

A Regional Orientation Training on Ecosystem Services Assessment under the Himalica Programme

3–7 April, 2014, ICIMOD Knowledge Park and Udayapur
District, Nepal

THREE DECADES
FOR MOUNTAINS AND PEOPLE



About ICIMOD

The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalayas – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.



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Event Report

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3–7 April 2014, ICIMOD Knowledge Park and Udayapur District, Nepal

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Ecosystem team, ICIMOD

Kamal Aryal, Seema Karki, Pratikshya Kandel, Kabir Uddin, Aye Myat Thandar, and Nakul Chettri

Acronyms and Abbreviations

AI	appreciative inquiry
APPA	appreciative participatory planning and action
GIS	geographic information system
GPS	global positioning system
Himalica	Rural Livelihoods and Climate Change Adaptation in the Himalayas
HKH	Hindu Kush Himalayas/Himalayan
ICIMOD	International Centre for Integrated Mountain Development
IID	Institute for International Development
IUCN	International Union for Conservation of Nature
NTFP	non-timber forest product
PLA	participatory learning action
PRA	participatory rural appraisal
RRA	rapid rural appraisal
VDC	village development committee

Executive Summary

The Rural Livelihoods and Climate Change Adaptation in the Himalayas (Himalica) initiative is aimed at supporting poor and vulnerable mountain communities in the Hindu Kush Himalayan (HKH) region to mitigate and adapt to climate change impacts through collaborative action research and pilot activities. This research and activities will help build the capacity of institutions working on resilience to climate-induced vulnerability, which will subsequently improve the livelihoods of the mountain communities in the HKH. Adaptive capacity can only be attained when the value of the ecosystem services provided by mountain communities to those downstream is understood, maintained, and recognized. Thus, the Ecosystems thematic area at ICIMOD is working to assess the status of ecosystem services in Bhutan, Myanmar, and Nepal.

A research framework for ecosystem assessment developed by ICIMOD will be used in these three countries to determine the current status of integrated ecosystem services (e.g., provisioning, regulating, supporting, and cultural services) in areas where communities depend heavily on natural resources for their subsistence livelihoods. Activities under Himalica will be carried out by local implementing partners at the country level. Towards a standard, comparable, and consistent methodology to ensure common understanding and harmonization among implementing partners, ICIMOD organized a five-day regional orientation training on 'Ecosystem Services Assessment', in collaboration with local implementing partners, Bird Conservation Nepal and Nabaprabhat Nepal. The training provided a common understanding of ecosystem services assessment, the theoretical aspects of participatory rural appraisal (PRA) tools, and hands-on training, which the participants will be able to apply in their work. The training brought together selected experts, researchers, and policy makers from the region, specifically Bhutan, Myanmar, and Nepal where Himalica is focusing its work.

The training was divided into two sessions:

- a one-day theory session at ICIMOD Knowledge Park (Godavari)
- a two-day field exercise (including two days travel) in Udayapur district, Nepal, which is one of the study sites under Himalica

The theory sessions on day one were:

- Management of ecosystems for sustaining services
- Ecosystem services assessment overview, training objectives, structure and expected outputs
- Household survey: Why and how to extract useful data
- Importance of quantitative data in ecosystem services valuation
- Community-based participatory rural appraisal: Concept, opportunities and challenges
- Use of GPS and GIS
- Enumerators' role in effective data collection

Participating countries were also provided with an opportunity to share their country-level experience on the use of PRA tools.

Field exercises were mostly confined to practising PRA tools and techniques, specifically, focus group discussion, resource mapping, institutional mapping, mobility map, seasonal calendar, pair-wise ranking and historical timeline, as well as the testing of the household survey questionnaire.

Introduction

Background

Economic development is contributing to extensive land-use and land-cover change, population driven demand for ecosystem services, unequal distribution of natural resources, and climatic variation induced by anthropogenic activities as the externalities leading to the depletion and fragmentation of natural resources that were once abundant. Realizing a need to identify the ecosystem services that communities rely on for their subsistence livelihoods, the time has come to manage and protect ecosystem services for sustainable development and livelihoods, for now and the future. However, the management of ecosystem services through interventions is only possible when the status of such ecosystem services is known.

ICIMOD is in the process of assessing ecosystem services in Bhutan, Myanmar, and Nepal using a standard methodology comparable across the three countries. For such a standard methodology, the enhanced understanding and capacity of partners about the application of ecosystem assessment concepts, tools, and approaches is essential. Thus, a five-day Regional Orientation Training on Ecosystem Services Assessment was organized in Nepal from 3–7 April 2014 for implementing partners and policy makers. The training was divided into two sessions: a one-day theory session at ICIMOD Knowledge Park (Godavari) and a two-day field exercise in Udayapur district, Nepal, which is one of the study sites under Himalica (See Annex 1 for training schedule and list of participants).

Training objectives

The objectives of the training were to:

- bring about clarity on the concept of ecosystem services assessment and its rational linking to the Himalica programme prior to partner's field-level engagement
- enhance the understanding, knowledge, and skills of partners on the application of the various tools and techniques that are applied for ecosystem services assessment
- discuss and agree on the household survey questionnaire to be used in the ecosystem services assessment and obtain inputs from the participants
- foster cooperation, partnership, and networking at the regional level through cross learning to address issues in relation to ecosystem services and their degradation

Training outcomes

The following outcomes were expected from the training:

- enhanced understanding and capacity of partners in relation to the application of ecosystem assessment concepts, tools, and approaches
- agree and finalize household survey questionnaires to be used for ecosystem assessment in the respective countries
- ensure the timely delivery of a data quality report on 'ecosystem services assessment', specifically:
 - start field work right after the training
 - data entry (Jun-Aug)
 - make first draft report available with map (Sept 2014)
 - regional learning sharing (Sept 2014)
 - final report (Dec 2014)

DAY 1: Overview of Training

Welcome remarks: Dr Eklabya Sharma, Director of Programme Operations, ICIMOD

The theory session started with welcome remarks by Dr Eklabya Sharma, Director of Programme Operations at ICIMOD. Dr Sharma welcomed the participants from the region who are working on ecosystem services assessment. He highlighted ICIMOD's work on developing scientific methodologies to achieve impact on the ground. He said that, in order to scrutinize these methodologies and make them comparable and consistent for harmonization and understanding among the researchers and practitioners, ICIMOD is applying them in its five regional programmes. He explained that, in addition to climate change, ICIMOD's work on adaptation to change focuses on other forms of change including outmigration, large-scale land-use and land-cover change, and communities' access to infrastructure and markets, deriving impact at the local level. Dr Sharma said that while the Himalayan Climate Change Adaptation Programme (HICAP) is focusing on the up scaling and down scaling of climatic data to support adaptation from a local perspective and Adapt Himal is working on re-understanding land and non-land based vulnerability at the local level, Himalica prioritizes action research and pilot projects to help improve the livelihoods of communities through improved ecosystem services.

Dr Sharma said that this regional training will focus on the livelihood component of Himalica, which works on transects and river basins. He said that, whereas major ecosystem services will be quantified as a baseline, interventions will be implemented through action research and pilot projects. At the end of the third year of Himalica, the initiative will monitor the changes in ecosystem services that are expected to add value to the livelihoods of communities. He said that the systematic and well-designed scientific framework developed by the Millennium Ecosystem Assessment in 2005 will be adopted by ICIMOD to assess ecosystem services in transects and river basins. Dr Sharma pointed out that the ecosystem services provided by this region cater to approximately 210 million people living in the Hindu Kush Himalayan (HKH) region and a further 1.3 billion living downstream, both directly and indirectly. Genetic resources are endangered and threatened, which represents the bigger picture. Hence, he asserted that dominant ecosystem services (provisioning, regulating, cultural, and spiritual) ought to be identified and we need to focus on how these services can be maintained to support the livelihoods of communities at the country level in the long term. He said that the indirect value derived from biodiversity and ecosystem services that enhance elements of the ecosystem services, referred as 'co-benefits', also need to be taken into consideration. Networking among partners from Bhutan, Myanmar, and Nepal would foster the sharing of experiences and the combined expertise of partners and participants would strengthen the training and practice, which will contribute to the ecosystem services assessment framework. Dr Sharma closed by wishing participants a productive and interesting week of learning and working on ecosystem services assessment.

Opening remarks: Christian Mazal, Programme Coordinator, Himalica, ICIMOD

In his opening remarks, Christian Mazal, Programme Coordinator for Himalica, stated that the five-year Himalica programme is now in its second year. Projects at the country level are to be implemented by local partners. The programme has five main components: policy support, action research, pilot projects, capacity building, and knowledge products. He explained that ecosystem services assessment is a way of contributing to the last component, 'knowledge products'. He pointed out that ecosystems can contribute to better livelihoods for people. Mr Mazal closed by saying that this training aims to build participants' expertise to synergize and harmonize the ecosystem assessment approach so that we can acquire comparable datasets and results.

Management of ecosystems for sustaining services: A HKH perspective: Dr Gopal Rawat, Chief Scientist, ICIMOD

Dr Rawat started by pointing out that ICIMOD has been working in the HKH region for 30 years and is now in the process of developing an ecosystem services assessment framework for the HKH, considering the framework provided

by the Millennium Ecosystem Assessment 2005. In his presentation, he highlighted the concept of ecosystem services, the availability of a framework to assess ecosystem services, knowledge gaps in assessing these services, and the linkages between ecosystem services and livelihoods. He also mentioned the general framework adopted by the International Union for Conservation of Nature (IUCN) in its guidelines. He said that, so far, the total value of 17 ecosystem services for 16 biomes has been quantified and that 14 out of 24 identified services are declining on a global scale. Ecosystem functioning and structure contribute to ecosystem products (goods and services), impacting on human wellbeing. However, the quantitative assessment of these products is still ongoing.

Dr Rawat said that ecosystem services have intermediate value when they are in-situ or within the ecosystem. These services when transportable are considered to be 'goods'. He said that human dependence, economic growth, and overharvesting of these goods and services exert a cumulative pressure on ecosystems and that equitable and sustainable use reduces such pressure. A mechanism for horizontal and vertical accounting of ecosystem services is required. Thus, the assessment of ecosystem services (using quantitative and qualitative methods) and the monitoring of impacts reduce knowledge gaps and scientific uncertainty and identify the flow and stress of these services in places where communities rely heavily upon them.

To add to the generalized framework adopted by IUCN, Dr Rawat said that ecosystems may vary, both at the spatio and temporal scale. He said that once ecosystem restoration management strategies are formulated by identifying the synergies between primary, secondary, and distant stakeholders; economic issues; ecosystem valuation; and ecosystem services, the assessment of these services can be conducted.

Ecosystem services assessment overview, training objectives, structure and expected outputs: Dr Nakul Chettri, Programme Coordinator, Kangchenjunga Landscape Conservation and Development Initiative, ICIMOD

Dr Nakul Chettri, Programme Coordinator for the Kangchenjunga Landscape Conservation and Development Initiative at ICIMOD, gave an overview of ecosystem services assessment and explained the need for ecosystem services assessment. He said that economic growth and sustainable development were originally considered two different schools of thought, but now we have realised their interdependency adding value to ecosystem services assessment. Dr Chettri said that, at the global level, the Convention on Biological Diversity, realizing the importance of ecosystem services, has set 20 Aichi Biodiversity Targets in its Strategy for 2011–2020. These targets focus on ecosystem management. The capacity to contribute to, and understand this, global agenda of biodiversity conservation must be developed.

Dr Chettri pointed out that, in addition to ecological and economic values, social values linked to human wellbeing are equally important. The enhanced resilience of ecosystems through a mosaic of ecosystem services management can bring about a continuous flow of ecosystem services – a win-win situation. He highlighted the relevance of ecosystem services assessment and its framework in this context. He explained that the framework will also use geospatial tools to determine the past and present status of ecosystem services, which can be used for future projections. Country-level participants with their own expertise will be able to share and learn from each other. Dr Chettri then explained the structure, objectives, expected outputs, and follow up actions of the training. In closing he said that this training will foster a common understanding, based on which we can develop comparable datasets.

Discussion

Question	Answer
In terms of assessment, monitoring is required. When is the right time to quantify the impact of an intervention on the ground?	Managing ecosystems is complex; thus, the impacts are hard to know when we intervene. An intervention in a simple ecosystem may give us a good result, but in a complex ecosystem, intervention without proper ecosystem assessment may not function well.
When is the best time to conduct ecosystem services assessment?	If goods and services change with the seasons, a seasonal assessment would be effective. In a tropical region, where there is no seasonality, ecosystem services can be assessed anytime.

How do you identify primary ecosystems in overlapping ecosystems?	In case of overlapping ecosystems, first you identify the intermediate region (ecotone). A separate assessment can help to decide the primary ecosystem. Gradient assessment helps to identify the intermingling of two or more ecosystems.
How does reducing poverty reduce stress over ecosystem services?	There is a high level of dependency among poor people on ecosystem services; they extract more resources and services for their sustenance. If we could provide them other livelihood options and opportunities, it would minimize their dependence on natural resources and, thus, reduce the disturbance to ecosystems.

The principles of household survey: Why and how to extract useful data? (Research ethics and principles of household survey): Dr Rucha Ghate, Senior Natural Resources Management Governance Specialist, ICIMOD

Senior Natural Resources Management Governance Specialist from ICIMOD, Dr Rucha Ghate, shed light on the principles of the household survey, which is a tool for collecting primary data through a focused key informant. She said that some decades ago, the word 'ecosystem' used to be used merely in the scientific domain. Now we gather information on ecosystems by interviewing communities through household surveys. Dr Ghate pointed out that the household survey, is a time-tested tool for gathering socioeconomic information. However, interviewers should be careful to keep the interview objectives in mind and avoid biasness. She said that a seasonal timeframe can be useful for recalling data, as in rural settings dates and times are less pronounced. The crosschecking and triangulation of data is always necessary. Dr Ghate explained that conducting a household survey is an art and the interviewer needs to appreciate and understanding the responses and avoid non-observational, non-coverage, non-response, and measurement errors. In order to respect the respondents, the interviewer must obtain their free and prior informed consent, record information without manipulation, and maintain gender sensitivity.

Importance of quantitative data in ecosystem services valuation: Mr Bikash Sharma, Senior Environment Economist, ICIMOD

At the outset, Mr Bikash Sharma, Senior Environment Economist at ICIMOD, underscored the importance of understanding the different decision-making contexts (e.g., demonstrating absolute value, the cost benefit analysis of policy interventions, and mobilizing resources for financing conservation initiatives) in which the economic valuation of ecosystem services is carried out before devising an effective strategy for generating quantitative data. He added that, while the determination of an absolute value for ecosystem services is useful for advocacy purposes (to demonstrate its contribution at the local, national, and global levels), determining the net benefit of alternative policy interventions can provide policy makers with meaningful insights. He described the type of data required to estimate both indirect use and non-use values, including common sources of error in many primary valuation surveys. He said that the common practice has been to value whatever is marketed (direct use). However, the valuation per se is not the end of the story. Only the recognition and mainstreaming of ecosystem values by policy and decision makers makes ecosystem conservation effective. To get the value of ecosystem services recognized, he stressed that quality data and results generated by scientifically-designed surveys are essential.

Discussion

Question/comment	Answer
Have the communities in Udayapur district been informed of the meetings that will happen during the field trip?	Yes; the meetings are arranged in consultation with communities involved in the Dumrithumka Community Forest Users Group. Bird Conservation Nepal and Nabaprabhat Nepal made such arrangements.
Survey questionnaires should be revised and finalized after field exercises.	
How can we manage our time during field exercises?	<ul style="list-style-type: none"> • Take consent of respondents • Focus on the cost of quality • Keep survey questions in your mind and take notes

Community-based participatory rural appraisal: Concept, opportunities and challenges: Ms Chhing Lamu Sherpa, freelance consultant

Ms Chhing Lamu Sherpa, freelance consultant, outlined the concept, opportunities and challenges of community-based participatory rural appraisal (PRA). She said that the failure of top-down approaches to decision making has resulted in a focus on involving communities through approaches such as PRA. Ms Sherpa explained that PRA gained recognition in the mid-1990s in Nepal and is now widely recognized as a scientific tool. From rapid rural appraisal (RRA) in the 1960s, PRA developed (from 1970s-1980s) into participatory learning action (PLA), appreciative inquiry (AI), and appreciative participatory planning and action (APPA), focusing on the 4 'Ds': discover, dream, design, and deliver. Nepal started using AI in 1994 and was a pioneer in developing APPA, which incorporated AI and PLA approaches together. She highlighted that PRA enhances stakeholders' meaningful participation in the planning, implementation, evaluation, and monitoring of activities in addition to empowering people. However, it does not cover all aspects. Therefore, a carefully designed household survey, key informant interviews, and other scientific tools such as maps, can supplement PRA and overcome its constraints.

Use of GPS and GIS: Mr Kabir Uddin, GIS and Remote Sensing Analyst, ICIMOD

Mr Kabir Uddin, GIS and Remote Sensing Analyst at ICIMOD, made a presentation on the use of GIS and GPS as geospatial solutions for acquiring information from around the globe. He said that these systems will help to identify natural hazards as they occur, including forest fires, flooding, and landslides, together with ecological changes such as changes in forest cover, biodiversity, and river courses. The integration of information, derived from remote sensing and GIS maps on land-use and land-cover change, validated with ground-level information collated from household surveys, provides us with complete information for the assessment of ecosystem services. Mr Uddin explained that using GIS and GPS we can identify the past status of an ecosystem and compare it with the present scenario. He added that, based on the past and present trends in the ecosystem and its services, we can make future projections as to the flow and availability of ecosystem goods and services.

Enumerators' role in effective data collection: Mr Kamal Aryal, Natural Resources Management Analyst, ICIMOD

Mr Kamal Aryal, Natural Resources Management Analyst, ICIMOD pointed out that enumerators are the medium of communication with respondents and are in a position to facilitate the generation of effective data for ecosystem services assessment. He emphasised that enumerators need to have a common understanding about the questionnaire and familiarity with the study area prior to the household survey. He added that they also need to show interest and openness to the members of the communities and keep questions in mind rather than reading from the questionnaire during the survey and post survey cross check. They also need to triangulate the information. Mr Aryal then briefed the participants on the PRA tools that were to be used during the field visit to Udayapur district, namely: resource mapping, focus group discussions, institutional mapping, mobility mapping, pair-wise ranking, and historical timeline. Lastly, he explained the field activities for the next four days.

Discussion

Discussion/comment	Answer
In the past, community development activities were planned in a less participatory and appreciative way. Thus, APPA was evolved and the 4 'Ds' came up. Although PRA is recognized as a scientific tool, it does not answer everything. Hence, we need to focus on why we are using the PRA tools. PRA is used to obtain an overview and focus our understanding and narrow down to household survey.	
The three partners from Bhutan, Myanmar, and Nepal can collectively come up from the field with socio-ecosystem information and work together on geospatial mapping at ICIMOD to produce concrete results. This will also build networking, facilitate the sharing of information, and build the capacity of ICIMOD's regional member countries.	
Is there any possibility of purchasing high resolution maps?	Yes; high resolution maps can be acquired.

Closing remarks: Dr Nakul Chettri, Programme Coordinator, Kangchenjunga Landscape Conservation and Development Initiative, ICIMOD

In his closing remarks, Dr Nakul Chettri mentioned that the theory session was very productive as it clarified our understanding of the concept of an ecosystem and its services through learning and experience sharing. He expressed his gratitude and thanked the participants from the Royal Society for Protection of Nature, Institute for International Development (IID), Forest Department of Myanmar, Bird Conservation Nepal, and Nabaprabhat Nepal for sharing and showing interest in working together for the betterment of communities living in the HKH region. Dr Chettri said that IID in Myanmar will be a key institution for executing ecosystem management and pilot activities around Inlay Lake over the next three years. IID's support is essential. He extended thanks to the Directorate, Himalica team, resource persons, and ecosystem team for their active participation in the workshop. He wished the participants a productive field trip to Udayapur, where the participants will learn more about how to apply PRA tools and techniques with Ms Chhing Lamu Sherpa.

DAY 2: Glimpses of PRA exercises in Udayapur district, Nepal

Workshop participants from the Bhutan, Myanmar, and Nepal visited in Rauta Village Development Committee (VDC) in Udayapur district, interacting specifically with the Dumrithumka Community Forest Users Group. During the two-day field exercise, participants applied PRA tools and techniques together with local communities. The first day of the field exercise was devoted to resource mapping, focus group discussion, institutional mapping, and mobility mapping. The second day covered pair-wise ranking, seasonal calendar, and historical timeline. Photographs of the field trip are presented in Annex 5. The crosschecking and triangulation of data gathered using the seven PRA tools was completed and the findings shared with local stakeholders. Each PRA tool was applied with different groups of stakeholders. The groups, ranging from 10–15 participants, were mostly led by women.

The resource mapping and focus group discussion found that the local community is highly dependent on the ecosystem services provided by forests, agriculture, and water bodies. The community's reliance on direct and indirect ecosystem services from forests is presented in Table 1.

Table 1: **Dumrithumka Community Forest ecosystem and its derived services**

Name of study area: Dumrithumka Community Forest, Punwara, Rauta VDC

Focus group discussion participants: 11 females; 9 males

Dependency on forest ecosystem services

Direct ecosystem services from forests	Indirect ecosystem services from forests (supporting and regulating services)	Cultural services
<ul style="list-style-type: none"> Fodder Fuelwood Timber Leaf litter Non-timber forest products (NTFPs) Vegetables 	<ul style="list-style-type: none"> Clean environment Air Greenery Hydrological cycle Soil erosion control Habitat for wildlife Flora and fauna Natural streams 	<ul style="list-style-type: none"> Holy river (Trijuga Khola) Holy pond (Rauta) <i>Artemisia vulgaris</i> (titepati) <i>Shorea robusta</i> <i>Aegle marmelos</i> (belpati) Ecotourism Educational tours Recreational activities (picnics)

The focus group discussion identified shrinking water bodies, reduced water availability in rivers and streams during the dry season, and a declining fish population as some of the issues surrounding water bodies. Community people also underscored that forest ecosystems are experiencing degradation, illegal timber logging, and reduced wildlife numbers, particularly tigers and wild boar (but the rabbit population has increased).

Institutional mapping identified an array of government offices, such as the District Forest Office, District Soil

Conservation Office, District Agricultural Development Office, and VDC, as well as non-government bodies such as the Nepal Water for Health and the Dumrithumka Community Forest Users Group, which are all working for the protection and conservation of ecosystems and their services in Rauta VDC.

The mobility map found that people move about for the collection of NTFPs (such as harro, barro, amala, sisnu, niguro), which has extended from Karamgachhi all the way to Teltele Feri. The reason given for the collection area being extended is the reduced availability of these NTFPs. Fodder species plantation on private land and the installation of alternative energy such as improved cooking stoves and biogas has helped the community to deal with the reduced availability of fuelwood and fodder and limited access to the forest. Similarly, availability and use of high value medicinal plants has also decreased and local people have to go up to Trijuga Khola to find species previous available locally, which is time consuming. The farthest local people go for employment, education, and health care is Dubai, Qatar, Australia, India and Kathmandu.

Pair-wise ranking identified five main fodder species preferred for stall feed: *Spantholobus parviflorus* (debre lahara) is mostly preferred fodder species followed by *Bauhinia vahlii* (bhorla), Muhune, and *Woodfordia fruticosa* (dhangero). *Mazus pumilus* (malati) is the least preferred species. However, *Spantholobus parviflorus* (debre lahara) is rare and *Mazus pumilus* (malati) is commonly distributed in this community. .

A seasonal calendar was prepared to determine the year-round activities of the local people related to the three main ecosystems (forest, agriculture, and water bodies). The seasonal calendar revealed that community people are busy in agricultural activities throughout the year, except for the two months from mid-December to mid-February.

An historical timeline was constructed based on discussions with senior citizens in the community. The timeline identified four major incidents: two earthquakes (one in 1933 and another 1990), malaria eradication in 1965, which resulted in an increase in the population from in-migration, and a flash flood and landslide in 2000. Some of these incidences claimed the life and property of local people. Other cascading effects identified included the drying up of natural ponds and increased incidence of pests leading to crop damage.

Participants' reflections on the training

After the training participants were asked to give feedback on the overall training and whether or not it enhanced their skills in using PRA tools in their work. Participants responded that the training was a good package overall with intensive theoretical and practical sessions. They mentioned that the field exercises provided them with an opportunity to recall, revise, and strengthen their knowledge on the application of PRA tools and techniques. The participants highly appreciated the participation and leadership of the women in the community, particularly during the focus group discussion. Similarly, they mentioned that the home stay enhanced cohesion, interaction, and openness with the community. According to the participants, the coordination among resource persons, facilitators, and participants was commendable.

Regarding what could have been improved, the participants said that the prior information about the field village would have helped them to better understand the community. Also, a 'transect walk' would have helped them to understand the various ecosystems in the village and their goods and services. Some participants suggested that the household survey questionnaire needed revising and that the partners from Bhutan, Myanmar, and Nepal need to have a common understanding of the terminology used in the survey. They said that ICIMOD should ensure a common understanding of terms and acronyms used in the questionnaire before conducting the household survey. Nevertheless, the participants said that the training had enhanced their ability to use PRA tools and techniques for research in their own country.

Pre- and post-evaluation results

A pre- and post-training evaluation was conducted to determine the level of change brought about by the training in terms of the understanding and knowledge of the participants on ecosystem services assessment. Participants were asked to rate the questions based on their knowledge and understanding of the various aspects of ecosystem

services assessment as 'no idea', 'general idea', 'basic working knowledge', and 'better knowledge'. For analysis, the questions were grouped into six categories: ecosystem services, ecosystem services assessment, biodiversity assessment, use of PRA tools, household survey, and use of GPS.

Figure 2 Post-training evaluation results regarding knowledge on different aspects of ecosystem services assessment Figures 1 and 2 depict progressive changes in the knowledge and understanding of the participants after the training. Regarding ecosystem services, 8% of participants reported 'better knowledge' prior to training, which increased to 42% after the training. Similarly, none of the participants had 'better knowledge' of ecosystem services assessment before the training, but 33% reported 'better knowledge' after the training. Regarding biodiversity assessment, prior to training only 25% had a 'basic working knowledge', which increased to 42% after the training. Some 50% of participants said they had 'better knowledge' of the use of PRA tools after the training, compared to only 8% prior to the training. Similarly, there was a considerable rise in the number of participants (8% to 33%) who reported 'better knowledge' on the household survey after the training. Regarding the use of GPS, 42% said they gained a 'general working knowledge' from the training, compared to only 25% prior to training.

Figure 1: Pre-training evaluation results regarding knowledge on different aspects of ecosystem services assessment

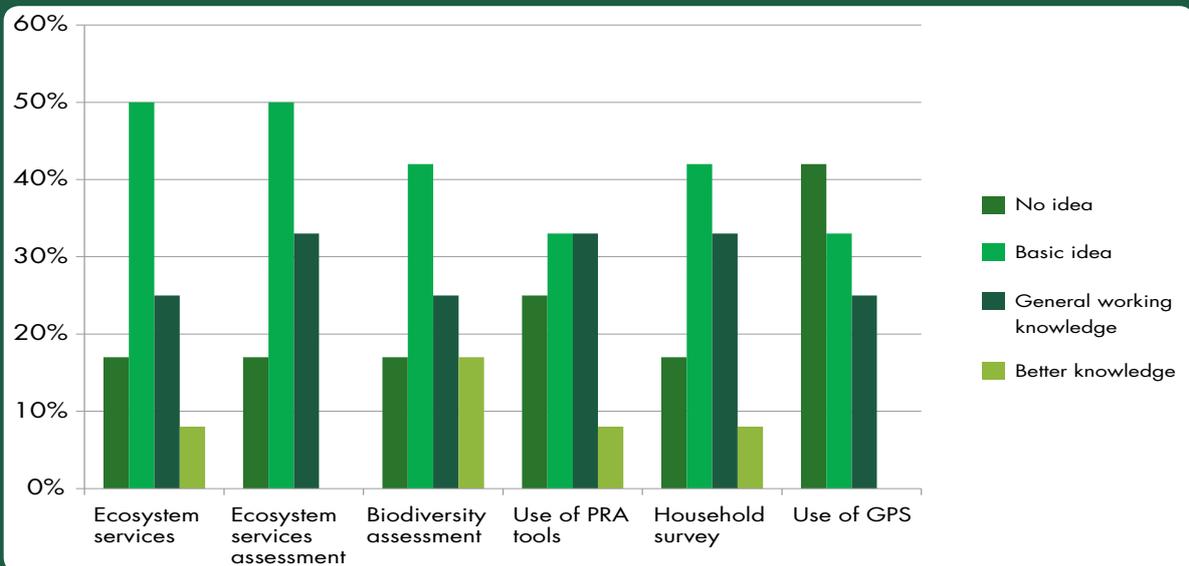
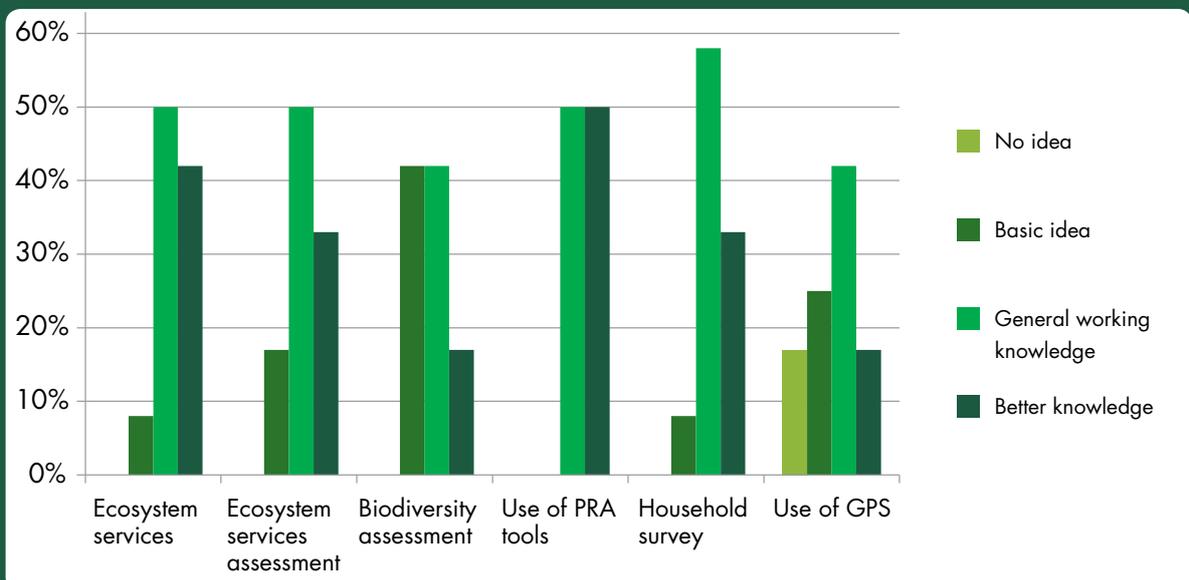


Figure 2: Post-training evaluation results regarding knowledge on different aspects of ecosystem services assessment



Annex 1: Background, training schedule and list of participants

Background

Ecosystem services, as defined by the Millennium Ecosystem Assessment, are “the benefits people obtain from ecosystems” (Millennium Ecosystem Assessment 2005). The services that ecosystems provide are generally classified into four types: provisioning services (food and water), regulating services (regulation of flood, drought, disease), cultural services (recreational, spiritual/religious), and supporting services (soil formation, nutrient cycling). The health of ecosystems and the services provided by them play a crucial role in human survival and wellbeing (Costanza et al. 1997). However, excessive demand for ecosystem services arising from a rapidly increasing human population and several anthropogenic activities have led to the extensive modification of vital ecosystems of the world (Burkhad 2010). This has generated global concern as it undermines ecosystem functioning and resilience and, thus, threatens the ability of ecosystems to continuously supply a flow of services.

The concept of ecosystem services dates back to the mid-1960s to early 1970s. However, the concept only gained widespread attention among scientific and global communities after the release of the Millennium Ecosystem Assessment in 2005. The Millennium Ecosystem Assessment highlighted the importance of ecosystem services to human wellbeing and showed that anthropogenic activities have affected natural processes and diminished the capacity of ecosystems to provide services in the future in many parts of the world. Since the release of the Millennium Ecosystem Assessment, the number of publications on the subject has progressively increased (de Groot et al. 2012). Continuous efforts are being made to integrate the concept of ecosystem services assessment into everyday planning, policies, and decision making. However, it is still a significant challenge to integrate the concept into everyday practice because of various limitations inherent in the prevailing approaches.

Ecosystem services perspective in the Hindu-Kush Himalayas

The Hindu-Kush Himalayas (HKH) spans over 4.3 million square kilometres and includes the whole of Nepal and Bhutan and parts of Afghanistan, Bangladesh, China, India, Myanmar, and Pakistan. The region has been identified as one of the most important conservation priority regions in the world (Brooks et al. 2006). Endowed with rich natural resources, the Himalayan region not only provides shelter to magnificent flora and fauna, but also provides an enormous number of ecosystem services to the people of Asia and beyond (Schild 2008). Approximately 39% of the area of the HKH region is managed as protected areas. Most recent estimates show that the land cover in the HKH region is as follows: 14% forest, 26% agricultural land (including areas with a mixture of natural vegetation), 54% rangeland and scrubland, 1% water bodies, and 5% permanent snow cover (Singh et al. 2011). The Himalayas – the water towers of Asia – are the source of 10 major river systems, which support water supply, food production, biodiversity, and energy generation in the region and beyond. The welfare of around 1.3 billion people in the uplands and downstream lowlands is, thus, inextricably linked with the natural resources found in the HKH. However, these ecosystems, just like other ecosystems in the world, are not exempt from the impacts of anthropogenic activity, including over exploitation and unsustainable use of natural resources due to rapidly human population growth and haphazard infrastructure development. The enhancement of economic development together with the change in population dynamics and gradual land use/cover change are influencing the health of ecosystems and, thus, the quality of the services they provide. Also significantly challenging is the impact of global climate variability and change, which has not only affected the provision of valuable ecosystem services, but also increased the vulnerability of mountain communities to natural disasters.

Nevertheless, despite the multi-dimensional (ecological, socio-cultural, and economic) importance of the ecosystems to human society, there have been no serious efforts to assess the ecosystem services of the HKH region (Rasul et al. 2011). The benefits provided by the ecosystem services are inadequately recognized and resource users do not

take into account the cost of degradation of these services in their resource management decisions. There is also limited understanding of ecosystem dynamics and the value that is being lost through degradation. Furthermore, the knowledge and skills of researchers on the subject matter are inadequate. Thus, there is a need to enhance human and institutional understanding of the state, dynamics, and value of ecosystem services and we are hopeful that this training will contribute to this understanding.

Objectives

The Regional Orientation Training on Ecosystem Services Assessment aims to enhance the capacity of researchers (partners) on: the concepts, principles, tools, and application of ecosystem-based management, approaches, and assessment of ecosystem services.

The specific objectives are to:

- bring about clarity on the concept of ecosystem services assessment and its rational linking to the Himalica programme prior to partner field-level engagement
- enhance the understanding, knowledge, and skills of partners on application of the various tools and techniques that are applied for ecosystem services assessment
- discuss and agree on the household survey questionnaire to be used in the ecosystem services assessment and obtain inputs from the participants
- foster cooperation, partnership, and network at the regional level through cross learning to address issues in relation to ecosystem services and their degradation

Expected outcomes

- enhanced understanding and capacity of partners in relation to the application of ecosystem assessment concepts, tools, and approaches
- agree and finalize household survey research questionnaire to be used for ecosystem assessment in the respective countries.
- ensure the timely delivery of quality report on 'ecosystem services assessment'

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Programme schedule

2 April 2014, Wednesday: Participants arrive from Bhutan, Myanmar and Nepal
 Stay at: View Bhrikuti Hotel, Godavari

Day 1: 3 April 2014, Thursday: Godavari Knowledge Park, Godavari
 Resource persons/ facilitators: Ms Rekha Rasaily and Ms Bhawana Syangden

9:00–9:15	Registration	
9:15–9:30	Participants introduction	All
9.30–9:45	Welcome remarks	Dr Eklabya Sharma Director Programme Operations ICIMOD
9.45–10.00	Opening remarks	Mr Christian Mazal Programme Coordinator, Himalica ICIMOD
10:00–10.30	Management of ecosystems for sustaining services: A HKH perspective:	Dr Gopal Rawat Chief Scientist, ICIMOD
10:30–11:00	Ecosystem services assessment overview, training objectives, structure and expected outputs from orientation training	Dr Nakul Chettri Programme Coordinator, Kanchenjunga Landscape Conservation and Development Initiative, ICIMOD
11:00–11:15	Discussion	
11:15–11.30	<i>Tea break</i>	
11:30–12:00	The principles of household survey: Why and how to extract useful data? (Research ethics and principles of household survey)	Dr Rucha Ghatge Senior Natural Resources Management Governance Specialist, ICIMOD
12:00–12:30	The importance of quantitative data in ecosystem services valuation	Mr Bikash Sharma Senior Environment Economist, ICIMOD
12:30–12:45	Discussion	
12:45–1:30	<i>Lunch</i>	
1:30–2:00	Community based participatory rural appraisal: Concept, opportunities and challenges	Ms Chhing Lamu Sherpa, freelance consultant
2:00–2.20	Use of GPS and GIS	Mr Kabir Uddin GIS and Remote Sensing Analyst, ICIMOD
2:20–2:40	Enumerators' role in effective data collection	Mr Kamal Aryal Natural Resources Management Analyst, ICIMOD
2:40–3:25	Country-level experience sharing on the use of PRA tools and techniques	(15 minute presentations from Bhutan, Myanmar and Nepal)
3:25–3:40	<i>Tea break</i>	
3:40–4:00	Introduction to PRA tools to be used in the field and briefing on field programme	Mr Kamal Aryal Natural Resources Management Analyst, ICIMOD
4:00–4:45	Excursion, Godavari Knowledge Park (transect walk)	All
6: 00–7:30	Reception dinner: Dhokaima Café, Patan Dhoka	

Day 2: 4 April 2014, Friday: Participants travel to Udayapur
(Participants to board ICIMOD arranged vehicle at 7:00am sharp from Hotel View Bhrikuti)

Stay in: Hotel A-one, Gaighat, Udayapur

Day 3: 5 April 2014, Saturday: Field exercise in Udayapur

7:30	Participants depart for field exercise	
9:30–10:00	Introduction and sharing of objectives of field visit and PRA exercise in Dumrithumka	All
10:00–12:00	Field exercise: Resource mapping Focus group discussion Mixed group Women's group	Ms Chhing Lamu Sherpa (freelance consultant) Mr Kamal Aryal, Natural Resources Management Analyst Ms Seema Karki, Research Associate Ms Pratikshya Kandel, Consultant
12:00–1300	<i>Lunch</i>	
13:00–17:00	Field exercise (continued): Institutional mapping Mobility mapping	Ms Chhing Lamu Sherpa (freelance consultant) Mr Kamal Aryal, Natural Resources Management Analyst Ms Seema Karki, Research Associate Ms Pratikshya Kandel, Consultant

Day 4: 6 April 2014, Sunday: Field exercise in Udayapur

8:00–11:00	Field exercise (continued): Pair-wise ranking Seasonal calendar	Ms Chhing Lamu Sherpa (freelance consultant) Mr Kamal Aryal, Natural Resources Management Analyst Ms Seema Karki, Research Associate Ms Pratikshya Kandel, Consultant
11:00–11.45	Sharing of findings with community	Ms Seema Karki, Research Associate, ICIMOD
12:00–13:00	<i>Lunch</i>	
13:00–16:00	Pre-test questionnaire; review and finalize together with partners	All
Day 5: 7 April 2014, Monday: Return to Kathmandu		Participants from Bhutan and Myanmar stay in Hotel Himalaya, Kupondole

Day 6: 8 April 2014 Tuesday: Participants from Bhutan and Myanmar return to their home country

List of participants

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Annex 2: Ecosystem services assessment: A framework for Himalica

Background

Ecosystem services regulate and support natural and human systems through processes such as the cleansing, recycling, and renewal of biological resources, and are crucial for the sustainability of human development in economic, social, cultural and ecological terms (Daily et al. 1997). Human needs have been, and continue to be, satisfied at the expense of altered land use, climate, biogeochemical cycles, etc., raising concerns about the consequences of such changes for ecosystem functioning, the provision of ecosystem services, and human wellbeing (Hooper et al. 2005). Moreover, as the world's population and global economy are growing, the demand for these services and the negative impacts of such demand are likely to increase (Millennium Ecosystem Assessment 2005). As the benefits provided by ecosystem services are neither priced nor marketed, resource users do not take into account the degradation of these services in their resource management decisions (Pant et al. 2012). Such concerns have moved beyond the scientific to the global community with the publication of the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005).

Although the concept of ecosystem services dates back at least to the 1970s, it gained momentum in the scientific literature only in the 1990s and was mainstreamed by the Millennium Ecosystem Assessment in 2005, which distinguished between provisioning, regulating, cultural, and supporting services. The number of publications on the subject has increased exponentially in recent years (Fisher et al. 2009), as well as efforts to put the concept into practice (de Groot et al. 2010). Ecosystems or landscape functions (and services) have become an important concept in policy making, as decision makers have to deal with an explicit demand for landscape services from a broad range of stakeholders. An important feature of the ecosystem service approach arises from the inherent demand for interdisciplinarity that characterize goods and services, in which basic ecological principles have to be taken into account as well as the social and economic aspects that determine environmental management and decision-making processes. However, many issues still remain to be resolved to fully integrate the concept of ecosystem services into everyday landscape planning, management, and decision-making processes due to various limitations in the prevailing approaches (Rasul et al. 2011). In spite of the challenges, there is a growing comprehension of and (economic) competence in ecosystem valuation, as it is crucial to rationalise the importance of ecosystems and landscapes for their sustained ecosystems goods and services (Dasgupta 2010).

The Hindu Kush-Himalayan (HKH) region is endowed with diverse ecosystems and rich biological diversity, which play a critical role in protecting the environment and in providing ecosystem goods and services for much of Asia and beyond (Schild 2008). These ecosystems, like many other ecosystems worldwide, are being degraded by a growing demand for ecosystem goods and services stemming from a burgeoning human population and haphazard infrastructure development, combined with unsustainable use and a poor understanding of the linkages between dynamic ecosystems and their capacity to sustain ecosystem goods and services. The extensive modification of vital ecosystems is affecting natural processes and reducing the capacity of these ecosystems to provide services in the future; however, with the exception of a few empirical studies, there have been no serious efforts to assess the ecosystem services of the HKH region (Rasul et al. 2011).

In keeping with the existing institutional strategy of ICIMOD and the focus of the current Medium Term Action Plan 2013–2017, the Ecosystem thematic area, with support from the Economic Analysis Division, is leading the Ecosystem Services element of the European Union funded project 'Himalica – Support to Rural Livelihoods and Climate Change Adaptation in the Himalayas'. As per the objectives of the programme document, the 'Ecosystem Services' element will focus on: analysing two ecosystems and developing five knowledge products on ecosystem services. To comply with the assigned task, the following framework has been designed for applied research, considering the expected outcome of the project document and the evolving science on the subject.

Overall goal

The overall goal of this concept note is to assist the Himalica project to achieve the targets for the next five years and execute project activities as envisaged in the project document.

Specific objectives

The specific objectives of the initiative are to:

- develop a research framework and methodology applicable in the Hindu Kush Himalayas to assess the ecosystems services of potential project areas or landscapes
- identify and assess two ecosystems from the study areas and prepare technical reports and knowledge products
- mainstream ecosystem services knowledge products into partners' planning and development strategies

Expected outcomes

The two major outcomes expected from the initiative are:

- stakeholders are enabled to plan and mainstream ecosystems services management with sound knowledge products using an ecosystem approach
- the gap in the need for an appropriate and integrated research framework and methodology crises faced by many resources management practitioners in the region is filled

Activities

To achieve the two major outcomes, the following types of activities will be undertaken:

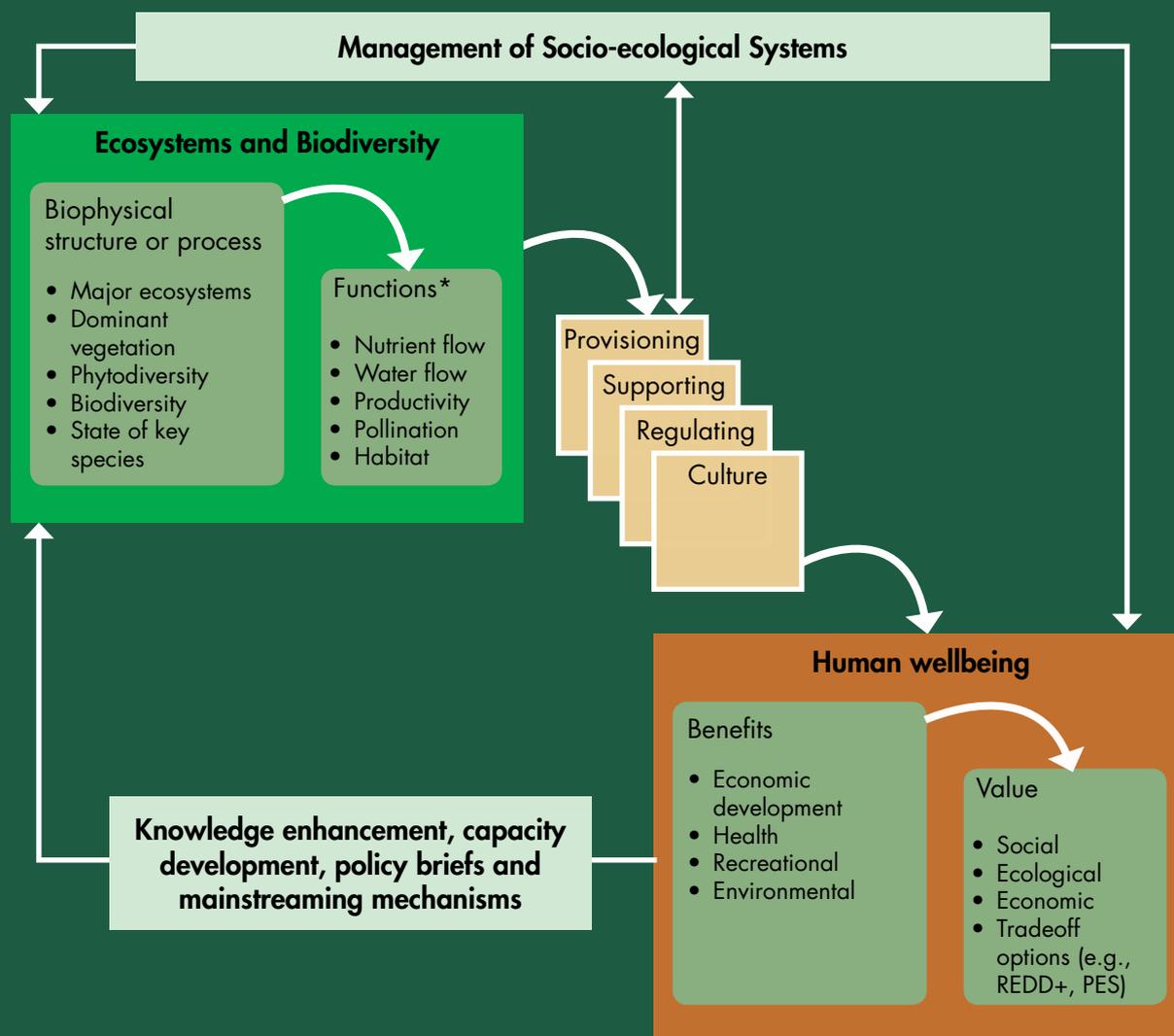
- develop a multidisciplinary team within ICIMOD and develop a research plan
- review the literature on the subject, identify ecosystems for comparison, and design methodologies
- organise capacity building training and workshops and train identified partners on the research design and methodology
- gather data through partners based on letters of agreement and analyse data
- prepare technical reports and knowledge products as per the project documents
- share and follow up to mainstream the knowledge into partners' conservation and development activities

Research framework

The team assigned to this task will use the 'Ecosystem Services Cascade' Framework (Figure 1A) (de Groot et al. 2010; Müller et al. 2010). This research framework was chosen because it enables the team to rationalise the importance and significance of ecosystem services to human wellbeing. The framework tries to compartmentalise the elements that are necessary for any systematic ecosystems services assessment, but could be readjusted based on the need and requirements of the study area. It allows the prioritization of, and focus on, elements of each of the compartments, namely, ecosystems and biodiversity, ecosystem services, and human wellbeing, and considers the elements of each of the compartments with the logical linkages necessary for developing linkages between the ecosystem services and human wellbeing (Figure 1A). The framework also enables us to understand the state of ecosystem services, dynamics of such services in a given study area, and links with people's dependency to strengthen the decision-making process. The anticipated work from the Ecosystem thematic area would also focus on the information and knowledge flow back (depicted by the shaded line in Figure 1A) as part of the impact pathway, which conventional ecosystem assessment practices have not considered as a cyclic or virtual process.

Two main types of indicators are envisaged to be vital in the research design for ecosystems services in the present study: state indicators describing what ecosystem structure, processes, and functions are providing the service and how much (e.g., people's dependency), and performance indicators describing how much of the service can potentially be used in a sustainable way (e.g., resource availability). As the knowledge of ecosystem services is to be linked with human wellbeing, the importance ('value') of ecosystems and their services can be considered within three value domains, namely, ecological, socio-cultural, and economic. The ecological value encompasses the state of health of a system (and not necessarily in economic terms) measured with ecological indicators such as diversity and integrity (and

Figure 1a: A research framework for ecosystem assessment linking to impact pathways



Source: Modified from de Groot et al. 2010 and Müller et al. 2010

trend and projection if applicable), while socio-cultural values include the importance of services to the people in terms of their culture and traditions, for example, the cultural identity and practices that are related to the use of ecosystem services (Raymond et al. 2009). Apart from these, the conventional economic valuation methodologies suggested by Rasul et al. (2011) and contemporary tools such as remote sensing, geographic information system, and modelling will also be used to understand the state and dynamics of ecosystems services, analysed in relation to their ecosystems.

To address the indicators for ecosystem structure, process, function, and quantity, a number of set questioned have been adopted from global frameworks (de Groot 2010) and prioritized as per the requirements for this action regional landscape programme and the thematic paper developed for ecosystem services (see Box 1).

Box 1 : Research questions to better integrate ecosystem services in ecosystem/landscape planning, management and decision-making

Understanding and quantifying the state of ecosystems and their goods and services

- What are the major ecosystems found in the study area and what are their status?
- What are the major ecosystem services provided by these ecosystems?
- What is the state of ecosystem services in the given study area?
- How can these ecosystems and the services provided by them be spatially mapped and show changes?
- What is the effect of (changes in) dynamic conditions (temporal and spatial) of ecosystem change on services?

Valuing ecosystem services

- What are the most important ecosystem services contributing to the economic wellbeing of the communities?
- Are there any species or ecosystems that are socio-culturally valuable?
- What are the ecologically significant species or ecosystems?
- How can values (ecological, social, and economic) be mapped to facilitate the use of ecosystem services in (spatial) landscape planning and design?

Use of ecosystem services in planning and management

- How can learning and outputs from the experimental research be mainstreamed into policy and practices on ecosystem planning, design and management?
- What could be the strategic measures to balance ecosystem management with rural livelihoods improvement so as to sustainably supply ecosystem goods and services through a participatory approach?

Methodologies and approaches anticipated for the research

The framework is an integrated approach under which multidisciplinary teamwork is inevitable. We firmly believe that the ecosystem services assessment of Himalica has to be integrated with other components and be conducted by a transdisciplinary team. To focus on the ecosystem services, we envisaged using the following broad methodology and approaches:

- Participatory rural appraisal tools: Resource mapping, mobility maps for resource/service use; historical timelines; stakeholder analysis; institutional mapping; seasonal calendar; pair-wise ranking, focus group discussions, and transect walks, etc.
- Household survey: A household questionnaire (see Annex 3) has been developed and field-tested considering various aspects and expertise. Expert inputs in terms of economic valuation are anticipated from the Economic Analysis Division at ICIMOD.
- Geospatial tools: Remote sensing and GIS, niche modelling, and habitat suitability will be used on some of the key elements of the ecosystems.

Institutional framework and partners

This component of the Himalica project will be implemented within the ICIMOD's Strategic Framework and Medium Term Action Plan 2013–2017 by professionals from the Ecosystem Services Thematic Area and Economic Analysis Division, in close collaboration with the Livelihood Regional Programme and project coordinator. The team will work closely with representatives of national stakeholders from ICIMOD's regional member countries for the identified project areas, including conservation and development organizations and community-based organizations. The executing partners will be identified based on the criteria set by the project documents and in consultation with other component leaders for complementarity.

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Literature where framework has been used by ICIMOD

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Annex 3: Household survey questionnaire: Community assessment of ecosystem services

Namaste, we are conducting an ecosystem services assessment survey in your community. The purpose is to assess the status of ecosystems and their services and we request you to take part in this household survey. If you agree to take part in the survey, we would like to ask you some questions, which will take around an hour. Your answers should be completely your views and perceptions; there is no right or wrong answer as such. The information, opinions, and knowledge you provide will help us to come up with a detail assessment of the ecosystem services in this community. We will ensure that your responses will remain completely anonymous and only the aggregate results will be published in the report and in papers.

Would you like to take part in this interview? Yes No

If the respondent decides not to take part in the interview, please thank the respondent in a polite way then proceed to the next household.

Thank you

Study Team: ICIMOD, Bird Conservation Nepal and Nabaprabhat (for Nepal)

Study Team: ICIMOD, Partners from Bhutan

Study Team: ICIMOD, Partners from Myanmar

1. Basic Information

a	Date (dd/mm/yy):		g	Name of respondent:	
b	Name of interviewer:		h	Sex	1 <input type="checkbox"/> Male 2 <input type="checkbox"/> Female
c	Name of country, state/ province/district		i	Age:	
d	Village:		j	Caste / tribe:	
e	Ward:		k	Contact number:	
	Household code				
f	GPS data:	Latitude:	Longitude:		Altitude:

2. Demographic Information

Please use the following codes: * 0 = Male; 1 = Female

** Marital status: 0 = Single; 1 = Married; 2 = Divorced/widowed

*** 0= No; 1= Yes

**** 1 = Farming; 2 = Household activity; 3 = Wage labour; 4 = Small business (specify); 5= Salaried employee;
6 = Studying; 7 = Remittances; 8 = Infant;

0 = Other (specify)

No.	Name of household members	Age (years)	Sex*	Marital status**	Can read and write***	If yes, level of education (years of schooling)	Occupation/main activity****	
							1st	2nd
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								

Note: Start with household head first, then spouse and other members in that order

3. Does your household have access to any agricultural land? 0 No 1 Yes

3.1 If yes, provide the following information:

Land type	Total area (in local unit)					Remarks
	Total owned	Self cultivated	Uncultivated	Rented in	Rented out	
Irrigated terraces						
Rainfed terraces						
Other (koriya, private forest)						

4. What are the major crops grown, their area coverage, cost of cultivation and gross return?

Major crops	Area under crop (in local unit)	Cost of cultivation* (in local currency)	Gross return (in local currency) (home consumption and sale)	Quantity produced	Unit price

*Cost of cultivation: Labour (person) days and other costs (seed, fertilizer, pesticides, etc.)

5. Does your household have any livestock?

0 No 1 Yes

5.1 If yes (Please use given codes: * 1= Stall feeding, 2= Grazing, 3= Both

Type	Present number	Number in the past 5 yrs	Way of feeding*	Average Income from animal and animal products/annum (in NPR)	Remarks
Sheep					
Goat					
Cow/bull					
Buffalo					
Donkey/mule					
Pig					
Poultry					
Other (please specify):					

6. How much money (cash income in local currency) gross does your household earn per year? Please tick one of the following:

- Less than 20,000
- Between 21,000–49,000
- Between 50,000–99,000
- More than 100,000

7. What are the major sources of drinking water? And volume collected/used

Sources of water	
Piped water	
Stream /river	
Spring	
Bore hole/well	
Pond/dam	
Wetland	
Lake	
Other (please specify)	

8. State of ecosystems and services

What are the major ecosystems/land uses in terms of coverage in the study area and how important are they in providing ecosystem goods and services?

(Please use given codes: 4 = very important, 3 = important, 2 = moderately important, 1 = less important, 0 = not important 4= highly dependent, 3= dependent, 2= moderately dependent, 1= less dependent, 0 = not dependent)

Major ecosystems	Rank in terms of their importance in providing services	Rank in terms of the dependency on the services	Remarks/reasons
Forest			
Agriculture land			
Grassland/rangeland			
Shrubland			
Freshwater (river/stream)			
Wetland			
Settlements			
Degraded or bare land			
Other (please specify)			

9. Has there been any change in these ecosystems/ land use in terms of their area over the last 10 years?

(*Please use given codes: 0= No change; 1= Increasing; 2= Decreasing, 3= No idea)

Major ecosystems	Change*	Reasons for change (change in hectare)
Forest		
Agriculture land		
Grassland/rangeland		
Shrubland		
Freshwater (river/stream)		
Wetland		
Settlements		
Degraded or bare land		
Other (please specify)		

10. Information on ecosystem services, sources and their status

What are the major ecosystem services provided by these ecosystems?

(Please use the following code: 0= No; 1= Yes)

Ecosystem services (provisioning)	Major ecosystems								Remarks
	Forest	Agriculture	Grassland	Shrubland	Freshwater	Settlement	Degraded land	Other	
Fuelwood									
Fodder									
Grazing									
Timber/poles									
Leaf litter									
Medicinal plants									
Ornamental plants									
Wild edible fruits and vegetables									
Mushrooms									
Fibre									
Thatch									
Bush meat									
Dyes									
Paddy									
Cereals									
Vegetables									
Fish									
Drinking water									
Water for bathing									
Water for irrigation									
Boulders									
Sand									
Other (please specify)									

11. What are the major ecosystems services provided by these ecosystems?

(Please use the following code: 0= No; 1= Yes)

Ecosystem Services (regulating)	Major ecosystems								Remarks
	Forest	Agriculture	Grassland	Shrubland	Freshwater	Settlement	Degraded land	Other	
Carbon sequestration									
Climate regulation									
Erosion/flood control									
Groundwater recharge									
Nutrient enrichment									
Pest regulation									
Pollination									
Seed dispersal									
Soil fertility									
Soil formation									
Soil stability									
Waste treatment									
Water purification									
Water retention									
Other (please specify)									

12. What are the major ecosystems services provided by these ecosystems?

(Please use the following code: 0= No; 1= Yes)

Ecosystem services (supporting)	Major ecosystems								Remarks
	Forest	Agriculture	Grassland	Shrubland	Freshwater	Settlement	Degraded land	Other	
Ecosystem resilience									
Habitat for species									
Hydrologic cycle									
Soil formation									
Other (specify)									

13. What are the major ecosystems services provided by these ecosystems?

(Please use the following code: 0= No; 1= Yes)

Ecosystem services (cultural)	Major ecosystems								Remarks
	Forest	Agriculture	Grassland	Shrubland	Freshwater	Settlement	Degraded land	Other	
Aesthetic beauty									
Ecotourism									
Education and research									
Recreation									
Nature worship									
Spiritual enrichment									
Other (please specify)									

14. Information on ecosystems services use and market values

What are the five most important provisional services contributing to economic wellbeing of your household?

(Please use the following code:

*Collected by: 0= Male; 1=Female; 2= Both

**Frequency: 1 = daily; 2 = weekly; 3 = monthly; 4 = once in 6 months; 5 = once in a year

Services	Mainly collected by*	Frequency**	Quantity in local unit	Season	Time required (hours)	Remarks

15. Estimating value using local people's willingness to pay for key ecosystem function and services

Let us assume your ecosystems are fully managed by a committee of people from your community to ensure that there will be assured/improved provision of ecosystem services such as fuelwood, fodder, water, etc. to your community and you would like to use the services from the system. In that case, are you willing to pay either in cash or kind (i.e., labour days contribution per year) for the services you use? This will help the committee to operate/maintain healthy ecosystem. We would like you to answer these questions at your ease; there is no wrong or right answer.

(* , **: Please use the following code: 0= No; 1= Yes; 2= Don't know)

15.1 If you do not want to pay, what is/are the reason/(s)?

- I do not think it is important to preserve the ecosystems .
- These are the free resources from the nature, so why should I pay?
- I cannot afford to give money to preserve the ecosystems .
- Preserving ecosystems has value to me, but it is not for me to finance preservation.
- Other (please specify)

15.2 If you want to pay/contribute, why did you decide to make a maximum NPR _____ per year (in kind or cash)?

- This is the value that I attribute to the particular ecosystem service.
- This is the maximum amount that I can afford to give.
- This is the amount I normally pays for good causes.
- I chose this amount randomly.
- Other (please specify)

16. Who do you think should manage the funds generated for managing the healthy ecosystem?

- a) Local community
- b) Government
- c) User committee
- d) VDC
- e) Other (please specify)

17. Information on ecosystems services and their socio-cultural and ecological values

Note: Socially important (important for subsistence livelihood); culturally important (important in tradition and culture such as sacred plant, animal, river, sacred groves); ecologically important (species or ecosystems that people think important for ecological balance and resilience)

17.1 Are there any species that are socio-culturally and ecologically valuable?

(Please use the codes: 4 = very important, 3 = important, 2 = moderately important, 1 = less important, 0 = not important)

Plant species	Socially important	Culturally important	Ecologically important	Indicate the reason
Animal species				
Ecosystem				
Sacred site				
Other				

18. Vulnerability context

18.1 Crisis, shocks, security

18.1.1 Number of months per year in which the household can live from **own food** production:
 < 3 months 4–6 months 7–9 months 10–12 months > 12 months

18.2 Most difficult months to provide adequate food for the household:

1 JAN 2 FEB 3 MAR 4 APR 5 MAY 6 JUN
 7 JUL 8 AUG 9 SEP 10 OCT 11 NOV 12 DEC

18.3 What kind of crises have you experienced during the past 12 months and how did you cope with these crises?

(Please use the codes: 0 = no problem, 1 =Minor problem, 2 = Major problem;

1 = Taking loan 2 = Grain loan from kin 3 = Adjusted meals 4 = Cash or cereal loan from merchants
 5 = Farmland mortgaged 6 = Farmland leased out 7 = Sold household assets 8 = Sold animals
 9 = Sold jewellery 10 = Sold farmland 11 = Occupation change 12 = Temporary labour migration
 13 = Permanent labour migration 14 = Begging 15 = Free support by any organization;
 16 = Free support by family / kin / neighbours / community; 77 = Other (please specify)

	Crisis	Problem *	Coping strategy	Remarks
a.	Poor production (please specify):			
b.	Shortage of food			
c.	Illness/accident of a household-member			
d.	Death of a household-member			
e.	Arrest of a household-member			
f.	Loss of job			

g.	Irregular remittances			
h.	Market fluctuation/inflation			
i.	Loss of land			
j.	Loss of livestock			
k.	Damage (please specify):			
l.	Degradation of natural ecosystem			
m.	Political crisis/insecurity (please specify):			
n.	Other (please specify):			

19. Long-term changes

Considering the last ten years – what has changed in regard to: (Please use the codes: 0 = No change; 1 = Improved/ increased/ better/ higher; 2 =Worsened/ declined/ smaller/ lower)

	Area	Quality of change	Remarks
a	Frequency of illness		
b	Health facilities		
c	Purchasing power		
d	Possibilities to generate income (locally)		
e	Possibilities to generate income (remittances)		
f	School facilities		
g	Quality of public services		
h	Access to forest		
i	Forest cover		
j	Soil fertility		
k	Food security		
l	Veterinary facilities		
m	Family size		
n	Security		
o	Communication, access to relevant information		
p	Transportation		
q	Access to credit		
r	Water availability		
s	Water quality		
t	Irrigation facilities		
u	Participation in decision-making		
v	Other (please specify)		

20. General

20.1 Has the livelihood of your household improved through ecosystem management compared to the situation 10 years ago? 0 No 1 Yes

20.2 What would be most helpful to improve the livelihood of your household?

Possibility to come back in order to clarify some points: 0 No 1 Yes

Thank you for valuable your time!

The End

Annex 4: PRA tools and techniques for regional orientation training

Participatory rural appraisal and its significance

Social researchers have developed various information collection techniques and methodologies for carry out their studies. 'Participatory rural appraisal' (PRA) is one such methodology. PRA was initially developed in the 1950s as 'rapid rural appraisal' (RRA) to ascertain the knowledge of a community on a particular topic in a short period of time. PRA developed further in the late 1970s and early 1980s and aims to engage and enable local communities to assess situations, identify opportunities and problems, develop a common understanding of the environmental situation among right holders and barriers to further analysis, and as a tool for planning and resources management (Mukherjee 1998) describes PRA as:

...a methodology for interacting with villagers, understanding them and learning from them. It involves sets of principles, a process of communication and a menu of methods for seeking villagers' participation in putting forward their points of view about any issue and enabling them to do their own analysis with a view to make use of such learning. It initiates a participatory process and sustains it. Its principles and the menu of methods help in organizing participation.

Because it is a collaborative process that actively empowers local people, de-emphasizes hierarchies, and helps to identify resource needs and sustainable use systems, Robert Chamber (Chambers 1994) describes facilitators as "handing over the stick" to communities, resulting in a high level of validity and reliability of information shared by local people through PRA, compared to data from other more traditional methods. He further explains the reversal and shifts of emphasis from closed to open, individual to group, verbal to visual, measuring to comparing, and extracting information to empowering local analysts. PRA emphasizes local community engagement in the assessment, monitoring, and planning of natural resources management through shared information and knowledge on the availability of existing resources, their utility, demand versus supply, and constraints. In addition, it is also said that participation recognizes the diversity of people found in all kinds of communities.

Nepal has been using PRA methodology since the 1990s. The use of PRA was further expanded after the establishment of the Nepal Participatory Action Network (NEPAN) in 1994 and its legal registration in 1995. The participatory approach is not only about tools, it is about avoiding the biased views of outsiders and creating a progressive learning environment with the use of local materials and local indicators, along with information triangulation.

Ecosystem services are essential for human wellbeing, but the links between ecosystem services and human wellbeing are complex, diverse, context-dependent, and complicated by the need to consider different spatial and temporal scales to assess them properly (Pereira, Queiroz et al. 2005). PRA approaches are used as one of the methodologies to assess ecosystem services. The benefits of using PRA in this context are:

- The main significance the PRA methodology is the high level of community participation, the duration of the method, and its low cost.
-
- PRA develops a sense of responsibility, transparency, and accountability and builds the foundation of community-based facts leading towards sustainability.
-
- PRA helps to mobilize local communities and realize the root causes of existing issues interdependent to natural resources.
- PRA can play a decisive role in building self-esteem among local people by systematizing and reassessing local experience and knowledge and by encouraging excluded people to take part and lead toward problem solving, which is undertaken as a joint action to be performed for an accountable and good governance system.

- The level of skill and understanding of participatory approaches and the PRA process among researchers and facilitators will play major role in the effectiveness of the PRA methodology. At the same time, the participatory attitude and behaviour of the community plays a vital role in making right holders identify their own issues.
- PRA is a significant way of empowering marginalized people for their own resource management and holistic development, self-action, and ownership, as well as for sustainable development.

Major challenges involved in PRA

- Community people's participation is higher when they are informed about the purpose of the interaction in advance.
- Community people, especially women, may not always be able to afford the time to join interactions and discussions because of their high level of involvement in household activities.
- Local elites might interfere in the process and overly influence discussions unless the facilitator handles the situation effectively.

Facilitator's role before, during, and after PRA exercise

The facilitator, while conducting, rapporteuring, analysing, and writing the PRA report, should know about participatory approaches and their tools for better understanding, linkages, and interpretation of the information accessed. It is important for there to be mutual respect between the facilitator and community, a learning attitude, and shared leadership among the facilitator and participants. The following should be kept in mind during the different stages of PRA.

Before PRA

- Identify the objectives of conducting PRA.
- Select the study site where the PRA is to be conducted.
- Identify the PRA tools to be exercised in field (ask who, what, where, when, why and how they meet the objectives of the study).
- Plan a meeting and discussion among the multi-disciplinary team from the local community (stakeholders).
- Prepare a checklist of stationery required for the particular PRA tools selected (utilise locally available materials where possible).
- Inform the community in advance and finalise the meeting location in consultation with local community. The meeting location needs to be at an accessible point so that community people can participate and could be a central public place such as a school area or place where communities feel at ease to share their ideas and information.
- A night halt in the village may be required in order to learn from the community in an informal setting. Hence, plan for necessary personal items to adjust to any circumstance.
- Make sure all of the members of the community are informed and reach the venue on time. The facilitator should plan to arrive at the venue before the community people arrive.

During PRA

- Arrive at the agreed venue before the community arrives and make sure that seating is arranged on the same level to ensure eye-to-eye contact and an effective discussion.
- Introduce team members briefly (name, where each one comes from) and ask the names of the community members and, identify if some are associated with a group or organization and which group they belong to, but avoid getting into too much detail.
- Explain the objective or purpose of the meeting and the visit along with the process and explain the tentative time schedule for the exercises.
- Encourage the community to start from what they know, but keep to the main objectives and involve all participants, including those who are quiet and stay in the background.
- Use the floor and local materials as much as possible (stone, sticks, mud, leaves, etc.)
- It is important to involve all of the community and, while making maps, make sure that no one person (or local

elites) takes over the discussion or overly influences the process.

- Use open-ended questions and avoid closed questions; reframe the question if a participant does not understand.
- Make sure that one of the facilitators keeps notes and cross verify important information. Use A4 sized paper for official use and big chart paper to hand over to the community at the end of the village stay.
- Thank all of the participants for their involvement and fix the time, date, and venue for the next meeting.
- Share the initial findings with the community for triangulation before leaving the village.

After PRA

- Share a summary of the findings, learning, and challenges to the participants.
- Document the findings with team members and conduct analysis as soon as possible. Share the findings and analysis among the participants for further input for the final report.
- Provide a copy of the findings in local language to the community members.
- Coordinate with any other organisations or institutions that assess ecosystems or other development services through PRA in the field for future livelihood planning and programmes so that people's time and energy are not wasted.
- Encourage participatory implementation and monitoring and evaluation in the whole project cycle so that local communities are better able to manage ecosystem services in the future.

PRA tools and techniques

There are many PRA tools and techniques that can be used to assess ecosystem services. It is suggested that all individual participants add further information and create new tools as per their need. This section provides a brief introduction and information to some of the tools, which will be helpful to the team members before the field exercises.

Resource mapping

Introduction

A community resource map is a tool that helps outsiders to learn about a community and its resource-based information. It also helps the community to realise the potential of their natural resource system and its access and control system. Participatory mapping techniques involve community people in locating the natural resources that are important in their local area on the map. Mapping is generally done on the ground using various objects to symbolised different resources and landmarks.

Objective

The objective of the resource map is to learn the community's perspective on what natural resources are found in the area and their status, as well as how these resources are being used.

Significance

The resource map depicts water sources (streams, ponds, lakes), forests (trees, NTFPs), secret shrines, minerals, and major manmade landmark (roads, settlements, schools, health posts, religious sites). It is used to determine what natural resources are available in the particular site; how the community have been benefiting from these resources in economic, health, and environment terms; what conservation and protection practices there are for future sustainability; and who is using the resources and for what purpose, among other things All available natural resource can be shown on one resource map, which will create an environment for excluded people to assert ownership over and use community resources. However, different sectoral resource maps can be developed based on need and the focus of the PRA exercise. Similarly, the map can also show the access to local resources by different groups of users to understand equity to raise awareness among the community.

The resource map provides a rapid visual representation of the resource system available to the community in the local area, which is useful for both community people and outsiders. The map supports further analysis of the management area and exploration of the possibility of integration of new interventions into the management plan.

Example of a resource map



Figure 4a: Khar VDC resource map

Steps to be followed

A resource map can be developed using a similar method to that for making a social map, with the involvement of men, women, senior citizens, children, people with disabilities, and others from the community in the target area. The following steps should be followed:

- Briefly explain the purpose(s) of making the map, the process and discuss the legend that will be used to prepare the community for the mapping activity.
- Encourage participants to start by putting objects on the floor to depict different resources or landmarks, based on whoever has the knowledge, but making sure that all community members have an opportunity to participate.
- Follow the basic steps and principles of PRA to ensure the active participation of all segments of the community.
- If the map is prepared on the floor, copy the map in the paper and discuss with participants whether some information is missed out in the resource map.
- While creating the map, analyse, evaluate, and crosscheck information on the map.
- Communicate the mapping information to participants on the spot, share with other concerned stakeholders, and link outcomes of the mapping exercise to broader planning activities.

Tips for the facilitator

- Pre-planning is important; make sure the roles of the note taker or rapporteur, facilitator who will lead the discussion, observer, and overall manager are clear to make the exercise go smoothly.
- Use moveable objects when you prepare the map (stones, leaves, etc.)
- Maps should be prepared in an open place where people can see clearly the map and focus on common objectives and common issues.

Focus group discussion

Introduction

The focus group discussion should cover specific issues with people from specific target groups to learn more about their opinions on these issues. The discussion should be conducted in small groups of 7 to 12 people grouped according to their profession, education, age group, and sex, or based on a wellbeing ranking or social status. It is important to brief the participants of the focus group discussion about the objectives and the subject of the discussion. Focus group discussions are a very effective tool for obtaining in-depth knowledge on specific issues.

Objective

The objective of the focus group discussion is to gather in-depth information from a small and specific group of people on a topic of particular interest.

Significance

It is not possible to gather all information through one PRA tool. The focus group discussion technique can help to gather additional and in-depth information, which other tools may not provide. It is also good for triangulating information previously gathered. Some community members may not feel comfortable providing their views in a large group (women, people from certain social groups); the technique is also suited to extracting information from those who are generally shy in large group.

Example of a focus group discussion



Figure 4b: Participants in a focus group discussion

Steps to be followed

- Focus group discussion participants should be informed in advance of the discussion subject, time, and venue.
- The facilitator should prepare a checklist to help the team conduct a smooth discussion.
- After the people have arrived, greet them and thank them for coming, introduce your team members, and ask the participants to briefly introduce themselves.
- Explain the purpose of the focus group discussion, the brief methodology, and time required.
- Create a relaxed environment through a suitable brain storming game, story, or joke and encourage members to contribute while respecting each other's points of view.
- Ask the group to suggest some ground rules and make sure that these include the following points.
 - Everyone should participate.
 - Stay with the group and do not engage in side conversations
 - Feel free to move around
 - Turn off cell phones if possible
- When the facilitator's list of questions has been dealt with, ask if anyone else has any comments or questions.
- Summarize your general understanding of what the participants' said and share it with the participants to make sure that you have understood correctly.
- Thank the participants and share the time, date, and venue for the next meeting.

Tips for the facilitator

- Same-level seating is important for eye contact and an effective discussion.
- Try to complete the focus group discussion within an hour and discuss one or two issues; do not put pressure on participants
- Discuss one issue at a time. Do not start another topic unless you have clearly finished with the previous topic.
- The facilitator should summarise the findings of the discussion and share it with the participants for further consensus and input.
- The note taker should prepare a written summary of the focus group discussion and share the findings with the team of facilitators for mutual understanding and further planning.

Institutional diagram

Introduction

Every society has influential people and organizations and they have their own identity, importance, and power relations. The institutional diagram, also called a 'chapati' diagram, gives us an idea about the relationships among and between the various organisations and their shared responsibility for resource management. The power and priorities of different stakeholders (organisations) will differ widely based on their interests and involvement. Furthermore, the degree of power to control decisions also differs between stakeholders. It is important to understand who has more interest and gives more importance to the management of local natural resources.

Objective

The objective of the institutional diagram is to identify existing organizations and their roles and relationships with other organisation so that they can be consulted and involved in further stages of ecosystem services management in the area.

Significance

This tool helps to identify the various organisations and their roles and responsibilities, as well as their relationships with the community people in resources management. The institutional diagram provides information for future planning, especially on how to involve the different organizations in the partnership process of the programme. Determining who needs to be involved and when and how that involvement can be achieved is important, as it provides a basis for collaboration between and among various organizations.

Example of an institutional diagram

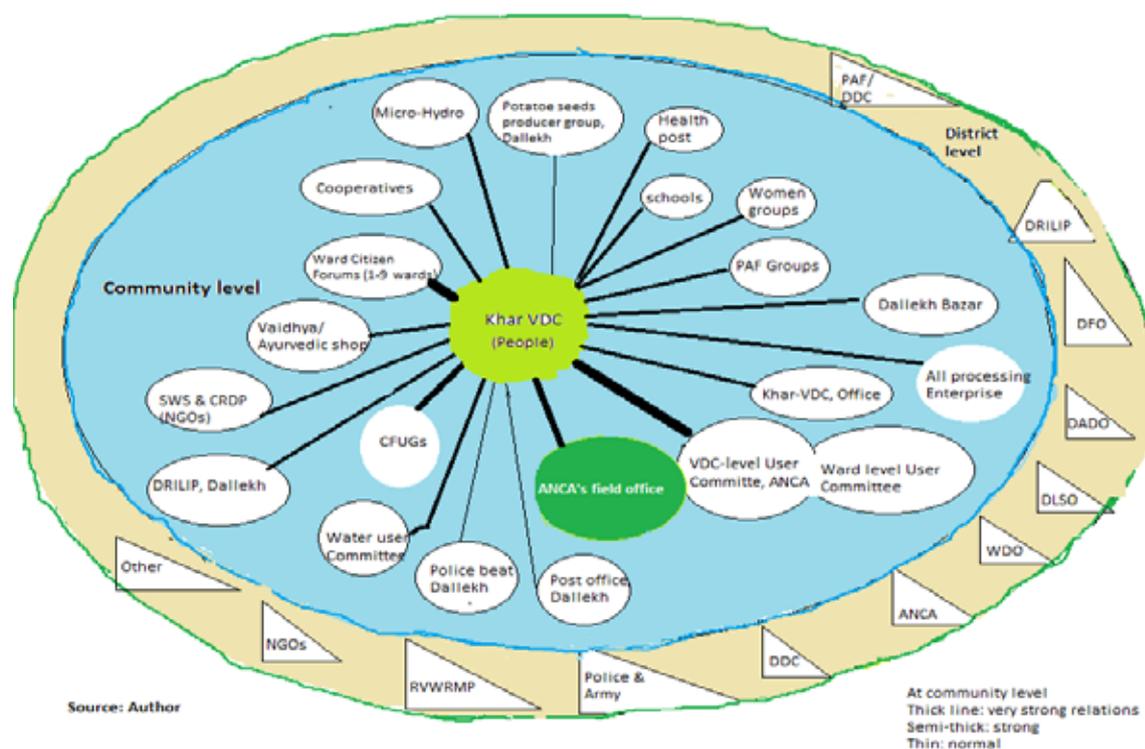
Figure 4c: **Types of institutions and linkages in an institutional diagram**

Figure 4A shows that the people in Khar VDC are associated with a number of institutions with different degrees of relationships at the local and district level. While these institution's relationships are strong with community-based institutions, they are relatively weak with district-level state and non-state actors. The presence of sectoral line agencies is sporadic, despite the fact that Khar VDC is one of the closest to the district headquarters. At the community level, people have membership in various community-based natural resource management institutions, such as community forest users groups, the Apinampa Users Committee at the VDC and ward level, water user committees, all enterprise, school committees, micro-hydro committees, ward citizen forums, and potato seed producer groups, among others.

Steps to be followed

- Pre-plan the materials that will be needed along with the role division among team member.
- Reach the location of the exercise on time.
- Follow the basic guidelines for the PRA process, as mentioned before, and, if involving the community in PRA for the first time, start the discussion with a brief introduction.
- Explain the purpose of the institutional diagram and obtain agreement from participants to give an honest assessment of local institutions based on their knowledge and experience, not affiliation or personal interest.
- List all available government institutions, NGOs, INGO, and local groups. When you are listing the organizations it is important to mark with a different colour those that are working in the protection and promotion of the environment or ecosystem services.
- Provide participants with round paper and other necessary materials and ask them to draw a big circle for those organisations working in the environment and ecosystem services.
- Ask each institution's role in the promotion and development of ecosystem services.
- Once the participants have identified all institutions with their roles and relationships, assist them to allocate closely or show by way of an arrow if these institutions have a strong relationship and good communication with other organisations. Identify the resources of different groups and institutions and how they are used in the management and promotion of ecosystem services.
- Summarise the findings and share them with the participants for further consensus and input.
- The note taker should prepare a summary of the findings and share it with the rest of the team members for common understanding and further planning.

Tips for the facilitator

- Use local materials as much as possible; however, it is advisable to have three different coloured markers to draw the different circles.
- Start by asking questions about the community or individual participant's concerns to create an environment that is conducive to discussion.
- As people are working, the facilitator should check to make sure that they have understood the task, because sometimes people will draw a big circle for an institution if their representatives or relatives are involved in that institution. The participants should be encouraged to focus on the environmental and ecosystem aspects the work of institutions.
- The note taker should document all discussions, as the institutional diagram can't show all information.
- The facilitator should share a summary of the findings and thank all participants.
- The note taker should prepare a written summary of the findings with a copy of the diagram in A4 size for documentation and understanding among the team members.

Mobility map

Introduction

A mobility map is a tool for obtaining information on the movement of women and men in the community and the purposes of such movement. The movement of the community to fulfil their needs – where people go to collect NTFPs, timber, fodder, and firewood; to access markets to buy and sell natural resources; to access education and health services; and where they go for employment – is depicted on a map. The map also allows a comparison of past and present situation. Segregated information can be examined by mapping information according to sex, ethnic group, and economic categories of people on the move for the same purpose. For example, the map can show where men, women, and youth of a particular village go for economic activities, health, and education. It can also show how families and the community perceive the positive and negative impacts of this movement. The mobility map also reveals the status of women and girls, who may not be able to move far or without the permission of a male family member.

Objective

The objective of the mobility map is to identify community movement, including access and control systems for services, in a particular community for use in programme planning.

Significance

A mobility map is a way of understanding the decision-making capacity of community members and their relationship with outsiders (organisations or individuals). A mobility map can help analyse power, access, control, and discrimination patterns among men, women, girls, and boys. The map can show changes and help identify how, where, and why people in a community move for particular reasons, as well as the challenges that men and women face in such movement. The mobility map also reveals social relations and how people can benefit or lose from particular movement. The map can be used to generate ideas for future planning.

Steps to be followed

- Follow the same process as for other PRA exercises regarding preparation, creation of a conducive environment, introduction, and so forth.
- Explain the objective of the mobility map exercise and the process.
- Identify and select the ecosystem services and list them to be used for preparation of mobility map.
- Encourage the community to draw where people move on the ground using a stick, mud, or chalk, or using a big chart if the environment does not allow drawing on the ground.
- Identify where people go and for what purpose before asking why.
- Ask open-ended questions one at a time and make sure participants are given equal opportunity to participate; divide groups into male and female if it will facilitate participation.
- After you complete the discussion, record results on a big chart for the community and on an A4 sized paper for your own records.

Example of pair-wise ranking

Table 4a: **Pair-wise ranking of five most important NTFPs used by community**

Species	Chiraita	Gurjo	Amala	Kurilo	Harro
Chiraita	*	Chiraita	Chiraita	Kurilo	Chiraita
Gurjo		*	Amala	Kurilo	Gurjo
Amala			*	Kurilo	Amala
Kurilo				*	Kurilo
Harro					*

Steps to be followed

- Each member of the team of facilitators should be clear on the ranking tool in advance.
- Follow the same process for PRA as for other tools including introducing the tool, its purpose and the process to be followed.
- After a brief explanation, facilitate the process either on the floor or a big chart. The facilitator can also provide an example of pair-wise ranking.
- Make a list of the problems, challenges, and opportunities one-by-one based on the community's experience and knowledge.
- Ask the participants to choose 5 to 7 of the most important points for pair-wise ranking and further in depth discussion. Write down each point on one big chart. It is usually better to use pictures instead of words for each point so that all participants can understand.
- Allocate these selected priority issues or opportunities on the chart and ask the community to compare.
- As the participants compare one issue to another, ask them to give reasons for the priority ranking.
- After completion of the ranking process, share the findings with the participants.

Tips for the facilitator

- The facilitator should keep SWOT analysis in mind while facilitating the pair-wise ranking.

Seasonal calendar

Introduction

The seasonal calendar identifies the year round activities of the community, providing good information for project design, research, and planning. A calendar allows people to visualise the patterns and variations in activities across the seasons and provides general and specific information on activities. A seasonal calendar can be developed for all activities together or for each activity separately (e.g., agriculture calendar, NTFP collection calendar, climate change calendar, festival calendar, health calendar, income generation calendar, etc.).

Objective

The objective of the seasonal calendar is to identify and understand the seasonal activities that affect the lives of people in the community, as well as variations in these activities.

Significance

The seasonal calendar is helpful in analysing the overall positive and negative effects of activities. It is a good way of showing patterns of service use, agriculture timings, health problems, and social and cultural status, as well as identifying the busiest month of the year, which can help outsiders to plan activities. The seasonal calendar can stimulate participatory discussions on patterns of variation over time and provides useful baseline information. The seasonal calendar is a simple participatory tool that does not require a high level of expertise (or literacy) to use.

Example of a seasonal calendar

Activity	Month												
	Baisakh Apr-May	Jestha May-Jun	Ashar Jun-Jul	Shrawan Jul-Aug	Bhadra Aug-Sep	Aswin Sep-Oct	Kartik Oct-Nov	Mangsir Nov-Dec	Poush Dec-Jan	Magh Jan-Feb	Falgun Feb-Mar	Chaitra Mar-Apr	
NTFP collection time		Ka											
Rainfall and hail storms			Rainfall										
												Hail storms	

Figure 4f: **Seasonal calendar for Khasur Village, Lumjung**

Steps to be followed

- Prepare a checklist of activities, but do not limit the exercise only to this checklist.
- Explain to the participants about the exercise and follow the same basic guidelines for PRA as in other exercises.
- Discuss and identify a list of seasonal activities and ask the participants to prioritise them.
- Encourage participants to start from an activity with which they are familiar, for example, local firewood collection or rainy season.
- Use pictures and locally available materials such as stones, sticks, chalk, and mud, as well as colourful chart paper to visualise and show general trends.
- If an issue arises during the development of the calendar, discuss and resolve the issue through participatory discussion.
- Discuss changes in activity patterns, challenges, and solutions in relation to ecosystem services and make sure the process, content, and outcomes of the discussion are recorded.
- Analyse the information and share it with the community; make corrections if necessary.

Tips for the facilitator

- Discuss the status of services, challenges, and alternative solutions with reasons and try to elicit maximum participation from the community.
- Calendar development is not useful unless you analyse the calendar and explain the information that is indicated on the calendar with a legend.

Historical timeline

Introduction

There are two kinds of changes and events: natural incidents and manmade incidents. It may be in a community's interest to minimise the negative effects of manmade factors if these factors are threatening future generations. For example, a community may decide to address uncontrolled forest destruction and its impact on livelihood services through a plan of action. Past historical local events faced by the community and to which they have applied local solutions can be plotted on a timeline and used to mitigate future problems. The timeline can be used to generate discussion on the eventual impact of these events on forest management systems and ecosystem services. The timeline can also be used to identify social and technological innovations.

Objective

The objective of a historical timeline is to identify important past events that have happened in the community and trends of change over time.

Significance

This tool maps the most important events in the community over time, which can serve as the basis for future work. It is important to involve elderly people of the community in this activity to obtain a long-term perspective. Apart from giving an historical background, this tool can help us to understand changing patterns in the environment, economics, social life, politics, and the culture of the village and create a culture of pre-planning for future action in the community.

Example of a timeline

Table 4b: **Timeline and consequences of major developments in shifting cultivation study sites in Nepal**

Date	Activity	Consequences	Sites	Driving factors
1990	More freedom for people realized after democracy	Shifting cultivation increased	Jogimara, Siddhi, Kakada, Dhaubadi	Political movement (democracy started)
	Commercial chiraito cultivation initiated on shifting cultivation land	Burning became an important step in chiraito cultivation	Taplejung	Market opportunities
1994	Handover of community forest to communities	Decrease in shifting cultivation (conflict arises in some places over shifting cultivation and community forest)	Jogimara, Siddhi, Kakada	Policy (community forestry)
	Cardamom plantation started to intensify/increase	Decrease in shifting cultivation	Sankhuwasabha	Market opportunities
	Strict rule enforcement and training from Kangchenjunga Conservation Area Project/	Decrease in shifting cultivation	Taplejung	Policy (conservation area)
2002	Intervention by Maoist's to allow shifting cultivation	Increase in shifting cultivation	Taplejung	Political movement (Maoist revolution)
2003	Livestock distribution and promotion of agroforestry through leasehold forestry	Decrease in shifting cultivation and use of alternative crops such as fruit and fodder	Jogimara, Siddhi, Kakada	Policy (leasehold forestry)
2004	Promotion of income generating activities, market access, infrastructure development	Increase in horticulture and agroforestry	Jogimara, Siddhi, Kakada	Market opportunities, knowledge base (due to I/NGOs)
2007	Comparatively more participation for planning of Kangchenjunga Conservation Area done by Kangchenjunga Conservation Area Management Committee	Shifting cultivation continues with controlled burning	Taplejung	Handover of Kangchenjunga Conservation Area Project to local community
2009	Large forest area burnt by fire (1 man and 200 yaks died, wild animals were burnt and died, medicinal plants were destroyed)	Shifting cultivation decreases due to forest fires and more doubts and fears emerge about shifting cultivation	Sankhuwasabha	Policy (fear of getting fined)

Steps to be followed

- Identify the most senior citizens and experienced people in the community to participate in this exercise. It may be helpful to spend the night in the community for this purpose so that you can talk to people in the evening when they are relaxed.
- Introduce yourself and ask particularly older people to remember past events.
- Write down all incidents date-wise and serially and review them once you have finished.
- Analyse and determine the present status natural resources based on past events and learning for further planning activities.
- Thank the participants for their time and share the timeline later with groups for their own understanding and additional information.

Tips for the facilitator

The timeline technique helps to build a close relation with the community. It is important to discuss what the effect of each event was on the lives of the participants and provide space if they want to ask questions. Respect the respondents, even they are off track and create an environment conducive to them remembering the events you are looking for.

Transect walk

Introduction

A transect walk is a simple method of collecting information about major land uses in an area. The researcher and key informants conduct a walking tour through areas of interest to observe, listen, and identify different zones or conditions, and to ask questions to identify problems and possible solutions. Using this tool, an outsider can quickly learn about the topography, soil, land use, forests, watersheds, and community assets of a site. A transect walk is a useful way of tapping into local people's knowledge about land use, natural resources, soil types, problems, and possible solutions.

Objective

The objective of a transect walk is to provide a picture of how natural resources are managed and used by a community and to identify the problems and opportunities inherent in each zone.

Significance

A transect walk helps to comparatively analyse land varieties, differences in soil fertility and crop varieties, and problem, opportunities, and solutions.

Example of a transect walk

Steps to be followed

- Identify key informants (within the village) who are knowledgeable and willing to participate in the transect walk.
- Inform them of your objectives and the purpose of the visit, along with the specific information that you would like to gather (major land uses, crops, trees, soil types, water, problems, opportunities, etc.).
- Identify the main route to be taken for the transect walk with community people. A resource map can be used for this purpose. The route should cover all major ecological and production zones.
- If possible, start from one end and walk with the key informants along the transect route.
- Let the key informants give information relating to the categories selected. Ask questions about additional factors that might come up during the walk.
- After the walk, transfer field data to a clean sheet of paper and add illustrations.
- Validate data with key informants.

Tips for the facilitator

- The facilitator should make sure that there is representation of both men and women and people from different ethnic groups and socioeconomic backgrounds in the transect walk.
- If the area is too big for one group to cover, divide participants into more than one group or conduct the walk in phase-wise manner.
- The facilitator should listen carefully and not react to the members of the community as they know their area better than an outsider.
- Do not raise any expectations among the community.

	Upland	Lowland	Creek	Lowland	Cane	Village	Upland	Creek	Upland
Water source	Rain	Rain Irrigation	Rain Runoff/ seepage	Rain Irrigation		Rain Well	Rain	Rain	Rain
Soil	Sandy Loam		Rocky	Clay	Rocky	Sandy Clay loam	Sandy Clay loam		Clay
Crops	Rice Sugar-cane Eggplant Beans Corn	Rice Sustiana Pepper Beans Tomato	Bamboo	Rice Sustiana Pepper Garlic Tomato	Bamboo	Okra Honeyedfish Grapes Beans	Peanuts Cassava Rice Corn Beans	Sam Soo	Rice Beans Sugar-cane
Forages	Grass-land for grazing	Glicidia	Grass	Azolla	Grass		Weeds in plots	Guinea grass	Grass land
Trees	Glicidia Mango Lusona Guava Banana Tamarind	Glicidia	Banana Glicidia Leucaena	Glicidia Banana Lusona Anacia Nsom	Glicidia Lusona	Acacia Mango Guava Coconut Leucaena Jackfruit	Mango		Mango Tamarind Star-apple
Animals	Cow Carabao Goat		Catfish Mudfish Carp Frog Crab	Golden snails Pig Fish Duck Frog	Catfish Frog Snail	Dog Cat Pig Goat Cattle Turkey	Goat Carabao Cattle	Snail Catfish	Cattle Carabao Goat
Problems	Erosion Lack of water	Feet and disease				Lack of coherence among local officials	Erosion Lack of water		Erosion Lack of water
Opportunities						Accessibility to road			

Figure 4e: Example of village transect walk

Further Study Materials

The information provided in this annex is for your general guidance. It is said that you should not 'follow the tool', but use the tool based on your objectives and need. For further information please consult the references below.

IIDS Institute of Development Studies, University of Sussex, Brighton BN1 9RE, Tel: +44 (0)1273 606261; Fax: +44 (0)1273 621202

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Annex 5: Photographs of PRA exercises in the field (Udayapur District, Nepal)



Figure 5a: **Resource mapping and focus group discussion**

Photos clockwise: Seema Karki (top 2); Aye Myat Thandar - (bottom left 3); Pratikshya Kandel - (bottom right)



Figure 5b: **Institutional mapping, mobility map, seasonal calendar, historical timeline, and pair-wise ranking**

Photos clockwise: Kaml Aryal - (top left, bottom left & centre); Seema Karki - (bottom right)



Figure 5c: PRA exercise

Photo: Seema Karki



Figure 5d: Handing over of resource map to Dumrithumka Community Forest Users Groups in Rauta VDC, Udayapur district

Photo: Seema Karki



Figure 5e: Group photograph of participants in field exercise

Photo: Seema Karki



Figure 5f: Group photograph during theory session at ICIMOD Knowledge Park, Godavari

Photo: Jitendra R Bajracharya

Annex 6: Pre- and post-evaluation form

Regional Orientation Training on Ecosystem Services Assessment

Training Assessment form

Please tick in the box: 1-No idea, 2- Basic idea, 3-General working knowledge, 4- Better knowledge

Ecosystem: Concept, definition, types of ecosystems, in general	1	2	3	4
Ecosystem assessment: Concept, principles, in general	1	2	3	4
Knowledge about ecosystem services	1	2	3	4
Types of ecosystem services (provisioning, regulating, supporting, and cultural)	1	2	3	4
Knowledge about valuation of ecosystem services	1	2	3	4
Willingness to pay for ecosystem goods and services	1	2	3	4
Biodiversity assessment in general	1	2	3	4
Plant diversity assessment	1	2	3	4
Animal diversity assessment	1	2	3	4
Vulnerability of ecosystem services	1	2	3	4
Climate change understanding	1	2	3	4
Relationship between climate change and ecosystem management	1	2	3	4
Knowledge on rehabilitation of degraded forest ecosystems	1	2	3	4
Enumerators role in quantitative data collection	1	2	3	4
Knowledge about household survey questionnaire	1	2	3	4
Enumerators role in qualitative data collection	1	2	3	4
Participatory approaches in general	1	2	3	4
Knowledge of using various participatory tools and techniques	1	2	3	4
Participatory approaches for socioeconomic assessment	1	2	3	4
Participatory approaches for vulnerability assessment	1	2	3	4
Basic knowledge about GPS use	1	2	3	4
Basic knowledge about GIS and remote sensing	1	2	3	4



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