Project brief
Results and impacts

SLANT Bhutan
Forest Ecosystem Services in Bhutan

Mountain forest ecosystems provide a wide range of direct and indirect benefits to the people who live in the mountains and downstream. Occupying steep slopes at high elevation, Bhutan's forest ecosystems provide services such as slope stabilization, regulation of hydrological cycles, maintenance of rich biodiversity and support for rural livelihoods. To manage these services sustainably, their diverse benefits must be recognized, assessed and valued. To date, there has been little assessment of forest ecosystem services in Bhutan, and particularly using field-based data.

About the project

This collaborative research project between UWICER and CIFOR aimed to develop a methodological framework to identify and assess Bhutan's forest ecosystem services based on social perceptions. Participatory research methods, including focus group discussions, key informant interviews and household surveys, provided ground-level information about the local perceptions of forest ecosystem services among villages associated with three forest types: high-altitude oak forest, forest management unit and community plantation (Fig. 1). The project is linked to the government priority of assessing the sustainability of current forestry practices and other forest uses.

Results can inform decisions at the policy level and forest management goals and strategies to support up-slope forest rehabilitation and protection to ensure delivery of forest services to *in situ* and down-slope dependent communities.

Key impacts

- Studies on the social perceptions of the importance of forests provide a foundation for understanding the ecosystem services in Bhutan, which can inform policy decisions by government agencies in the allocation of public resources to forest protection and sustainable management.
- This project has enhanced capacity of project team members in participatory research design and methods for ecosystem service assessment, in scientific writing and research communication.
- There was a two-way interaction in the field, with researchers learning about how communities value the forest and appreciating local knowledge, and villagers learning about the ecosystem service conceptual framework.
- The new-found knowledge on both sides raises awareness of the value of local forests, informs future research, and empowers Bhutanese people in decision making.

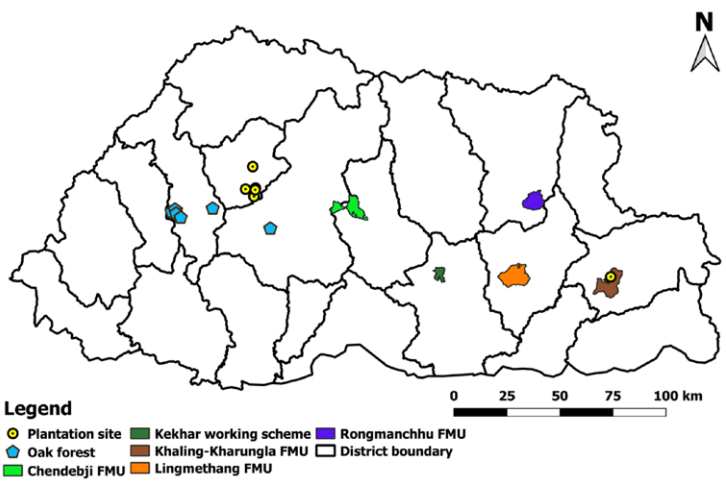

Figure 1. Project study sites in Bhutan.

Planted Forest for Restoration

By 2017, there were 18,100 hectares of planted forest in Bhutan, in part thanks to a community plantation initiative in the 1990s to restore forest on degraded and barren land. We set out to understand the contributions these planted forests make to local livelihoods and environment through assessing the perceptions by local people.

We assessed the community values for these restored areas in eight villages associated with five planted forests in Punakha district and one in Trashigang (Photo 1). All were planted primarily with *Cupressus* sp., a cypress locally called *tsenden,* with other native species of oak and pine. Despite the small size of the planted forests (<1 to 15 ha), surrounding communities recognized multiple benefits from these stands.

Key messages

- The community plantation efforts in the 1990s had positive outcomes to local communities and the environment.
- While local people recognize multiple ecosystem services from planted forest, timber was considered as the top priority.
- Additional priority services appreciated were soil and water conservation, leaf litter collection, aesthetic improvement and recreation. The perceptions of services depended on village proximity to the plantations and dependence on local springs.
- Overall, community members were satisfied with outcomes of the planted forest initiative, yet some highlighted the attraction of the forests to wildlife, which results in disturbance to agricultural crops.
- In the future, choice of species for planting should be based on the site conditions, and the needs and desires of the local people and other stakeholders.

Photo 1. Restoration plantation in community forest, Khaling, Trashigang.

Ecosystem Services from Forest Management Units

Natural forest ecosystems are critical in Bhutan for the provision of wood and non-wood resources as well as regulating and supporting services. Forest management for commercial timber is conducted in the Forest Management Units of the government reserved forests. For villagers residing within and below these areas, these goods and services are critical for their livelihood. Increasing demand for timber, driven by growing wealth and urban development, poses a threat to the sustainability of the resource base.

Through focus group discussions with members of eight villages, we assessed the perceptions of the benefits from four FMU forests and one working scheme forest in central and eastern Bhutan. Our aim was to assess whether current forestry practices and other forest uses in the FMU support the continued provision of key forest ecosystems services.

Key messages

- Assessment of ecosystem services from the FMU provides an understanding of the importance of forests to the local communities.
- Local people recognize multiple ecosystem services from FMU, with highest priorities given to soil productivity, timber and fresh water (Fig.2).
- While direct benefits are easily recognized by villagers, they had difficulty naming indirect benefits such as carbon sequestration and pollination. Their perceptions were based on their proximity to the forest and their work experiences.
- Villagers attribute their good health to a healthy forest, though they believe that there is a general decline in the provision of ecosystem services from the FMU forests due to increasing demand for timber.

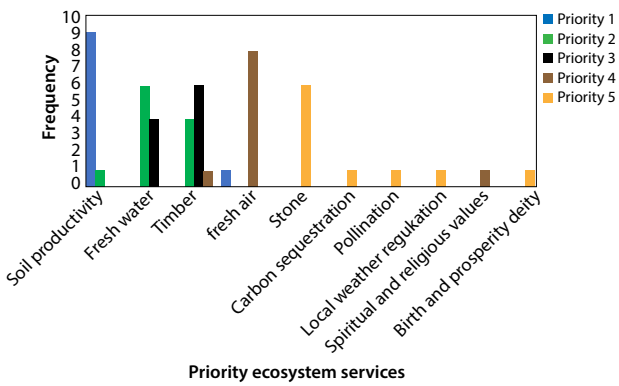

Figure 2. Priority ranking of ecosystem benefits from FMU forests by villagers.

Oak Forests in Western Bhutan

Oak forest ecosystems in Bhutan's mountains play a crucial role in supporting rural livelihoods and happiness for the local people. These temperate forests dominated by *Quercus semecarpifolia* occur between 2200 m and 3500 m a.s.l. and are highly appreciated by farmers for the goods and services they provide. Household interviews and focus group discussions were carried out in seven villages associated with oak forests.

Key messages

- High-altitude oak forests are regionally considered critical for watershed conservation and ecosystem services. We must understand the ecology of oak forests properly to manage, enrich and enhance the sustainable use of forest resources.
- Local people and forest managers recognize the multiple ecosystem services of oak forests. Twenty-two ecosystem services were identified (Fig. 3). Priorities included water regulation, provision of fodder and fuelwood.
- There is strong awareness about the value of oak timber and oak forests. Oak forests suffer from a lack of regeneration, and villager perception is that services are declining, leading to an interest in enrichment planting as well as restoration planting with oak on barren land.
- Awareness programs about the multiple ecosystem services of oak forests and their contribution to rural livelihood is important to deter people from felling oak trees illegally and enabling regeneration of oak trees.

Table 1. Ecosystem services identified by villagers from three forest types. Multiple checks indicate higher priority.

Site	Oak forests	FMU forests	Plantation forests
Service			
Provisioning			
Fresh water	✓✓✓✓	✓✓✓	✓
Timber	✓✓	✓✓✓	✓✓✓
Fuel wood	✓✓✓	✓	
NWFP	✓✓	✓	✓
Fodder	✓	✓	✓
Leaf litter	✓	✓	✓✓
Regulating			
Groundwater recharge	✓	✓	✓
Fresh air	✓	✓✓	
Carbon sequestration	✓✓	✓	
Soil erosion protection	✓	✓	✓
Supporting			
Soil productivity		✓✓✓✓	
Wildlife habitat	✓	✓	✓
Biodiversity	✓✓	✓	✓
Pollination	✓	✓	
Cultural			
Spiritual sites	✓	✓	
Recreation	✓	✓	✓
Aesthetic	✓	✓	✓

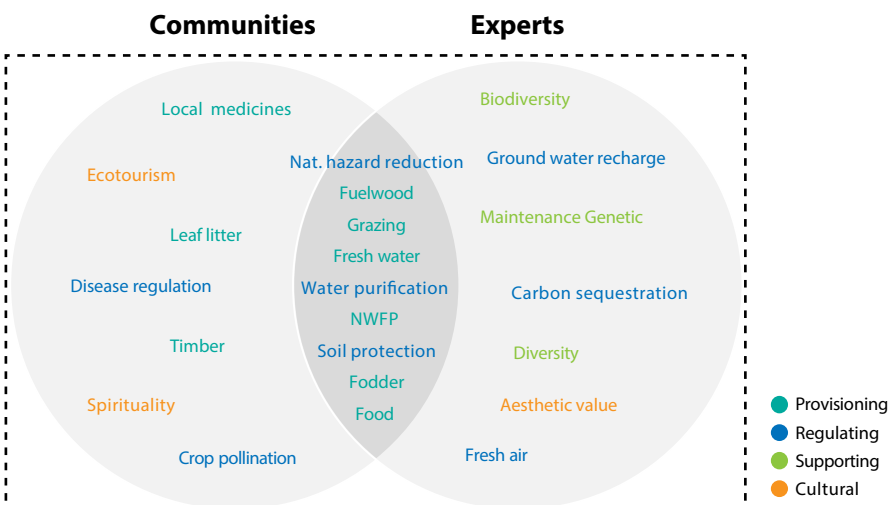

Figure 3. Key areas of agreement and variations between local communities and the forestry experts in the priority ecosystem services.

Photo 2. Unprocessed logs from an FMU.

Project Impacts

This study was carried out from June 2016 through June 2019 in Bhutan and had two main objectives. First was for researchers to learn from rural residents the values they hold and benefits they perceive from local forests. Second was for the research teams to increase understanding among rural residents about the diversity and types of goods and services provided by forests. We used the ecosystem services conceptual framework from the Millennium Ecosystem Assessment to help guide the thinking among villagers.

Through household interviews and focus group discussions, we collectively engaged 396 villagers in 23 villages in 17 forest areas across Bhutan. Twenty-five local forest officers and other forest officials were also engaged in interviews and coordination. Research teams are returning to the same villages to share project results and seek validation and further input.

Key project publications

Baral, H, et al. 2017. Approaches and tools for assessing mountain forest ecosystem services. *CIFOR Working Paper* Vol. 235. Bogor, Indonesia: CIFOR.

Dorji, T, et al. 2019. Socio-cultural values of ecosystem services from oak forests in the eastern Himalaya. *Sustainability* 11(8): 2250.

Rai, PB, et al. (in prep.). Participatory assessment of ecosystem services from community managed planted forests in Bhutan.

Sears, RR, et al. 2018. Bhutan's forests through the framework of ecosystem services: Rapid assessment in three forest types. *Forests* 9(11): 675.

Sears, RR et al. 2017. Forest ecosystem services and the pillars of Bhutan's Gross National Happiness. *CIFOR Occasional Paper* No. 178.

Wangchuk, J, et al. 2019. Ecosystem services from Forest Management Units in eastern and central Bhutan. *CIFOR Working Paper* Vol. 248. Bogor, Indonesia: CIFOR and UWICER.

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This is the final project brief. SLANT Bhutan project members: Shacha Dorji, Kinley Choden, Tshewang Dorji, Jigme Wangchuk, Dorji Dukpa, Prem Bahadur Rai, Norbu Wangdi, Cheten Thinley, Damber Ghemiray, Nawang Norbu, Sonam Phuntsho, Himlal Baral, Yustinas, Robin Sears, Louis Putzel.

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