

Understanding the impact of institutional heterogeneity on the management of the mile-a-minute weed in Chitwan, Nepal

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Mikania in Chitwan Community Forests

Chitwan, Nepal is a rapidly urbanizing region adjacent to the internationally important Chitwan National Park (CNP). Community forests (CFs) were formally established in the buffer zone region around the park in the mid-1990s in order to provide residents opportunities to collect forest products in forests that were largely self-governed.

A social-ecological threat has arisen with the invasion of the mile-a-minute weed, *Mikania micrantha*.



Figure 1. Left: Mikania taking over a tree outside of CNP; Middle: Map of CNP; Right: Image of the one-horned rhino inside CNP

- Mikania is a vine-like plant native to South America that favors humid, warm environments
- Buffer zone CFs have been invaded to differing degrees
- Detrimental effects of Mikania on the biodiversity of the Chitwan region have been established (Murphy et al. 2013)

Less is understood regarding:

- The role that Mikania plays in affecting the everyday lives,
- How governance relationships in the region operate, and
- The influences on collective action for managing Mikania.

Institutional arrangements play an important role in mediating relationships between communities and the environment in social-ecological systems (Berkes et al. 2003). With this in mind, our primary research questions are:

- (1) What are the existing governance relationships in the buffer zone CFs?
- (2) How do these relationships influence distinctions in Mikania management and collective action between the CFs?

Methods

A mixed method approach was employed in the field:

- 29 semi-structured interviews with 87 people between May and July 2014 in five case study buffer zone CFs
- Participant observation in the CFs aided in understanding activities like fodder collection



Figure 2. Participant observation: Learning fodder collection practices in one of the CFs.

Perceptions of Mikania and impact on daily lives

Most interviewees believed that Mikania was increasing. **Table 1** (right) details these percentages of interviewees in each CF.

	same	increasing
CF 1	0	100
CF 2	0	100
CF 3	20	80
CF 4	20	80
CF 5	0	100

Interviewees in CFs 3, 4, and 5 expressed that Mikania was impacting their daily time, by making collection of grasses and fodder increasingly difficult.

- Interviewees in all five CFs articulated that increasing Mikania limits food sources for wildlife, increasing the amount of animals (tigers, rhinos, boar) leaving the forest in search of food.

Understanding governance relationships

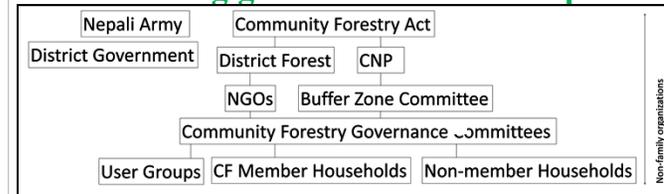


Figure 3. Overview of participant structure.

Relationship between:	CF 1	CF 2	CF 3	CF 4	CF 5
Nepali Army					
District Government					
Community Forestry Act					
District Forest					
CNP					
NGOs					
Buffer Zone Committee					
Community Forestry Governance Committees					
User Groups					
CF Member Households					
Non-member Households					
Non-family organizations (e.g. tourism, schools, marketplace)					

Table 2. There are numerous relationships among the CF members and the CF governance committee in each case study. Each CF interacts with actors in different capacities.

- Some links are indirect. For example, some CF members indirectly convey concerns to CNP through the buffer zone committee.

There are key differences between CFs:

(1) **Collaboration and interaction with NGOs is different.** For instance, in CF 3, NGOs are very integrated, interacting with the CF governance committee and CF members. CF 5 presents the opposite case, as they have little to no integration with NGOs.

(2) The strength of the relationships varies. For example, CF members in each case have either direct or indirect connections with the national park. However, **the level of trust in the national park is different.** In particular, members of CFs 1, 3, and 4 reported low levels of trust in CNP. CF 2 members expressed lack of trust in their governance committee and its interactions with CNP.

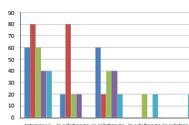


Figure 4. Percentages of interviewees expressing distrust by CF

Governance relationships affect information and management decisions

CFs with more negative interactions with other actors are more likely to report distrust and less likely to seek information about management from outside sources.

These governance relationships represent part of the set of “rules-in-use.” (Ostrom 2005). There are several takeaways from these relationships.

Relationships characteristic	Outcome
Distrust from CF members	Less communication; management rules less defined; less incentive to ensure positive outcomes; outcomes become less predictable; CF members perceive lack of relationships to improve impact on daily lives
Isolated decision making	Information is limited; engaging in removal practices (e.g. burning) that increase Mikania
Conflicting perspectives/unequal power	When opinions about Mikania from actors in higher positions of power differ from CF members, relationships can be damaged

Factors affecting collective action

Collective efforts to remove Mikania exist in each of the CFs, but to differing degrees.

Governance capacity is related to collective action in several CFs; as governance capacity increases, monetary and social resources increase.

Collective action	CF 1	CF 2	CF 3	CF 4	CF 5
High	High	High	Medium	Low	Low
Medium	Medium	Low	Low	High	High
Low	Low	Medium	High	Low	Medium

Table 4. The relationship between governance capacity (GC) and collective action. GC was measured in the past; changes from recent data are in red.

Other factors affecting collective action include:

- Reliance on CF resources
- Severity of other problems, including wildlife attacks and flooding

Discussion

We hope that this more detailed understanding of governance relationships related to management will contribute towards successful efforts to remove Mikania.

Future research will use this data to inform an agent based model combining an understanding of governance and Mikania management with ecological factors to explore social-ecological outcomes.

Acknowledgements and references

This research was supported by NSF award number 1210408. References: Berkes, E., J. Colding, and C. Folke. (2003). Navigating social-ecological systems: Building resilience for complexity and change. Cambridge University Press, Cambridge, UK. Murphy, S., Saboti, N., Juvavali, S.R., Lankichase, B.R., Upadhyay, G.P., Kock, R., and Amin, R. (2013). Invasive mikania in Chitwan National Park, Nepal: the threat to the greater one-horned rhinoceros rhinoceros unicornis and factors driving the invasion. *Oryx*, 47, pp 361-368. Ostrom, E. (2009). *Understanding institutional diversity*. Princeton university press.