Using experiential learning games to support invasive species management with local partners in India

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MFL-ILRI Webinar:

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Photo: Foundation for Ecological Security

Technical approaches alone cannot solve invasive species problems. Governance is essential.

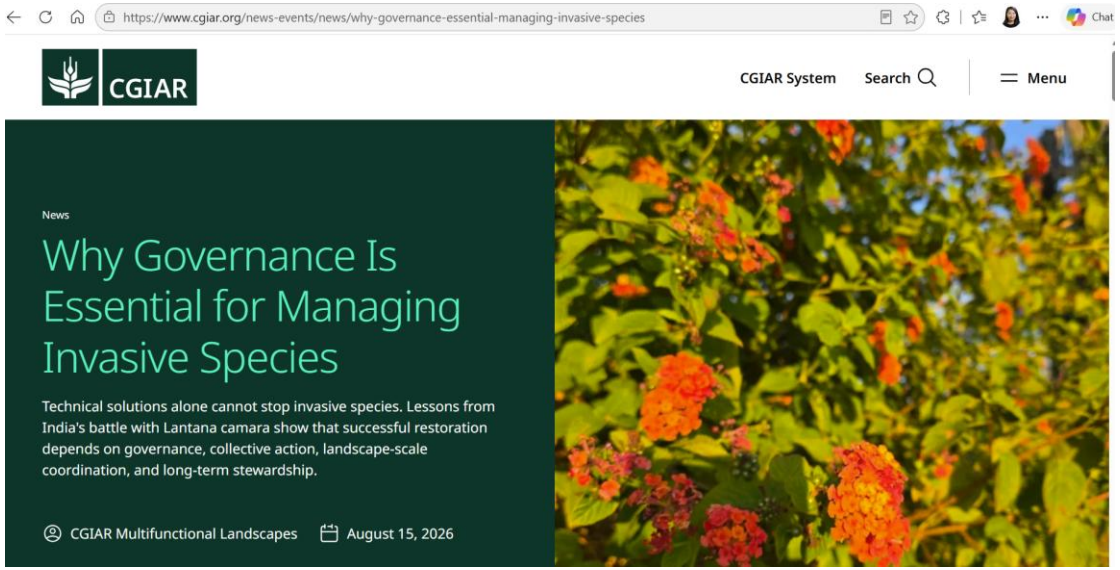
Management challenges

- Benefits are real — but distributed across different actors (individuals, communities, national and global stakeholders)
- Individual action isn't enough

Invasive Species Management Is a Governance Problem

- The set of formal and informal ways that society organizes to make and implement decisions (UNDP)
- Governance is necessary to address these challenges:
    - **Mobilize resources** for labor-intensive removal and replanting, considering who receives benefits and has incentives to contribute.
    - **Coordinate action across entire landscapes**, as the problem spans individual farms, village commons, reserve forests, and wildlife areas managed by government departments.
    - **Sustain monitoring and management** over time to prevent reinvasion.
- Successful governance of invasive species can't just be by government—it requires a combination of individual and collective action as well.

Invasive species management is a microcosm of the broader land governance challenges MFL seeks to address.



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The case of lantana (*Lantana camara*)

- An ornamental shrub that has become one of the world's ten worst invasive plants.
- Introduced to India 200 years ago, it now threatens over 40% of the country's forests, forming dense, thorny thickets that smother native vegetation and reduce forage for livestock and wild herbivores. While its spread in tiger reserves (e.g., Kanha National Park) has drawn attention, lantana also invades agricultural land and village commons that are central to rural livelihoods.
- Removing lantana requires uprooting it and planting native or locally appropriate vegetation—a difficult and expensive process. It's not enough to do it on one plot of land—it has to be done over whole landscapes to be effective. And it's not a one-shot deal—it requires continued monitoring and removal of new lantana plants.
- The Foundation for Ecological Security (FES) has been working on the issue of lantana in Mandla District in Madhya Pradesh for the past decade. The forest-dependent communities here identified lantana removal as a key restoration intervention to reclaim degraded forest and grazing land as well for community use. After removing lantana from their common lands, they promoted the growth of native species through collection and dispersal of palatable grass seeds, plantation of native species, etc.
- In villages where collective action remained strong, communities periodically removed lantana regrowth and maintained the restored areas. Where such collective management was weak, lantana re-established itself.
- Building on the initial success with community lantana removal and restoration in Mandla District, FES identified an interest to use experiential learning games to support future effort in Madhya Pradesh and other states.



Photo: Foundation for Ecological Security

Co-development process and plan for pilot and implementation

Dec 2025

Co-development workshop

Workshop with FES to understand the problem and develop a prototype of the game

Mid-2026

Field test in Mandla

Game is tested in the field in Mandla with 15 participants

June 2026

Cost-benefit analysis (CBA)

A CBA is conducted to validate that the benefits of eradicating lantana outweigh the costs over 5 years

Aug 2026

Co-development workshop

Refine the game and develop a final version based on results from the testing and the CBA

Oct/Nov 2026

Planned pilot in 60 villages

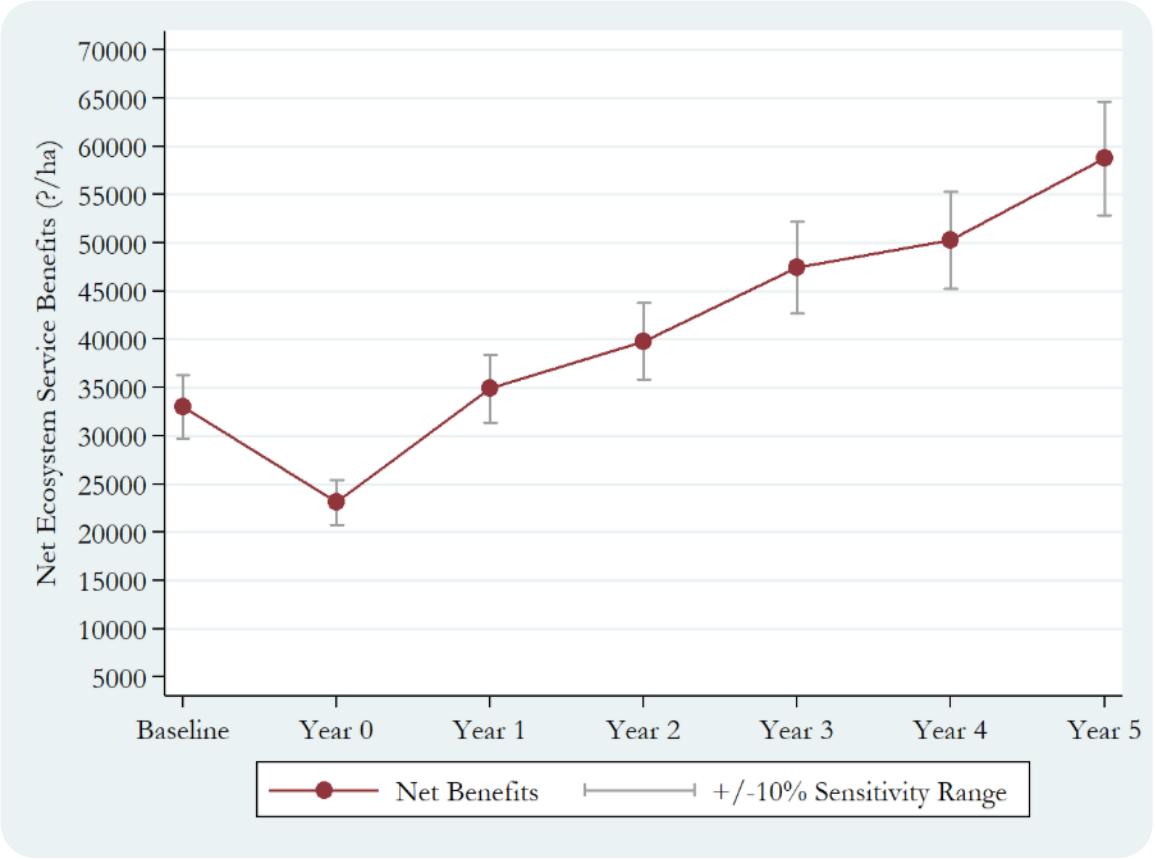
Across Odisha, Madhya Pradesh, Chhattisgarh and Andhra Pradesh



Photo: Foundation for Ecological Security

Cost-benefit analysis of lantana removal and maintenance

- Assess the economic viability of lantana removal and restoration and construct community-informed ecosystem service recovery trajectories.
- Costs included lantana removal including machinery in the first year, and labor in following years.
- Benefits include restoration of ecosystem services. Values of ecosystem service restoration were derived from a meta-analysis on the values of commons in India(Sandhu et al., 2022) and from community consultations.
- The BCR covers a five-year time horizon. Removal in Year0, then maintenance and recovery of ecosystem services up to Year 5.



Cost-benefit analysis of lantana removal and maintenance

- Discounted benefits of ecosystem services (provisioning, regulating and supporting) (₹56,761 to ₹67,358/ha) exceed discounted costs (₹17,477 to ₹18,324/ha), so restoration is economically viable even under conservative assumptions.

- This scenario only considers the following provisioning ecosystem services: fodder and grazing, fuelwood, food (wild fruits, leafy vegetables, tubers, seasonal foods), composite NTFPs.
- While still economically feasible, the BCR decreases compared to when all ecosystem services are valuated.

Discount Rate	Discounted Benefits (₹/ha)	Discounted Costs (₹/ha)	Benefit-Cost Ratio (BCR)
3%	67,358	18,324	3.68
5%	62,811	17,966	3.50
8%	56,761	17,477	3.25

Discount Rate	Discounted Benefits (₹/ha)	Discounted Costs (₹/ha)	Benefit-Cost Ratio (BCR)
3%	51,040	18,324	2.79
5%	47,521	17,966	2.65
8%	43,215	17,477	2.47

A sneak peek: Lantana management board game

- The board game is a simulation of lantana spreading and clearing on community common land played with 7 players, who decide how to split limited labor between wage work and clearing lantana over up to 7 rounds, each representing a year.
- A 6x6 grid of 36 cells or quadrants represents the community land. The game starts with 14 seeds placed at random.
- Terms for the game:
  - **Seed** = a lantana sapling. Seeds mature into twigs in the next round if not cleared.
  - **Twig** = mature lantana. Twigs pay nothing as mature lantana blocks access to resources.
  - **Labor stone** = one unit of a player's yearly work capacity. Each player gets 3 per round.
  - **Play Rupees (PR)** = the game's play money.



Photo: Foundation for Ecological Security

A sneak peek: Lantana management board game


Photo: Foundation for Ecological Security

- Each round, players either give stones to the facilitator to clear lantana (1 stone per seed, 3 per twig) or keep them for wage income (50 PR per stone).
- Every player earns 10 PR for each quadrant without a twig, whether they helped clear the board or not.
- The game ends after round 7, or earlier if the grid is covered in twigs. Session 1 is silent, and Session 2 allows discussion between rounds.
- Optional variations: e.g., add a round with surprise lantana growth or a loss in income as a result of wildlife-human conflict.
- Community debriefing after gameplay is a crucial part of the learning