Social perceptions of invasive plants in Chitwan, Nepal: Implications for forest management

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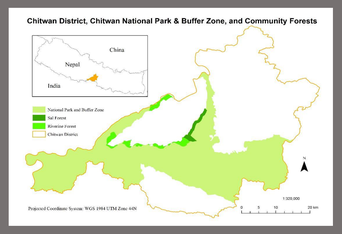
Introduction

Invasive species are one of the leading drivers of biodiversity loss worldwide. Invasive plants, in particular, can:

- alter biomass production
- reduce access and availability of valuable natural resources
- cause harm to the ecology, economy and health of ecosystems

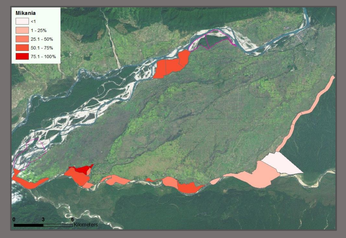
Invasive plant removal strategies often neglect to include social perceptions and stakeholder input.

Study location

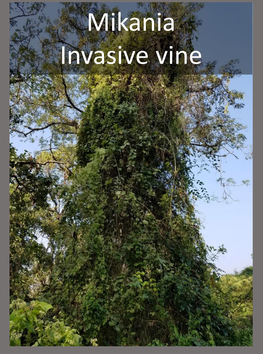


21 community forests (CFs) are established in the buffer zone of Chitwan National Park, Nepal.

CFs were established as a location for forest users, predominantly women, to collect natural resources.



The invasive plant *Mikania micrantha* was first documented in the community forests in 2000. By 2013, Mikania became the most widespread invasive plant across all 21 CFs.



Mikania is a rapidly growing invasive vine. It is capable of over-growing forest canopies, and preventing light from reaching the trees - eventually smothering and killing them.

Perceptions hypotheses

What are the social perceptions of invasive plant species and their associated management activities? How might perceptions influence adoption of management activities?

We hypothesize the following perceptions:

1. People who have participated in forest management techniques are more likely to perceive them as beneficial for the environment and stability of the forest
2. Women have more experiences with resource collection and encounter invasive plants more often and view forest management as important and necessary

Institute for Social & Environmental Research - Nepal
ISER - NEPAL

Acknowledgements: We are thankful for the data collection efforts from ISER-N staff for the length of the intervention study (2015- 2018). We are especially grateful for Ms. Rija Manandhar for her project management skills and Mr. Nabin Paudel, Ms. Sundari Lama and Mr. Gobinda Lamichane for their dedicated research assistance.

Ecological survey

RQ1. Which management technique was most effective at reducing invasive plant species?

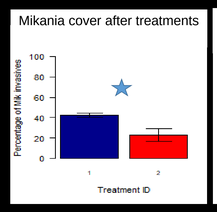
We compared two management approaches:

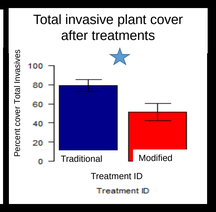
The **traditional approach**, locally referred to as 'jungle cleaning,' is the cutting of **all** herbaceous species by sickle in the entire plot.

The **modified approach,** called bag-and-bury, is a meticulous removal process that requires uprooting **only** invasive plants and burying remnants.

Ecological methods:

- We surveyed 5 forests and conducted four treatment approaches in each forest (20 plots).
- We collected data on invasive plant cover then compared treatment effects of modified and traditional approaches using ANOVA. Results are reported for two year post-treatment data.





Time	Treatment	% change Mikania
Pre-treatment to post-treatment	Traditional	11%
	Modified	-39%

- Mikania abundance was significantly lower in modified treatment plots (red) compared to traditional treatment plots (blue)
- Modified treatments had less total invasives
- When comparing pre and post treatment effects, there was an 11% increase in Mikania in traditional treatment plots

Ecological survey takeaway:
The traditional management approach was significantly less successful at removing Mikania and other invasive species over the experimental testing period (2 years).

Social survey

RQ2. How are experimental approaches perceived by the general public, forest managers, and stakeholders?

We surveyed 5 different focus groups (FGs) from each CF for a total of 25 FGs with 5-10 participants each.

Invasive species management

Perceptions of invasive plant management

Familiarity with experimental innovation | Forest use and familiarity with resources | Reliance on forest resources – forest membership | Management familiarity | Nearness to the community forest

Key focus groups identified below

Participants in the experimental project removing invasive plants	Elected CF management committee person	Non-participants who are unfamiliar with the experiment
• Women participants • Men participants	• CF committee member (Women and/or Men)	• Women non-participants • Men non-participants

Social methods:

- Semi-structured interview questions conducted at each individual treatment plot (qualitative)
- Ranking treatment plots in order of value/use/appeal (quantitative)

Ranking of Treatment ID averaged by focus group (rank 1 = excellent to 4 = worst)

Treatment ID	CF Management	Men non participant	Men participant	Women non participant	Women participant	All groups
Modified with burn	1	1	1	1	1	1
Modified	2	2	2	4	2	2
Traditional with burn	4	3	3	1	4	3
Traditional	3	4	4	1	3	4

- **Women non-participants** ranked traditional approaches as the best plots compared to the modified approach. They described traditional plots as being 'clean' and 'able to see wildlife' and 'good for grasses to re-grow'
- Management committees ranked modified treatments as the most valuable plots and always described the reduced invasive plant cover as their reasoning

Social survey takeaway: Qualitative interviews showed that women respondents from both groups would prefer to collect forest resources in traditional approach plots due to the belief that intensive clearing allows more grasses to re-grow and it was safer to see and prevent wildlife conflicts.

Future directions and conclusions

What are the potential social barriers to ecological management approaches in the future? How can we mitigate those barriers at the onset of ecological research?

- 100% of forest management committees said they used 'jungle cleaning' in the past year (in a 2013 survey of 21 CFs). CF managers have the greatest control over the direction of forest management. CF managers viewed modified approaches as 'excellent' at achieving forest management goals.
- CF managers are not the dominant forest users. Women, on the other hand, have a daily dependence on forest resources. But, women who are unfamiliar with the experimental project (non participants) had a less favorable view of the modified treatment approach. This suggests a person's familiarity with forest management goals changes their forest preferences. The comprehensive forest management goals achieved in the modified approach may go unnoticed if management goals are not communicated to forest users.
- Traditional approaches, though easier to implement and less meticulous than the modified method, are more likely to increase Mikania cover and further exacerbate the invasive species issue.

This project was completed with funding provided by the National Science Foundation and the US Fulbright Research Program (2017-2018).

A group of women non-participants as they describe why they prefer this plot to others (though it is densely invaded).

Respondents who live near the forest are more likely to experience a wide array of damaging effects from Mikania and other invaders.

Communicating new approaches

Image of a poster for an awareness campaign of an invasive plant (Banmara) that we created to help draw attention to the problem and communicate a potential management solution.

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