



SANDEE 



Assessing Ecosystem Services in the Kailash Sacred Landscape

Mt Kailash (6,714 m) is a holy cultural site in the Himalaya, worshiped by devotees of different religions including Bon, Buddhism, Hinduism and Jainism. More than 30,000 km², the Kailash Sacred Landscape (KSL) spreads over parts of three countries – China, India, and Nepal – is home to approximately 200,000 households. KSL provides multiple onsite and offsite ecosystem services, which local residents and visitors enjoy. KSL is remote from primary road networks and, for this reason, households in this area are strongly reliant on the surrounding ecosystem for goods and services.

The diversity and health of KSL ecosystems have undergone many changes due to anthropogenic and climatic factors. A change in ecosystem can have substantial effects on the local economy by disrupting lives and livelihoods. To assist people living in KSL, the International Centre for Integrated Mountain Development (ICIMOD) initiated the Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) to achieve long-term conservation of the KSL environment, while enhancing the resilience of local communities and safeguarding important cultural heritage sites. We have conducted this work in coordination with partner organizations in China, India, and Nepal.

In this brief, we present three thematically linked, but separate studies in the KSL addressing issues of ecosystem services as assessed using the valuation approach. We follow these studies with a set of policy recommendations to address ecosystem service issues in a holistic approach that attempt to account for all the potential values of ecosystem services. With this approach, we can use these “values” to create more equitable and sustainable systems of supply and distribution.

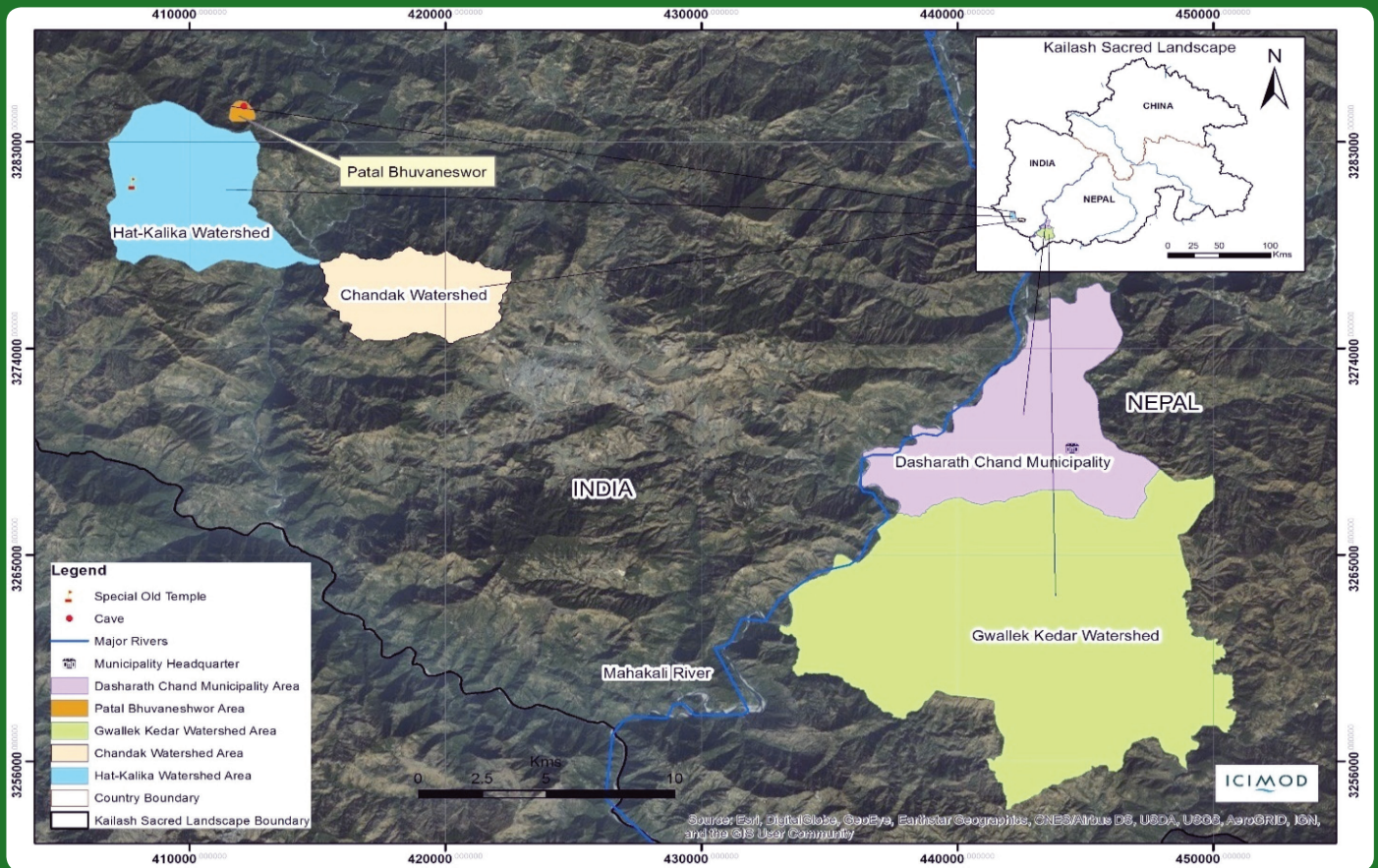
Valuation Approach

Based on behavioral economic theory and statistical methods, we estimate use values for cultural and water provisioning services of forest ecosystems, and willingness to pay for managing a watershed that supplies drinking water to a small township. To gather data for

Highlights

- Annual estimated consumer surplus of culture services to households at KSL pilgrimage sites exceeds two billion NPR
- Villages located near mixed or broadleaf forests experience less water stress than neighbors adjacent to monoculture forests
- Payment for ecosystem services schemes can incentivize more sustainable water use in upstream communities

Figure 1: Study sites



these three studies, we interviewed 1,418 respondents for this study (approximately 50% women) from five locations (Figure 1).

- To assess cultural values of Patal Bhuvaneshwor, Hat-Kalika and Gwallek-Kedar, we used the travel cost method. The site-specific values are then used to estimate the use value of cultural services of the entire KSL (study 1).
- The value of water provisioning services was computed at Gwallek, Hat-Kalika, and Chandak-Aunala Ghat watersheds using the household production function approach to understand the relationship between forests types and water availability (study 2).
- To assess the possibility of introducing incentive payment for drinking water provisioning services, we used a discrete choice experiment for estimating the willingness-to-pay (WTP) of households. WTP was used to design an incentive payment for ecosystem services (IPES) scheme for drinking water supply at Baitadi (study 3).

Study 1: Cultural Services in the KSL

We conducted this research at two Indian sites (Patal Bhuvaneshwor and Hat-Kalika) and one Nepali site (Gwallek Kedar). For the Patal Bhuvaneshwor, which draws visitors to the temple, the value of the cultural services that visitors derive is INR 13,750 (US\$ 215) per visit per person, which means that an average visitor is willing to pay, on average, INR 13,750 to visit the site. For visitors to Hat-Kalika and Gwallek-Kedar, the value ranges from NPR 1,784 (or INR 1,115 or US\$ 17) to NPR 3,413 (or INR 2,100 or US\$ 33) per person per visit, depending which site they visit. The annual average value of cultural services to these three sites is NPR 300 million (INR 187.5 million or US\$ 2.9 million). Excluding the use value to visitors, the annual estimated use value (consumer surplus) of cultural services to the 200,000 households living in the KSL, who frequently visit nearby cultural sites for religious purposes, is over NPR 2.35 billion (or INR 1.47 billion/USD 22.6 million).

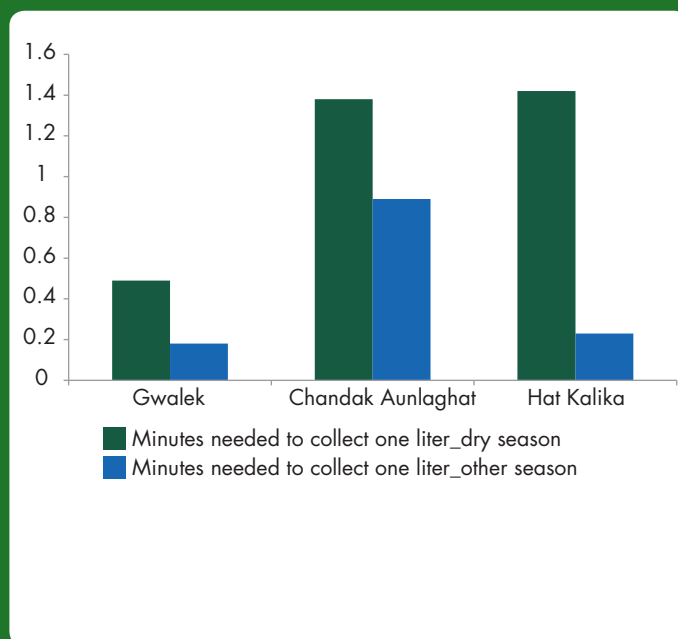
Study 2: Water Availability and Forest Types

We focused on forest types and water availability in three areas that reported increasing water scarcity in recent

years: Gwalek, Hat-Kalika, and Chandak-Aunala Ghat (Figure 2). All three communities cope with water scarcity by drawing water from multiple sources during the day, which takes considerable time and work. We found that water filters and water purifiers are more common in Hat-Kalika (82%) and Chandak-Aunla Ghat (32%), while many households in Gwalek (76%) are investing in water storage items.

However, in our study, we found an interesting relationship between water availability and forest type. Those households living close to the Chir pine forests are more water stressed compared to their neighbors that live in proximity to Deodar or mixed forests of broadleaf-conifers or Chir pine-Deodar. As a result, those households living near Chir pine spend more time collecting water and more money for storage and other devices than households living near different types of forest. In specific numbers, people living near Deodar or mixed forests of broadleaf-conifers or Chir pine-Deodar varieties save between 27-90 minutes per day per household collecting water. Translating that time into economic terms, the estimated savings ranges from US\$31–US\$318 (or INR 2,099 to INR 21,532) in India

Figure 2: **Seasonal water collection (per liter) time in the pilot watersheds**



and US\$23–US\$238 (NPR 2,484 to NPR 25,704) in Nepal per year per household.

Policy options

Based on the results of this study, we make the following policy recommendations:

- **Account for cultural use value of religious sites:** The estimated use value of the religious sites in the KSL is USD 22.6 million per year. This indicates that landscape provides an array of services that contribute to the welfare of local communities. Accounting for these values may help to understand the significance of the landscape for people living in the KSL.
- **Conserve religious/cultural sites:** Mountain communities living in the region place great value on the religious sites and the natural landscapes. Incentivizing conservation in these areas can renew the interest of local communities to protect these sites, and thus improve the welfare of mountain communities.
- **Improve facilities for tourists/visitors:** In our sample, only 17% of visitors purchased local products and none of them stayed overnight at local cultural sites. This may be due to lack of available local products and overnight-stay facilities. Respondents have shown their willingness to pay for these services, if available. Therefore, landscape planners and local institutions should focus on establishing and improving overnight-stay facilities and outlets for local products at pilgrimage sites.
- **Convert gradually pine monocultures into mixed forest:** Mountain communities are facing drinking water scarcity, and to compensate they spend more time and effort collecting water. Villagers living close to mixed forest and broadleaf forest spend less time collecting water compared to the villagers living close to pine monocultures. Therefore, converting pine monocultures to mixed forest may help to reduce water scarcity. We recommend further study in this regard.
- **Integrate IPES with environmental impact assessment:** Designing IPES is a rigorous process that demands substantial time and resources. Therefore, integrating IPES design into the conceptual phase of drinking water supply projects, particularly during initial impact assessments, may reduce the cost and guarantee the involvement of relevant stakeholders in all phases of the project.

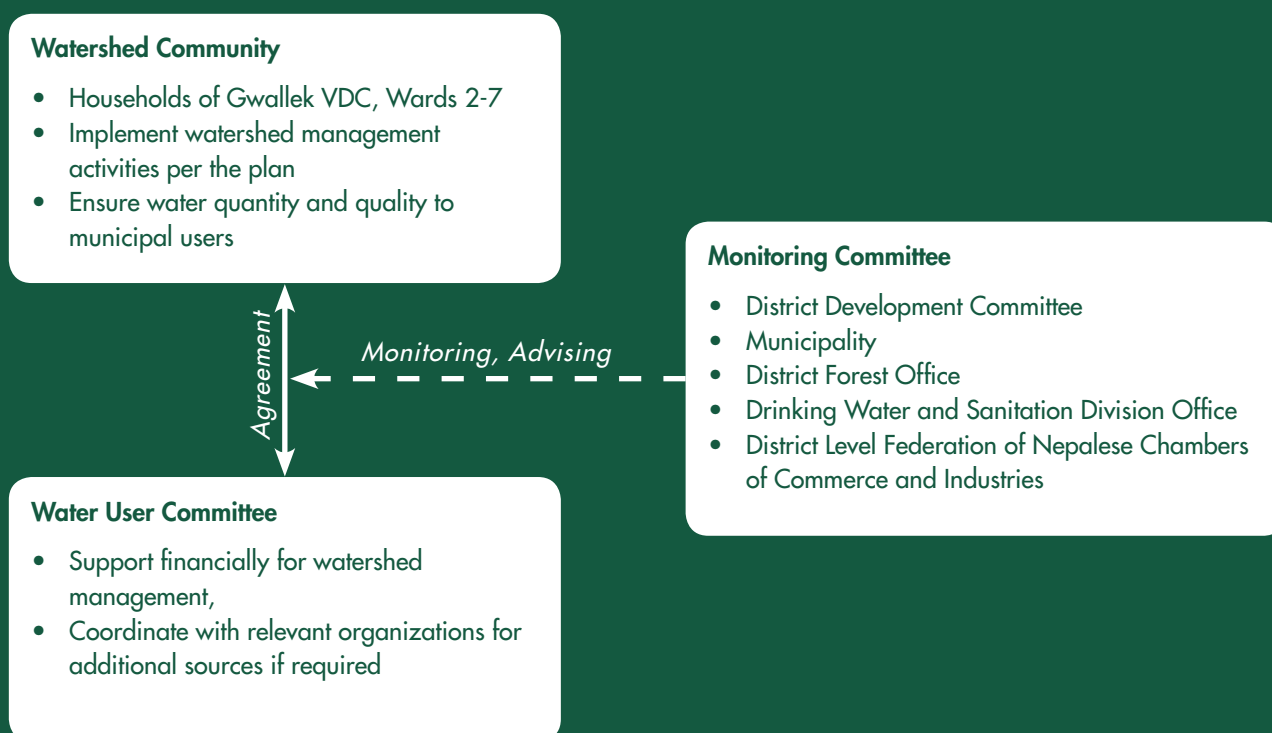
These recommendations could be useful for the Governments of India and Nepal while designing policies and measures for the sustainable development of mountain areas and improving the livelihoods of local people living in the Hindu Kush Himalaya.

Study 3: Incentive Payment for Ecosystem Services in Baitadi

In Baitadi, Nepal, we assessed the possibility of designing an IPES scheme for the town's Water Supply and Sanitation Project to enhance sustainability of the drinking water supply by addressing the long-term impacts of water diversions to watershed communities (Figure 1). We found that municipal water users are willing to pay additional water surcharge for maintaining quality as well as quantity of drinking water. The estimated annual willingness to pay for: i) doubling up water availability is NPR 482,076 (USD 4,505), and ii) for doubling up water quantity that is clean and drinkable without further treatment or filtering is NPR 1.18 million (USD 10,988).

The results of our household survey and consultations with stakeholders indicate that construction of public toilets, regulation of grazing, off-season vegetable farming, and drinking water distribution in upstream areas would contribute significantly to maintain the quality and quantity of water available to municipal water users. Support for these activities would require NPR 1.17 million (USD 10,987) in the first year and NPR 425,640 (USD 3,978) annually from the second year onward. In addition, a tripartite institution involving water users, households living in the watershed, and local municipality would be needed to implement the IPES scheme (Figure 3).

Figure 3: Proposed institutional set-up for implementing IPES schemes in KSL Nepal



For Further Reading

Nepal, M., Das, S., Rai, R.K., Bhatta, L.D., Somanathan, E., Kotru, R., Khadayat, M.S., Rawal, R.S., & Negi, G.C.S. (2017). *Valuation of ecosystem services in Kailash Sacred Landscape*. ICIMOD Research Report, 2017/2. Kathmandu: ICIMOD

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