

How much do local people value watersheds? A case study from Nepal

Watersheds are key geographical features that supply a wide range of important environmental and agricultural services. However, in many parts of Nepal, watershed areas are being degraded, with significant negative impacts on local livelihoods. To help policy-makers act to improve watershed conservation, a new SANDEE study in collaboration with the Himalayan Climate Change Adaptation Program of ICIMOD has assessed the value of the services provided by the watershed that drains into the Koshi River Basin in central Nepal.

The study finds that local people do value watershed services and would be willing to pay for them. Significantly, local people would be more willing to make a contribution to watershed management – and would contribute more – if they could provide their labor in lieu of payment. The study also finds that downstream farmers (who practice commercial vegetable farming) are willing to pay more than upstream farmers for these services. In light of these findings, the study recommends that the potential for a watershed conservation scheme involving trade between downstream and upstream users of watershed services should be investigated.

Support policy with evidence and information

The objective of the study was to improve watershed management in the Koshi River Basin by providing village leaders and government and non-government agencies with focused information on local demands and preferences. To get this information, the study used a choice experiment to examine differences in demand for local ecosystem services among farmers in downstream and upstream areas. The study also looked at how the way in which villagers were asked to pay for improvements in ecosystem services – either in cash or in labor – affected the amount they would be willing to contribute.

The first step in the research was identifying those watershed services that were most important to local residents. Focus group discussions (FGDs) with local communities and district authorities, showed that villagers were interested in the following watershed services: irrigation water, drinking water, fuelwood and leaf litter (which is used for agriculture).

The importance of watersheds

Watersheds help many rural households maintain their livelihoods. Well-managed watershed areas also make it easier for rural communities to adapt to the challenges posed by climate change. Both of these issues are significant in Nepal, where the International Center for Integrated Mountain Development (ICIMOD) and SANDEE are working to enhance community resilience to climate change through the sustainable management of ecosystems, including watersheds.

To help in this vital work, this study looked at the Jhikhu Khola Watershed area in the middle hills of central Nepal. Water from this catchment drains into the Indrawati River, which is part of the Koshi river basin. This watershed serves a population of 10,875 households and covers an area of 11,141 ha, which is dominated by agriculture and forests. Because of an ongoing decline in the condition of the watershed, local communities in this region are experiencing a drop in the availability of both water and forest resources.

Creating the choice experiment

A choice experiment requires the creation of a series of 'choice sets' to assess people's preferences for action. The choice sets in this study were designed to make it easy for participants to choose between different watershed management policy options and the status quo. Pictures and charts were used to depict each policy alternative. In this study, policy options comprised a range of increases in the availability of drinking and irrigation water, increases in the amount of leaf litter available per day during the forest opening period and increases in the amount of fuel wood available per year.

The choice sets also contained easy-to-understand information on how much households would be expected to contribute for the implementation of each policy alternative – either in terms of the amount of money they would have to pay, or the amount of labor they would have to contribute. Computer software was used to create 20 choice sets (each of which offered a choice between two different groups of policy outcomes and the status quo). Each respondent was shown four of these sets.

The choice experiment involved 600 randomly selected households, 300 each from upstream and downstream areas. In both upstream and downstream areas, half of all respondents were told they would be asked to pay for the watershed management policies in cash and half were told that they would be asked to contribute their labor. All respondents were asked a follow-up question to see if they preferred an alternate mode of payment.

How much would people be willing to pay?

Study results report that, while about 50% of participants would be willing to pay in monetary terms for improvements in environmental services, 75% would be willing to contribute their labor to help put these improvements in place. This result suggests that rural households have a strong preference for labor payments. For example, on average, respondents who were asked to pay using money were willing to pay NPR 29 per year for one additional liter of drinking water per household per day during the dry season. Those contributing their labor would be willing to contribute labor worth NPR 33 to get this improvement. Participants paying cash would also be willing to pay NPR 1,443 per year for an additional month of irrigation; those contributing labor would pay NPR 1,728 for this enhancement.

Residents were also asked what improvements in watershed services they would have a preference for. Proposals for how such improvements might be brought about were discussed and policy alternatives were drawn up. Three main conservation activities were highlighted for action: the gradual conversion of pine forest to broadleaved species, as local communities perceived that pine monoculture forests is major cause behind drying of water resources, the harvesting of sub-surface water from water bodies and the construction of water retention holes and conservation ponds to enhance water availability.

Household perceptions of watershed services

The study found that a majority of households thought that most watershed services had declined over the previous five years. In particular, there was a general consensus that water availability has decreased, especially in the dry season. Households stated that road construction, population growth and reduced rainfall were the major causes of water scarcity.

While almost half of the respondents thought that forest conditions had improved due to the involvement of communities in forest protection, they also suggested that the availability of forest products had decreased. Some 56 percent of the respondents indicated that recently planted stands of pine had contributed to a decrease in the supply of water and forest products.



The value of a ten-year management plan

The study looked at how much people would be willing to contribute to the development of a ten-year watershed management plan that would bring significant improvements in the amount of water, leaf litter and fuelwood that local farmers would have access to. Findings show that households would be willing to pay a minimum of NPR. 3,136 (USD 31) in cash annually for the development of such a plan. If they were allowed to pay by contributing their labor, then they would be willing to contribute NPR. 3,900 (USD 39) per year (equivalent to 13 days a year). The estimated average household willingness to pay for the new watershed management program was NPR. 3,268 (USD 33) for upstream users and NPR. 4,486 (USD 45) for downstream households. This finding can be explained by the fact that downstream households practice commercial vegetable farming that requires significant quantities of irrigation water but upstream households still practice subsistence farming.

Interestingly, allowing households to contribute their labor (rather than pay in cash) would increase the estimated value of the social benefits of the watershed management plan by between 1.4 and 2.2 times. Overall, the social benefits from the watershed project would be, at a minimum, 40 percent higher if households were asked to contribute their labor, than if they were asked to make monetary payments.

Figure 1: An example of a choice set

Attributes	Alternative 1	Alternative 2	Current situation																																																
Drinking water 	200 litres/day 	200 litres/day 	100 litres/day 																																																
Irrigation water <table border="1" data-bbox="201 1178 571 1341"> <tr> <td>Jan</td> <td>Feb</td> <td>Mar</td> <td>Apr</td> </tr> <tr> <td>May</td> <td>Jun</td> <td>Jul</td> <td>Aug</td> </tr> <tr> <td>Sept</td> <td>Oct</td> <td>Nov</td> <td>Dec</td> </tr> </table>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	12 months available <table border="1" data-bbox="600 1178 919 1341"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table>													8 months available <table border="1" data-bbox="943 1178 1227 1341"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table>													8 months available <table border="1" data-bbox="1251 1178 1508 1341"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table>												
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May	Jun	Jul	Aug																																																
Sept	Oct	Nov	Dec																																																
Leaf litter collection 	2 sacks/day 	2 sacks/day 	1 sack/day 																																																
Fuelwood collection 	30 bhari (stacks) 	30 bhari (stacks) 	20 bhari (stacks) 																																																
Watershed management fee 	NPR 3,000.00 	NPR 600.00 	No additional fee																																																
Your choice M Please tick (✓) one box																																																			

SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) is a regional network that seeks to bring together analysts from the different countries in South Asia to address their development-environment problems. Its mission is to strengthen the capacity of individuals and institutions in South Asia to undertake research on the inter-linkages among economic development, poverty, and environmental change, and to disseminate practical information that can be applied to development policies. SANDEE's activities cover Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka.

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Recommendations for policy makers

Overall, the study highlights the importance of identifying people's willingness to pay for ecosystem services in non-monetary terms. It notes that, if subsistence farmers are not allowed to express their willingness to pay in labor terms, then the benefits of any conservation program may be undervalued. As a result, environmental programs may receive too little attention from policy makers. This may, ultimately, compromise the welfare of households in subsistence communities.

From a specific policy point of view, the study identifies the value of individual ecosystem services. Policy makers can use these values to estimate benefits from specific watershed management strategies – and therefore provide support for their implementation.

The study also highlights differences in preferences for watershed services among households in different locations and between age groups and genders. This difference in demand for services suggests that there may be some potential for schemes such as payment for ecosystem services that involve trade between downstream and upstream users of watershed services.

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