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Policy Brief

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Financing the Control of Invasive Plant Species around Chitwan National Park in Nepal – A Choice Experiment

Mikania Micrantha, an invasive plant species, was first reported in1963 in eastern Nepal. This plant is now found in over 20 eastern, central and western districts of Nepal's Terai region and is poised to take over the local biodiversity. In Chitwan National Park in Nepal, Mikania covers up to 80 per cent of the buffer zone community forests, with significant negative effect on the forest ecosystem and the livelihoods of local people. To help communities and the forest department address this pressing challenge, a recent SANDEE study assessed how much local households would be willing to pay to reduce the damage done by the plant. The study is the work of a team led by Rajesh Kumar Rai, from the School of Accounting, Economics and Finance at Deakin University, Australia.

Overall, the study finds that local households are willing to contribute up to USD 1.35 million (NRs 106 million) per year for improved management of Mikania. Households are willing (and able) to pay because effective management of the invasive plant would reduce the time they spend collecting firewood and fodder and also increase tourist numbers to the National Park. The study recommends that policy-makers should design a Mikania management strategy based on the needs of the people who would benefit most from it and that agricultural households should be in the frontline of any such development.

Invasive plant species

Invasive plant species (IPS) are recognized as one of the greatest threats to native forest ecosystems around the world. IPS are non-native species that have been relocated deliberately or accidentally as a result of economic activities. The recent expansion in global trade and travel has accelerated the spread of such species and the challenge they pose is set to get ever larger.

Mikania is a particularly damaging IPS. It is a native South and Central American climbing perennial weed that has become a significant invasive plant in many tropical and subtropical Asian countries, including Nepal. The pattern of Mikania's spread and its aggressiveness in Nepal indicate that it may create a monoculture that will destroy biodiversity, particularly in the Terai region. Thus, rapid steps must be taken to control it immediately.

The Chitwan National Park buffer zone

This study is based on the Chitwan National Park's buffer zone, where there are high levels of Mikania colonization. The 750 sq km buffer zone was designed to take pressure off the protected forest area and includes 35 village development committees and two municipalities. A total of 21 forestry user committees and one sub-committee, representing approximately 45,000 households, manage the buffer zone. Buffer zone communities receive 30-50 per cent of the park's total annual income for community development. In addition, development of eco-tourism in the buffer zone generates local income.

To find out whether and how much villagers living in the buffer zone would be willing to contribute for better

This policy brief is based on SANDEE working paper No. 74-12, 'Valuing the Damage Caused by Invasive Plant Species in a Low-income Community in Nepal' by Rajesh Kumar Rai, Doctoral Candidate, School of Accounting, Economics and Finance, Deakin University, Australia. The full report is available at: www.sandeeonline.org

Designing a Choice Experiment in rural Nepal

This study is based on a Choice Experiment on a hypothetical invasive plant management program. Households in rural Nepal were informed that a Mikania management program would be similar to regular forest management activities. However, it would involve an additional contribution in the form of labour for cutting vines and/or an annual membership fee (payable into a fund managed by forest user groups). Since forest users are often involved in forest weeding, pruning and thinning activities, they felt comfortable committing themselves to managing the invasive species.

The Choice Experiment presented households with different options in terms of the benefits and costs of a Mikania management program. The range of benefits included improvements in tourist numbers and a reduction in forest product collection time. Households were also presented with different cost outlays – amounts households would need to pay for the scheme in terms through an annual membership fee or labour.

The choice sets offered to the surveyed households were based on carefully solicited information during Focus Group interviews.

- Forest User Groups in the Chitwan buffer zone host approximately 20,000 visitors annually, although five years ago this number was as high as 30,000. Focus groups reported that they have plans to double the number of visitors to their forests. Based on these discussions, respondents were offered three options for the impact that the proposed Mikania management might have on visitor numbers: current numbers, 1.5 times as many as current and twice as many as current.
- According to the focus groups, before Mikania was introduced, households could collect their daily requirement of fodder and fuel-wood in one hour. Since the colonization of Mikania, however, approximately four hours is required for the same purpose. Respondents were therefore offered three options in each choice set for the impact that Mikania management might have on forest product collection times: four hours, two hours and one hour.
- In order to determine what options to offer with respect to labour and monetary contributions, the researchers asked focus group participants how much their households could realistically contribute annually to mitigate the damages caused by Mikania. The respondents proposed either a labour contribution of between one and seven days annually or an equivalent financial contribution at the average wage rate of NRs. 350 per day. Respondents in the choice experiment were therefore offered household labour options of three days, five days, seven days, and none. Respondents were also offered the following four levels of annual membership fees to choose from: 0, NRs. 1,050, NRs. 1,750 and NRs. 2,450.

management of Mikania, Rajesh worked with five community forest user groups from the area. First, focus groups were asked about changes resulting from Mikania colonization. Local people responded that Mikania colonization had two main impacts: it had led to a decrease in visitor numbers because it had reduced the likelihood of tourists seeing wild animals. It also increased the amount of time it takes households to collect forest products.

Survey design and data collection – a Choice Experiment

Based on focus group feedback, the study team designed a 'Choice Experiment' – a commonly used tool in marketing and economics studies – to examine willingness to pay for a change or a new product (see the Side bar for further details). Researchers identified several options for managing the IPS, which were then clustered into four different 'choice' sets. A field survey presented 325 households with these 'choice sets' in order to illicit their willingness to pay for Mikania management.

Each choice set included three different options and respondents were asked to choose one option from each set. The options identified potential benefits to households from different IPS management schemes and associated costs. The alternative benefits included reduced time to collect forest products and an increase in the number of visitors coming to the national park. Two types of costs were identified: an annual membership fee for paying for Mikania management and labour contributions to cut vines etc.

The importance of 'labour time'

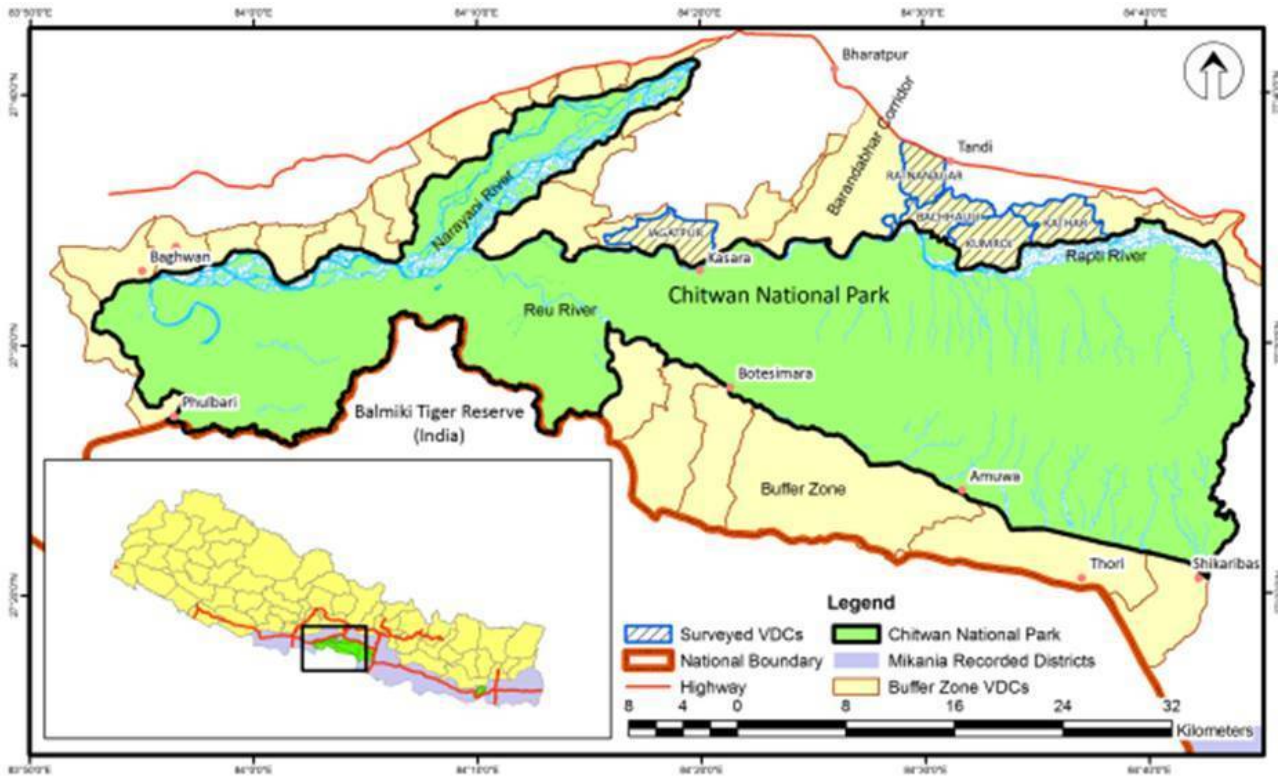
Since this study was undertaken in a subsistence economy with limited cash transactions, researchers examined different monetary and non-monetary ways in which households could 'pay' for Mikania management. To make sure willingness to pay was not underestimated, the study team asked respondents how much labour time they would be willing to contribute toward reducing the IPS problem.

Follow-up questions were asked to help the researchers understand the decision-making strategies used by respondents. These questions were about their preferred mode of payment (whether money or labour) and who they thought should be responsible for carrying out a Mikania management program.

People's willingness to pay

By assessing the different options chosen by surveyed households, the researchers were able to get an understanding of how much people would be willing to pay for Mikania management. In monetary terms, the average household was willing to pay NRs 541 (USD 7) for a one hour decrease in forest products collection time per day and NRs 240

Figure 1: Study Area



(USD 3) for every 1000 increase in tourist numbers. In labour terms, households were willing to contribute 3.26 labour days for a decrease in collection time of forest products each trip by one hour and 1.43 labour days for an increase in 1,000 visitors. The value of labour that households were willing to contribute for Mikania management is NRs.166 (USD 2) per day, which is approximately 47% of the local wage rate. The numbers suggest that households are clear about the trade-offs between their labour time and their monetary willingness to pay.

Overall, 36 per cent of respondents showed a preference to pay for Mikania management with money, while 63 per cent preferred to pay via the contribution of their labour. The estimated willingness to pay for the former group of respondents is considered as a lower-bound and aggreaged willingness to pay for both options are considered as upper-bound of the social benefits of managing Mikania.

Household had varied preferences over the potential impact of the Mikania management program i.e. whether it helps bring in more tourists or reduce their own forest product collection time. These preferences depended on the characteristics of households. For example, households with large livestock herds mostly preferred management options that included lower forest product collection time because they spend much of their time collecting fodder.

A feasible Mikania management program

To see how much local people would be willing to contribute for a specific 'feasible' Mikania management program, the study assessed a policy scenario with two benefits: it would reduce the average collection time (for a day's requirement of forest products) by two hours and increase annual visitor numbers by 7,000. In this scenario, households were not expected to bear any costs in terms of labour for IPS management. The annual household WTP for this policy scenario is estimated to be NRs. 2,382 (USD 31). This amounts to 4 per cent of the average annual household income (NRs. 66,420) in the region.

Aggregating average willingness to pay across all households in the buffer zone, the study finds that households in the area would be willing to contribute up to USD 1.35 million (NRs. 106 million) annually for this proposed Mikania management program. This estimated local WTP is nearly two times the annual income earned by Chitwan National Park in 2009/10 (NRs 61 million). This shows how important this issue is for local communities. Proper management of Mikania is perceived to be able to increase visitors and this would increase park revenues.

SANDEE

The South Asian Network for Development and Environmental Economic (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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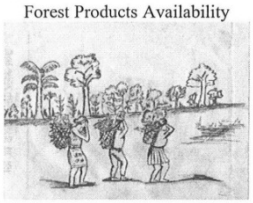
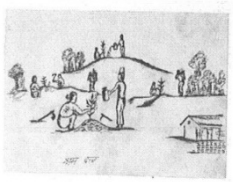
Policy Recommendations

Currently, the Government's buffer zone management budget does not include a program for Mikania management even though it has a fairly large budget. Communities in the buffer zone are clearly worried about the spread of this invasive species and are willing to contribute to reducing its impacts. Thus, it is timely for the forest department to design a strategy to control IPS in the Chitwan National Park Buffer Zone.

Since different sectors of society in the buffer area have different preferences over the outcomes of a Mikania management policy, any effective program will need to engage local people and target their specific needs. In this study, agriculture and livestock-based households chose forest improvement alternatives most frequently over the current status quo. Thus, agricultural households should be in the front line of any IPS management strategy in the Chitwan buffer areas.

Figure 2: Example of a Choice Card offered to Survey Respondents

Choice Situation 1.1	Alternative 1	Alternative 2	Current Situation
Forest Products Availability 	1 hour	4 hours	4 hours
Visitors to Forests 	The same number as now	Twice as many tourists as now	The same number as now
Labor Contribution 	3 days	3 days	0
Annual Membership 	NRs. 1,050	NRs. 2,450	0
Select one (√)			

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