

# Understanding the payment for ecosystem services and associated challenges: Global practices and recommendation for Nepal



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**Abstract** The payment of ecosystem services (PES) helps to preserve the natural environment and enhance the livelihood of the local people. There is always the fear of the long-term availability of the ecosystem services provided to the locals. There is an uneven distribution of the benefits received by the countries for protecting the natural environment. This study was based on the secondary literature review to explore the global benefits and challenges associated with the payment for ecosystem services, focusing more on the South Asian context. The outcomes were analyzed along with the benefits and challenges received for preserving the ecosystem by Nepal. PES programs have upgraded the livelihoods of local people, decreased energy demand, increased forest coverage, and helped decrease greenhouse emissions. PES has contributed to livelihood sustainability and economic development through forest management programs. There is more potential for Nepal to provide additional services to tourists and to generate additional resources against ecosystem services. There is an urgent need for collaboration among central, provincial, and local governments in Nepal to implement PES more effectively.

**Keywords:** ecosystem services, environment protection, forest, Nepal, PES

## Abbreviations

ASEAN	Association of Southeast Asian Nations
BCN	Bird Conservation Nepal
GEF	Global Environment Facility
GRIT	Global Research Institute and Training Center
GoN	Government of Nepal
ICIMOD	International Centre for Integrated Mountain Development
MEA	Millennium Ecosystem Assessment
PES	Payment for Ecosystem Service
REDD	Reducing Emission from Deforestation and Forest Degradation
TAL	Terai Arc Landscape
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
VDC	Village Development Committee

## 1. Introduction

'Eco' refers to a part of the world, while 'system' refers to the coordinating unit comprising living organisms of habitat and their surrounding environment working together (Balasubramanian 2008). Ecosystem services are direct and indirect contributions of ecosystems to human well-being (TEEB 2010). The purpose of ecosystem services is to sustain and fulfill human life through ecosystems and their biodiversity (Brauman and Daily 2008). According to Millennium Ecosystem Assessment (Hassan et al 2005), ecosystem services include provisioning services (e.g., freshwater), regulating services (e.g., climate and flood regulation), cultural services (e.g., aesthetic and spiritual benefits), and supporting services (e.g., nutrient cycling). One method employed to preserve the natural environment and local livelihoods is payment for ecosystem service (PES). PES helps protect the environment, in which customers of environmental services pay producers to implement eco-friendly policies that guarantee the long-term availability of such services (Wunder 2005; Huberman 2008). PES is the process in which the beneficiaries or users of an ecosystem service make payments to the providers of that service (E 2014). It is also a market-



based mechanism that provides incentives to natural resource owners to provide ecosystem services needed by society (Bijaya et al 2018). As ecosystem services become scarcer and conservation interest declines, PES programs aim to cost-effectively address ecosystem and natural resource management problems (Gauli et al 2014). PES is part of a new conservation and management paradigm that explicitly addresses the need to bridge the interests of communities connected by ecosystems and the cost of providing ecosystem services (Bhatta et al 2014).

The ability of ecosystems to continue providing the same quality and quantity of ecosystem services is greatly hampered by population growth (Carpenter et al 2009; Wang et al 2012; Zhen et al 2014; Baral et al 2014). However, it is found that the decisions made by communities, managers of natural resources, and policymakers have hampered the benefit from ecosystem goods and services required for livelihoods, human survival, and reducing negative environmental impacts at both global and local levels (Daw et al 2011; Lü et al 2012; Daw et al 2015). Researchers (Ostrom 1990; Agrawal 2001) argue that PES helps create local rules that help prevent overexploitation and bring long-term benefits to the populations. Therefore, there is a lot of potential benefit in managing and exploiting common goods based on local knowledge, local institutions, and local actions (Agrawal and Chhatre 2006; Ostrom 2009; Dressler et al 2010).

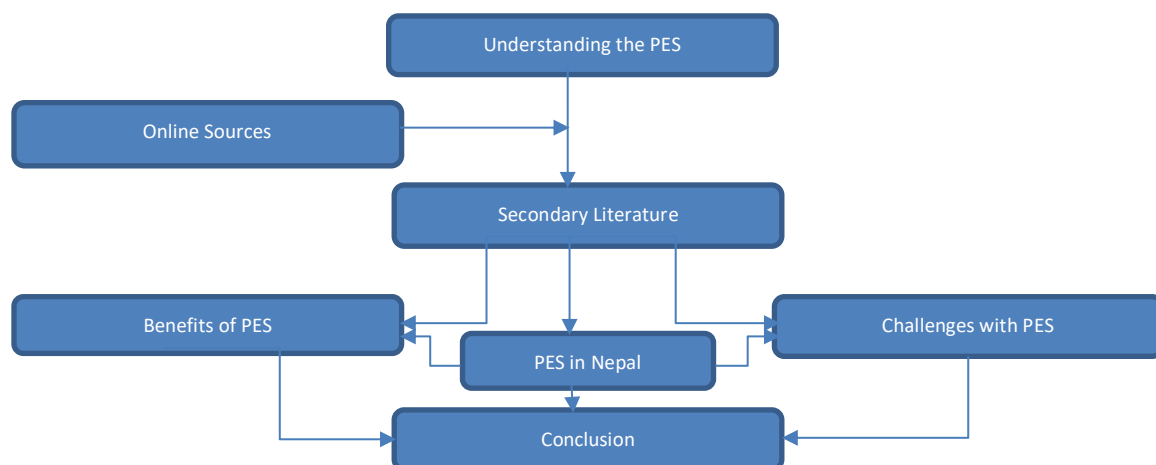
Though ecosystem services need to be used wisely, there is always a fear that only certain people with the means to pay can use and benefit from the services provided by nature (Matulis 2014; Corbera 2015; Leimona et al 2015). Sustainable urban and rural regions can be planned and developed using the ecosystem services approach. Community-based Forestry provides many ES from local to global benefits from forest restoration (Paudyal et al 2017). Likewise, the concept of paying for ecosystem services is becoming more prevalent in watershed management to ensure sustainable water sources available to communities and the ecosystem (Aryal et al 2019). Forests and people have been coexisting together and helping to shape our environment (Miah, Mohiuddin and Chakrabarty 2022). Ecosystem services planning would require a major shift toward new geographies and a broadening of conservation goals (Chan et al 2006). Despite uncertainty and context, the analysis shows that the global ecosystem service value is considerable and ranges between 490 int\$/year for the total bundle (de Groot et al 2012).

This study mainly underlines the ecosystem services available within Nepal. The study explored the benefits and challenges with the payment for ecosystem services in Nepal, undertaking secondary literature. Nepal is a country located in South Asia, covering altitudes as low as 60 meters and as high as 8,848.86 meters (Mount Everest, the highest peak in the world). There are 118 ecosystems in total, including 112 forest ecosystems, 4 agricultural ecosystems, 1 water body ecosystem, and 1 glacier/snow/rock ecosystem in Nepal (GoN 2014).

## 2. Methods

This is a review paper exploring the benefits and challenges associated with the payment for ecosystem services at the global level, with recommendations for Nepal. The study has mainly focused on countries with similar geographical structures and climatic conditions, like Nepal. The researchers involved in this study were connected via a network formed by Global Research Institute and Training Center (GRIT). Altogether, 108 articles were searched from Elsevier, Springer, and Google Scholar using search terms like ecosystem services, payment of ecosystem services, benefits of ecosystem service, challenges of PES, PES programs, and benefits of payment for ecosystem services (Figure 1). First, the documents were screened based on the title and arranged in folders per the searched term.

Further, the articles were selected after going through the papers' abstract, methodology, and conclusion sections. The related papers were only arranged in the folder, and others were removed. Altogether, 64 documents were reviewed for this study.



**Figure 1** Conceptual framework of the study.

### 3. Results

This section deals with the benefits and challenges associated with ecosystem services in Nepal. Apart from the national issue, the analysis also includes the benefits and challenges incurred at the global level.

#### 3.1. Benefits from payments for ecosystem services

Bhutan tops the list of countries benefiting from PES in South Asia. The immediate utility of the forests to upstream residents, such as fuelwood and timber, and the structural insurance and benefits the downstream people by increasing the soil infiltration capacity and reducing soil erosion have benefited from forest management in sloping landscapes (Sears et al 2018). The Bhutanese populace continues to enjoy and cherish its pristine forested environment and benefit from the conservation of its natural resources. The provision of water resources has been seen as the most crucial aspect of the community forest plantation in eastern Bhutan, where land degradation is more common, and water is more scarce. It has been regarded as a significant accomplishment that after the forest plantation was established, and the downstream flooding decreased (Rai et al 2020). For 2014–2015, the economic value of all provisional ecosystem services in Merak village and Sakteng village was estimated to be US\$ 155,948.3. Decision-makers and policy planners have benefited from a better understanding of the remote areas by learning more about the influence of the PES system on livelihood and the effects of climate change on the overall livelihood (Dorji 2020). In Bangladesh, PES programmes have helped to decrease energy demand, increase land value, avoid drainage maintenance costs, increase social interaction, and benefitting the psychological and physical health (Zinia and McShane 2018). The Miandam watershed's landscape of Pakistan contains carbon stocks worth \$ 16,306,000, while the annual value of the tourism services it offers is US\$ 157,8458 (Muhammad et al 2021).

In India, where the serious threat to food security with population growth has created chaos, the PES tools effectively manage land degradation (Kumar 2011). When PES programs and local agroforestry options were combined in India, a market-based mechanism where farmers provide environmental services to communities downstream operated more effectively (Ranjan 2021). The PES plan in Thailand has given low-income families jobs and stopped the KARN Wildlife Sanctuary elephants from destroying their property. Thus, the PES plan has the potential to transform the conflict between humans and elephants into one of harmony by changing the villagers' perceptions of elephants from being a nuisance to being a valuable resource that should be protected. PES follows a well-known pattern of capitalist growth and intensification in the field of environmental preservation in South Africa (Buscher 2012). PES programs are one method used to safeguard water resources in Beijing, China which is experiencing an urgent water crisis (Kumar 2011). It has been successful for the Paddy land to dry land (PLDL) program in Beijing to improve both the quantity and quality of water. The PSA program in Costa Rica has received some credit for helping the nation, which was once known for having one of the highest rates of deforestation in the world; in the early 2000s, it achieved negative net deforestation. Between 1998 and 2005, the 21,000 ha of plantations under the PSA programme contract sequestered roughly 1 million tons of carbon (Pagiola 2008). In Brazil, payment for ecosystem services is promoted as a tool to slow down deforestation while also giving local poor people who live in amazon forests and have few other options for an additional living income. To provide economic benefits to those who ensure the maintenance, protection, establishment, or reestablishment of tropical forests, the payment for ecosystem services is being implemented in many tropical forests (Seehusen 2009). Kreetsand's shallow water area of the Elbe River has a total economic value of €0.83 million/year of ecosystem services (Mangi 2016).

In Nepal, forest ecosystem services contribute to livelihood sustainability and economic development (Lamsal et al 2018). A study (Bhandari et al 2018) revealed that Panchase Protected Forest offered a wide range of ecosystem services, including provisioning, regulating habitat, and cultural and amenity services. Likewise, conservation areas of Nepal have a high potential to provide additional services to tourists and to generate additional resources against ecosystem services (Kc et al 2013). A study (Gurung et al 2021) in the Jal Binayak community forest found that investment in ecosystem service improvements is a practical concept that should be implemented in the city. In the Baghmara Buffer Zone Community Forest of Nepal projected average willingness to pay for recreational and aesthetic services was NRs. 33,347 (about US\$ 460) per year (KC et al 2013).

#### 3.2. Challenges with ecosystem services in Nepal

Because of the numerous anthropogenic and natural disturbances, ecosystem restoration strategies are of vital concern for the ecosystems of all ecological areas of Nepal (Stahl and Sapkota 2014). Social characteristics, such as caste, class, and gender, shape the access to ecosystem services among different groups, causing environmental injustices to be concealed and entrenched by the current trend of focusing on aggregated benefits within ecosystem services (Chaudhary et al 2018).

Making the best use of the forests, plants, and animals already present is a significant challenge in the PES industry. Another challenge is setting up a collaborative environment where federal, provincial, and local governments, forest groups, and the private sector can work together effectively to manage forests, conserve biodiversity, and manage watersheds (GoN 2014). Among the ecosystem services like carbon sequestration, biodiversity conservation, watershed protection, and ecotourism, carbon sequestration and ecotourism are attractive ecosystem services options for investment and enterprise

development in Nepal (Gauli et al 2014). Due to their direct connection to human livelihoods, forests, biodiversity, and watersheds have the potential to significantly contribute to the prosperity of the nation by boosting wages and employment through sustainable management of these resources, including improved landscaping (GoN 2014). To address the issue of upstream and downstream conflict, an appropriate benefit-sharing mechanism needs to be developed because managers are suffering, and free riders are benefiting from the PES programme. Awareness raising and empowerment are crucial for local communities to improve their livelihoods and biodiversity conservation through PES mechanisms (Kunwar 2008). The VDC, local government entities, and even private parties can act locally as mediators in the PES implementation process (ICIMOD 2014).

Biodiversity conservation needs better coordination, cooperation, public participation, elective resource mobilization, and transboundary solid and international cooperation (Acharya 2012). In protected areas of Nepal, such as national parks, wildlife reserves, and conservation areas, ecosystem restoration practices are essential as it helps conservation of biodiversity (Stahl and Sapkota 2014). To conserve biodiversity resources at the landscape level, the Ministry of Forests and Environment, with the support of various donor communities, including the United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), Global Environment Facility (GEF), World Wide Fund for Nature (WWF), and Netherlands Development Organization (SNV) implements landscape management programs in three important landscapes, namely the Terai Arc, Sacred Himalayan, and Kailash Sacred Landscape. In 2004, the Terai Arc Landscape (TAL) program was created to guide and address urgent conservation management issues, and tackle priority threats to make the area ecologically functional (GoN 2015). As a result of the initiation of the community forestry system in Nepal, forest cover has improved, which provides a variety of ecosystem services to forest users (Thani et al 2019). In collaboration with Bird Conservation Nepal (BCN) and Nawaprabhat Nepal, the International Centre for Integrated Mountain Development (ICIMOD) sponsored an initiative to identify practical solutions for improving ecosystem management through collaborative action research in the Rauta village development committee (VDC) of Udayapur district Nepal (Khanal et al 2018).

**Table 1** Summary of the main findings of the study.

Themes	Findings
Benefits of PES at global level	<p>PES helps to protect the environment, in which customers of environmental services pay producers to implement eco-friendly policies that guarantee the long-term availability of such services</p> <p>The ability of ecosystems to continue providing the same quality and quantity of ecosystem services is greatly hampered by population growth</p> <p>Decisions made by communities, managers of natural resources, and policymakers have hampered the benefit from ecosystem goods and services required for livelihoods, human survival, and reducing negative environmental impacts at both global and local levels</p> <p>PES programs have helped to decrease energy demand, increase land value, avoid drainage maintenance costs, increase social interaction, and benefitting the psychological and physical health</p> <p>The PES programs have provided jobs to low-income families</p> <p>PES has helped to achieve negative net deforestation in different countries</p>
Benefits and challenges with PES in Nepal	<p>Due to the initiation of the community forestry system in Nepal, forest cover has improved</p> <p>PES has become more prevalent in watershed management to ensure sustainable water sources available to communities and the ecosystem</p> <p>Nepal has implemented the reducing emission from deforestation, and forest degradation (REDD) program</p> <p>Due to insufficient policy, legislation, and institutional capacity, PES became difficult in Nepal</p>

#### 4. Discussion

It is widely believed that ecosystem services (ES) play a significant role in human well-being (Chopra et al 2022). Careful identification of ecosystem values can help policymakers determine what options should be prioritized to maximize benefits (Selivanov and Hlaváčková 2021). A study in China (Zhang et al 2010) revealed that ecosystems have great economic value, which humans have often overlooked. The Indian Himalayan region (IHR) rangelands provide essential regulation and buffering services to many people on the Indian subcontinent, and their provisioning services support the local economy (Badola et al 2013). Ecosystem services provided by Bhutan's forests are by far the largest, whereas other ecosystems, like lakes and rivers, and inland wetlands, are also very important but occupy relatively small areas (Kubiszewski et al 2013).

Furthermore, the study on Central Kalimantan, Indonesia, shows private and household owners receive monetary benefits from timber, NTFPs (rattan and jelutong resin), and agroforestry rubber (Suwarno et al 2016). Studies in the Association of Southeast Asian Nations (ASEAN) countries urban ecosystem services to streamline the planning of urban areas as it provided regulation (waste absorption, climate regulation, water purification, flood regulation, and disease control) and followed by cultural (tranquility, social relations, and recreation) services on the urban area (Rosehan et al 2022).

As colonial and commercial interests controlled local communities, earlier legislative measures like the Indian Forest Policies of 1894 and 1952 and the Indian Forest Act of 1927 failed to address equitable access to the Himalayan resources (Badola et al 2013). Countries like Vietnam and Costa Rica have some concrete legislative framework on PES (Bhatta et al 2014). In Vietnam, according to the Environmental Protection Law of 2005, local communities' rights and legitimate interests must be guaranteed before biodiversity protection can be put into practice. Incentives for the development and use of clean and renewable energy sources and international trading in greenhouse gas emissions are just a few of the economic and financial measures that the Law on Environmental Protection of 2005 permits that would help mitigate climate change (Hanh et al 2005). One of the most researched case studies in the PES literature is Costa Rica's Payment for Environmental Services Programme, which is widely regarded as a success on a global scale. The PPSA was formally established in 1997 through amendments to the national Forestry Law to reduce deforestation. To advance constitutional rights to a safe and ecologically balanced environment, it aims to replace the traditional ideas of "subsidies" and "incentives" with "economic recognition" for ecosystem services. The least amount of government involvement is in private PES programs. In this instance, private entities, such as private companies, people, or groups of people, act as buyers and sellers of ecosystem services. Governmental bodies are only ever involved in such schemes as middlemen. One such instance is the Brazilian Project Oasis, in which agreements are made between private landowners and the O Boticário Foundation (Greiber 2009).

Nepal has implemented the reducing emission from deforestation, and forest degradation (REDD) program, owned by Government has already implemented the REDD readiness preparedness plan (RPP). Due to insufficient policy, legislation, and institutional capacity, PES became difficult in Nepal (Gauli et al 2014). Despite the lack of a concrete legislative framework on PES in Nepal, some policy and legislative frameworks, like the three-year national plan (2011-2014), recognize the economic value of ecosystem services. The main piece of legislation governing how protected areas and their buffer zones are managed in Nepal is the National Park and Wildlife Conservation Act 1973 (Bhatta et al 2014).

## 5. Final Considerations

PES has helped communities upgrade their livelihood and reduced the negative impacts on the global and local environment. However, the fear persists as limited people can enjoy the maximum benefits of nature. Ecosystem planning needs to focus more on the new geographies by broadening environmental conservation goals.

South Asian countries have mainly benefitted from forest management and water resources. Nepal has benefitted from the PES granted under the protected forest scheme. Still, there is a high potential to increase revenue from forest carbon credit. Apart from the REDD program, Nepal still has room to grab further benefits. There is a need for collaboration among Nepal's federal, provincial, and local governments to effectively manage the forest, biodiversity, and watersheds.

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## Ethical considerations

Not applicable.

## Conflicts of interest

The authors declare no conflicts of interest.

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