, scale-matching, property rights, distribution issues, sustainable funding, adaptive management, education and politics, participation, and political coherence (Farley and Costanza 2010). Implementing PES in the context of weak institutions is also challenging (Wunder 2007) due to unclear property rights and distribution issues. Most PES programmes have been implemented in the developed world where the institutional framework and property rights are strong (Clements et al. 2010); in the context of the rangelands of the Indian Himalayas, where the traditional institutions

have been eroded and a hierarchy of institutions exists, implementing PES poses a challenge. Here, we propose a multi-layered nested framework for the role of institutions in implementing PES (Figure 26).

Since ecosystem services are bundled together and are the joint products of intact ecosystems and their loss is irreversible, collective institutions should take the lead in PES (Jack et al. 2008; Farley and Costanza 2010). Any project, including PES, has conception and planning as the initial step, which needs support from global, national, and state level institutions. Fundraising needs to be done at all the spatial scales from global to local. The local level institutions in the IHR include the van panchayats, traditional institutions, and NGOs, and their participation is needed in managing access to information, conflict resolution, monitoring compliance, and enforcing laws, regulations, and contracts.

Recognition of the Himalayan rangelands (Central Rangeland Regulatory Authority) as a unique ecosystem that provides important ecosystem services is the first step. Geographic mapping and accounting for the rangelands ecosystem services in the rangeland areas need to be done to create baseline information. This baseline information can be used to obtain alternative land management regimes or scenarios, and to assess the levels and types of services that could be supplied under alternative land management regimes. Further, generation of baseline information will help in forecasting changes in services and societal

**Figure 26: Framework depicting the role of institutions in PES implementation**



need under alternative demographic, land-use, and climate change scenarios. There is an urgent need to have consistency in inter-sectoral policy to enable adoption of market-based instruments, including PES.

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