

# Weeds to Wealth

*Using invasive species for livelihoods, restoration and climate change mitigation*



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# Overview

1) The Lantana Problem

2) Creating Value

3) Monitoring and Restoration

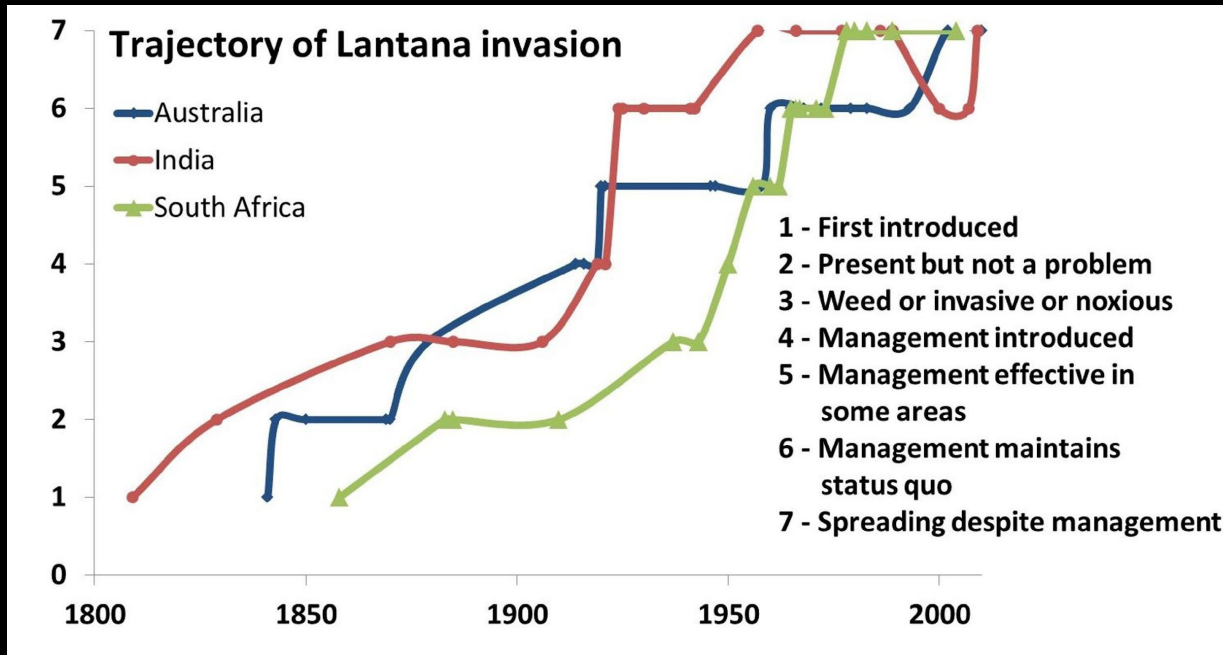
4) Summary and Conclusion

# 1. The Lantana problem

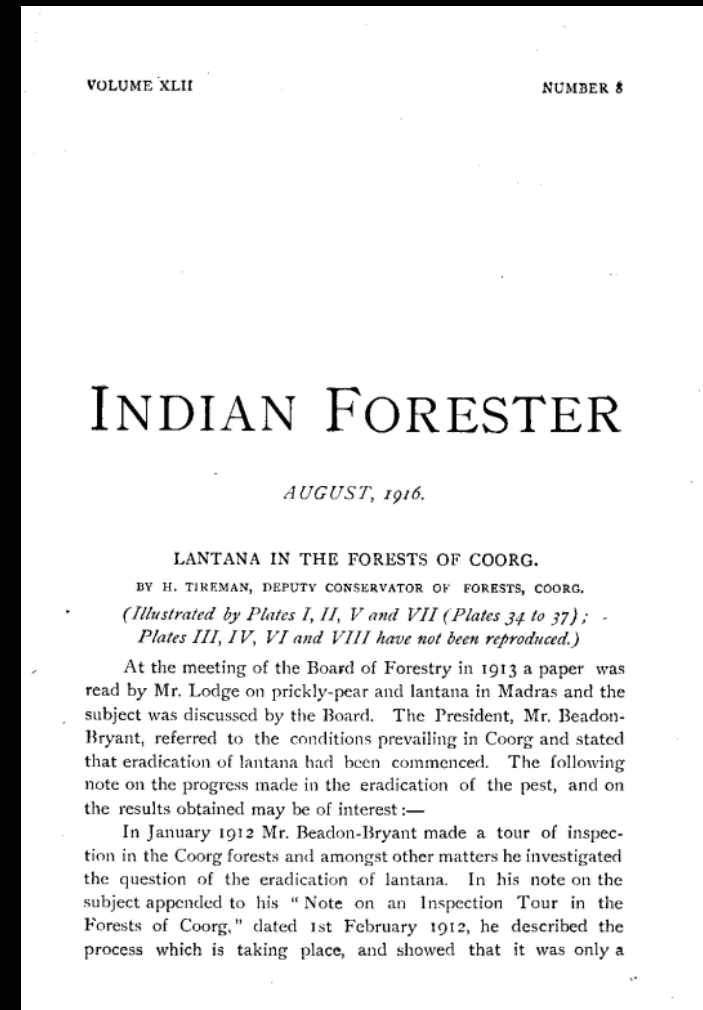
- Toxic properties (Sharma et al. 1981)
- Allelopathic properties (Achhireddy & Singh 1984)
- Displacing wildlife – increased HWC
- Vigorous coppicing (Sharma et al. 2005)
- Large soil seedbank + vegetative growth (Parsons & Cuthbertson 2001, Swarbrick et al. 1998).
- Prohibitive removal cost - Rs. 1Cr INR or 100K GBP /sqkm.

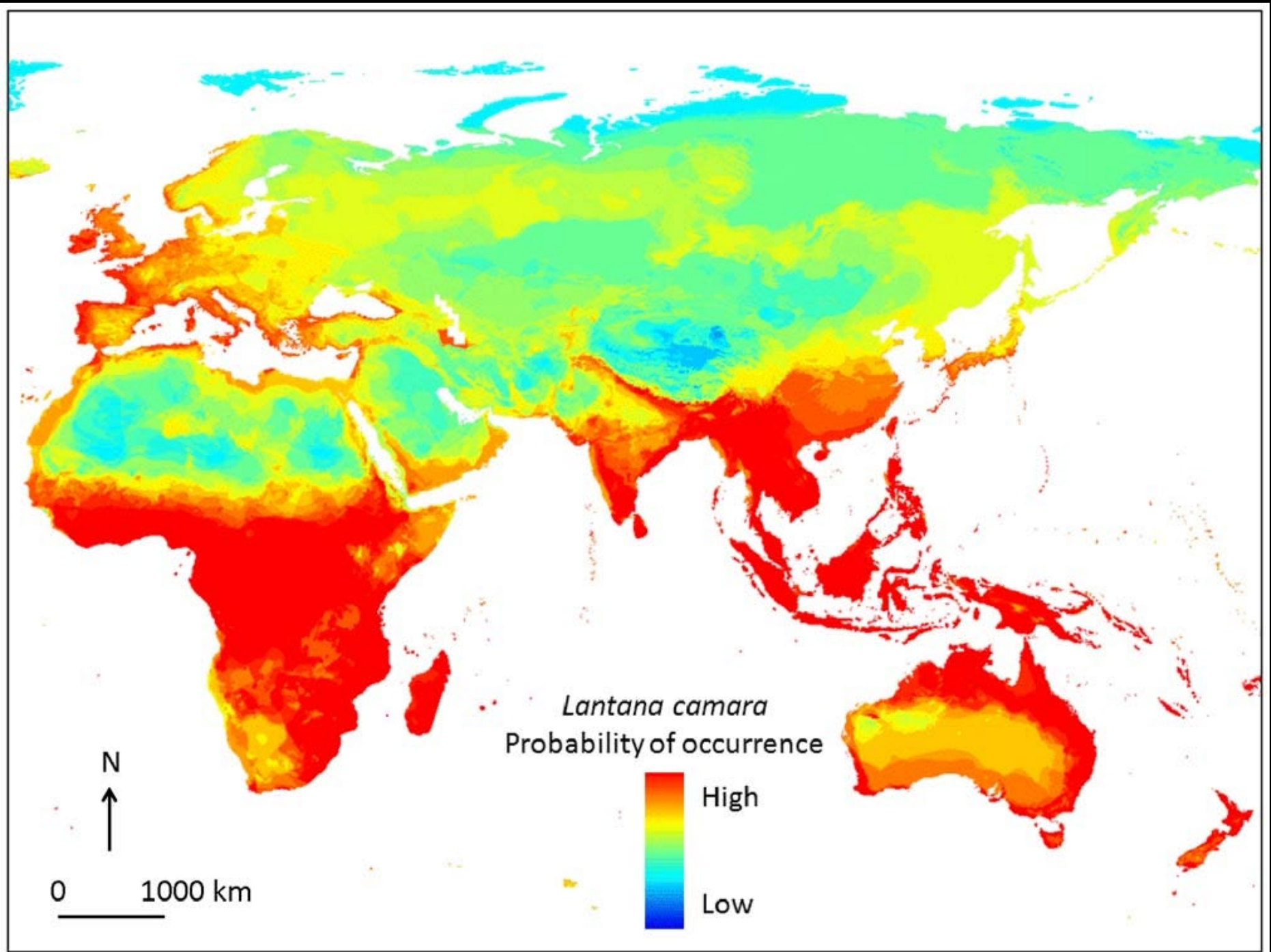


# History of the problem

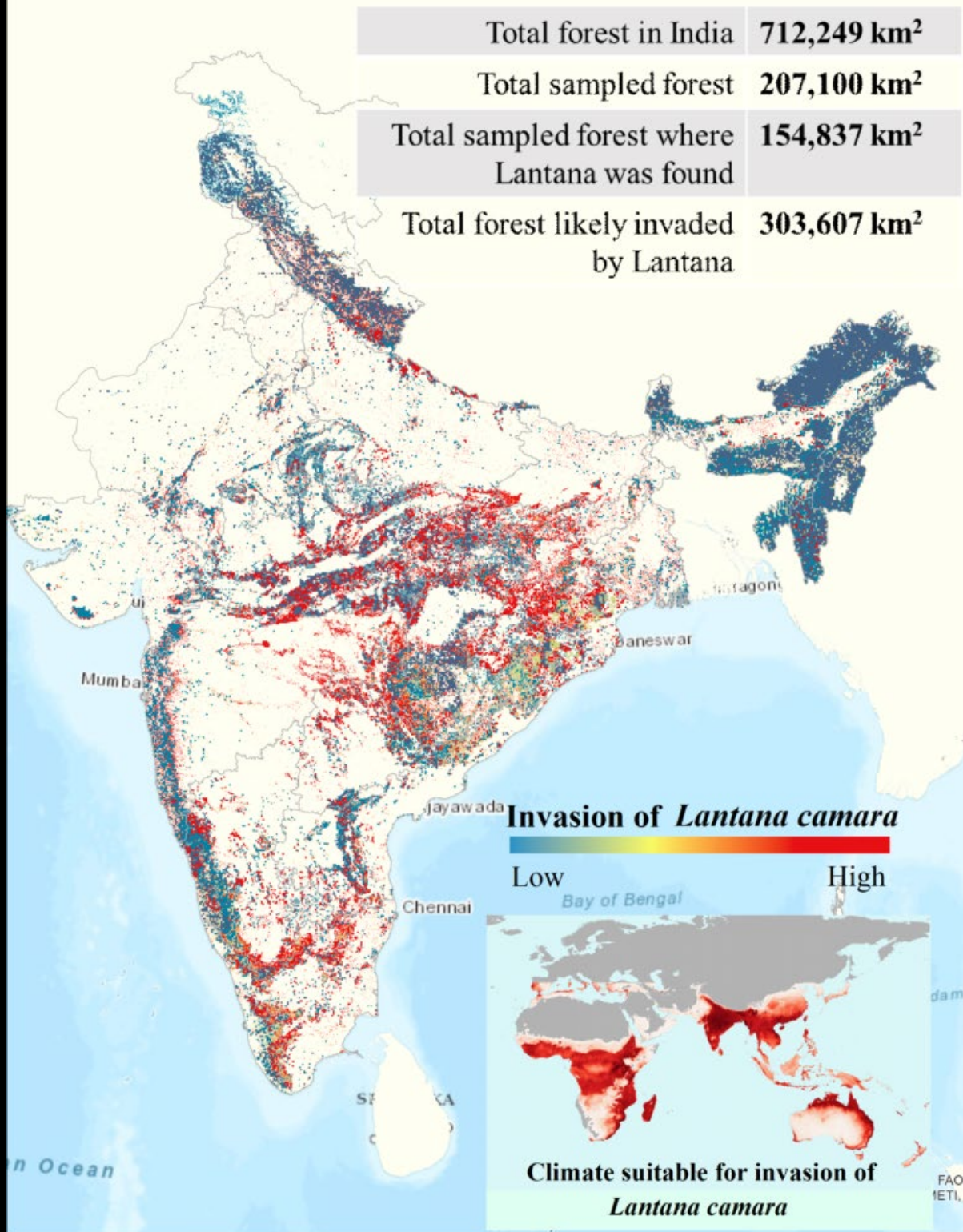


**Take away: first eradication plan 100+ years ago, but no efforts to date have paid off (Tiremen 1916, Bhagwat et al. 2012 )**





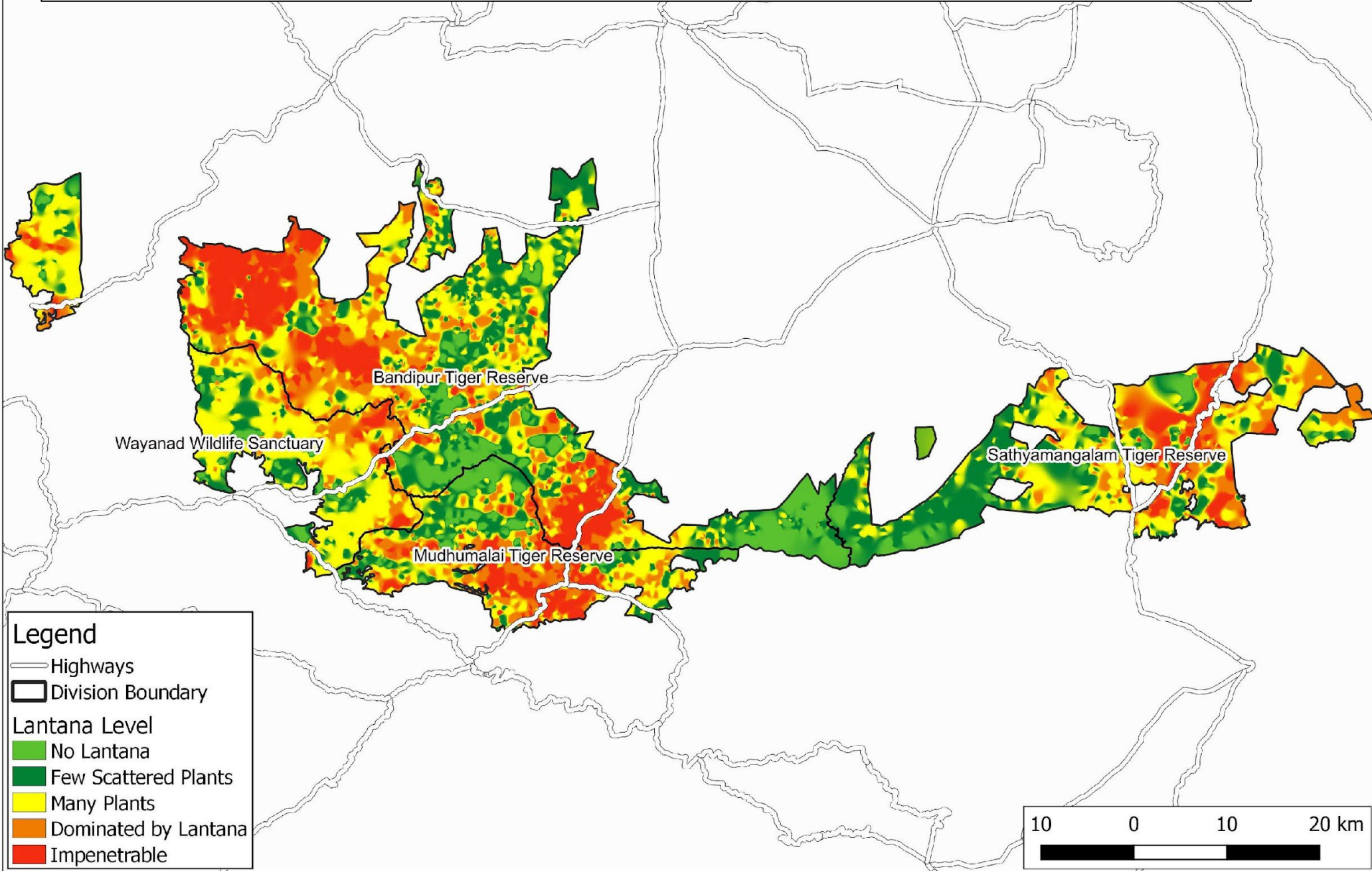
The Global Lantana Niche – invasive in over 60 countries (from Bhagwat et al. 2012)



- At National scale, total Lantana infestation is over 3L sqkm,
- Can cost up to 160,000 Cr INR/ 16B GBP to remove all this and restore.
- Traditional Manual removal mechanism is not feasible and new methods have to be developed.

(From Mungi et al. 2020)

**Approx. 35% dense Lantana infestation in Mudumalai, Bandipur and Sathyamangalam  
viz. 2000 sqkm (or 2000Cr INR/200M GBP to remove) across PAs in the Nilgiri Biosphere Reserve**



## 2. Creating Value

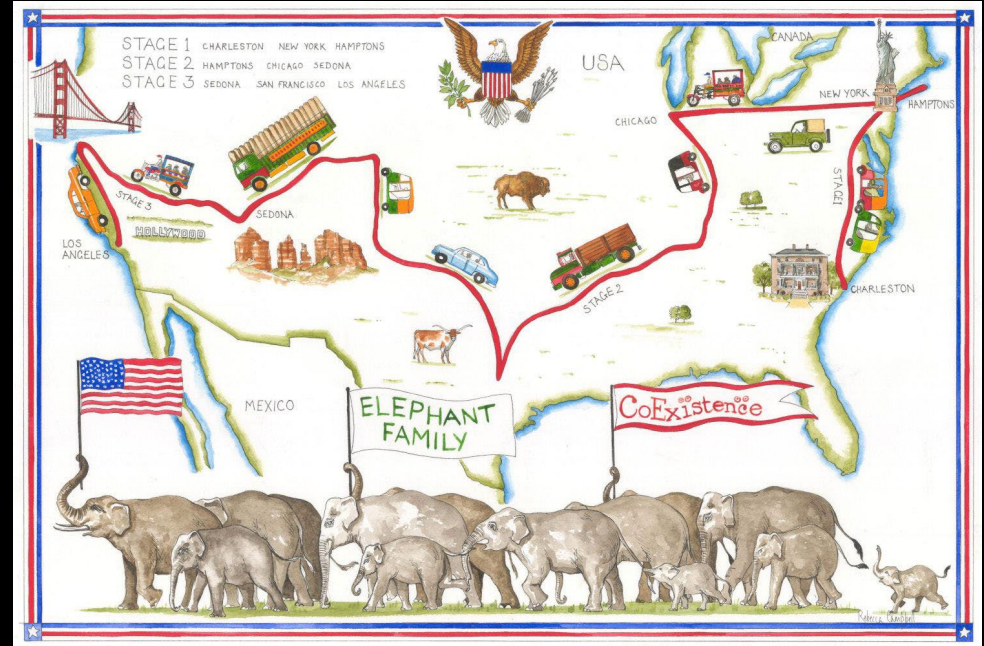




**Multiple Exhibitions in India: Kochi Biennale 2019, G20 Environment Ministers meeting (2023), London 2021, Installations in Mudumalai for Prime Minister and President, 5 elephants at the Rashtrapati Bhavan**

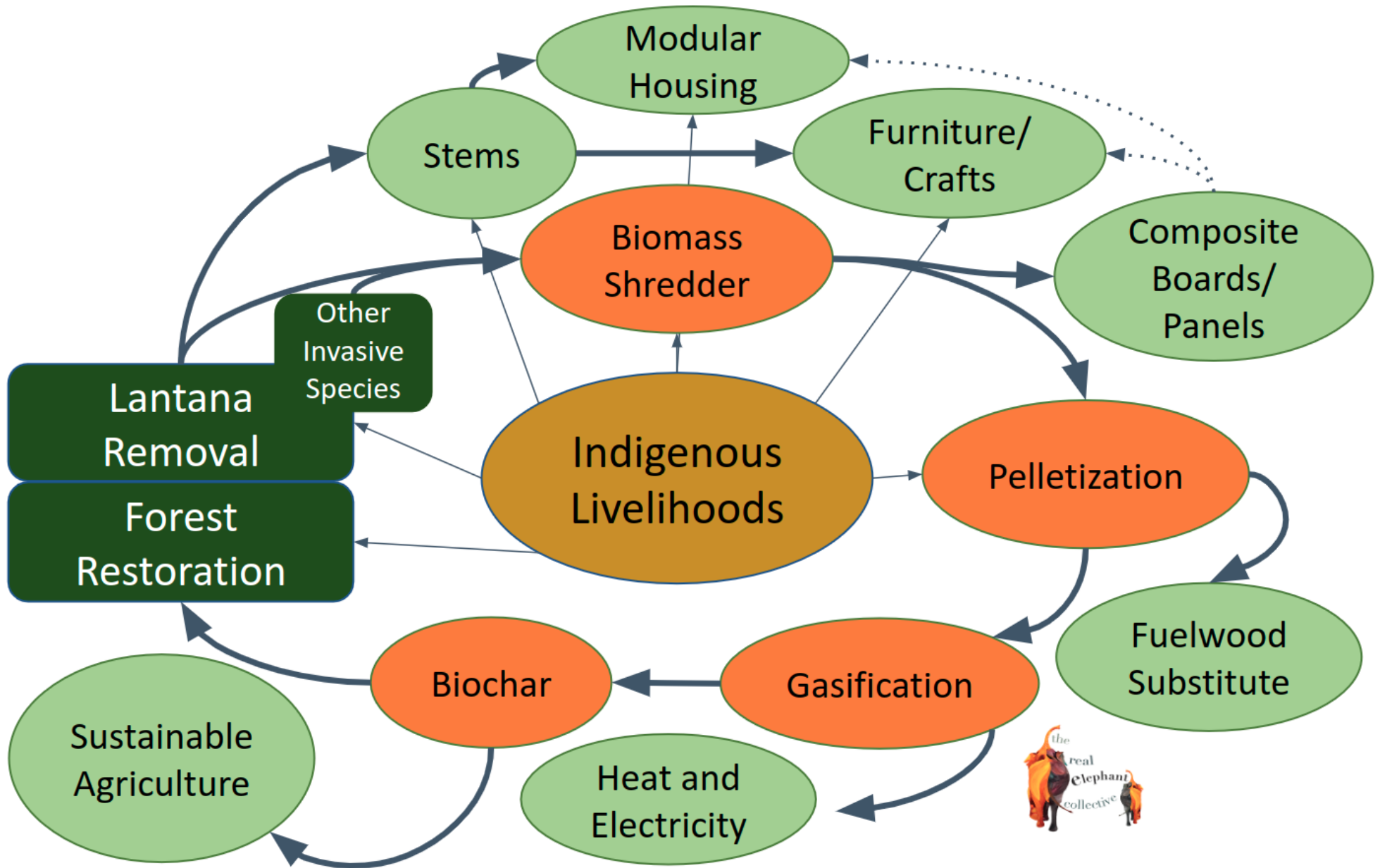


# 2024-2026: Large Exhibition planned in Cubbon Park (Bengaluru), Travelling TN, KL and KA, USA.



# 3. Creating Value: A circular “Lantana Economy”

*Revolving around Forest Restoration and Indigenous Livelihoods*



# Other uses



REUTERS World Business Legal Markets Breakingviews Technology Investigat

### Biochar: the 'black gold' for soils that is getting big bets on offset markets

By Karen Luckhurst



A worker in Peru prepares to grind biochar made from bamboo residues. REUTERS/Enrique Castro-Mandujano



# Briquettes and Biochar



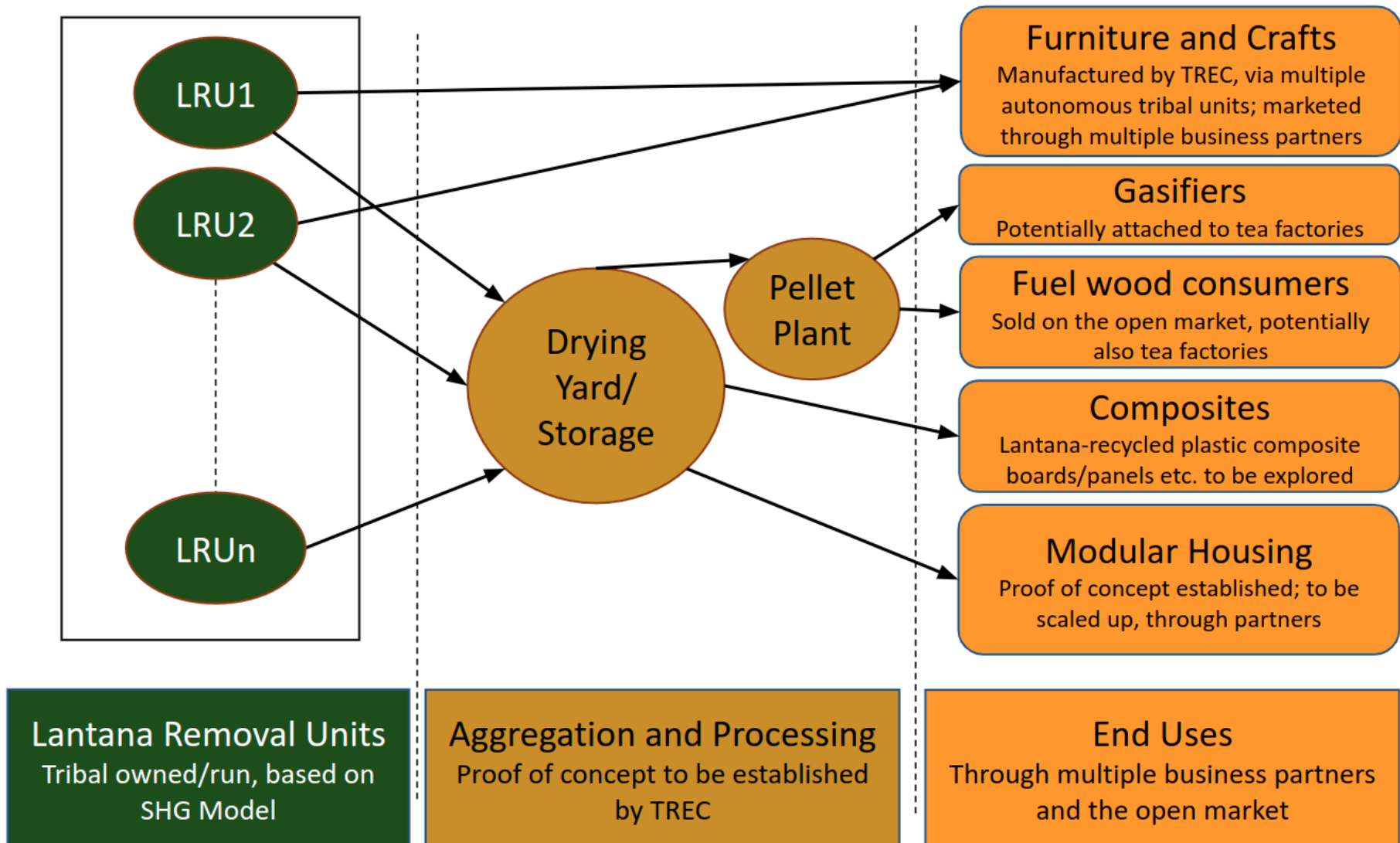


**Specialised machines for lantana removal and pulverisation – mini-excavator or tractor-based winch for uprooting lantana depending depending of labour availability, and tractor or pickup based shredder based on terrain.**





# Logistical and Institutional Structure at Park Level



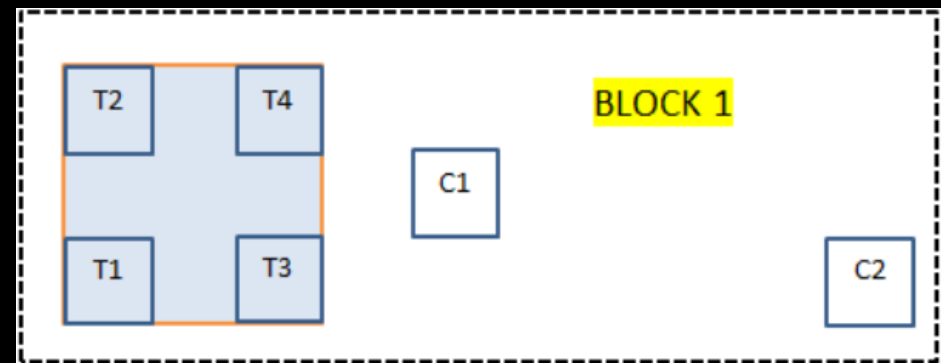
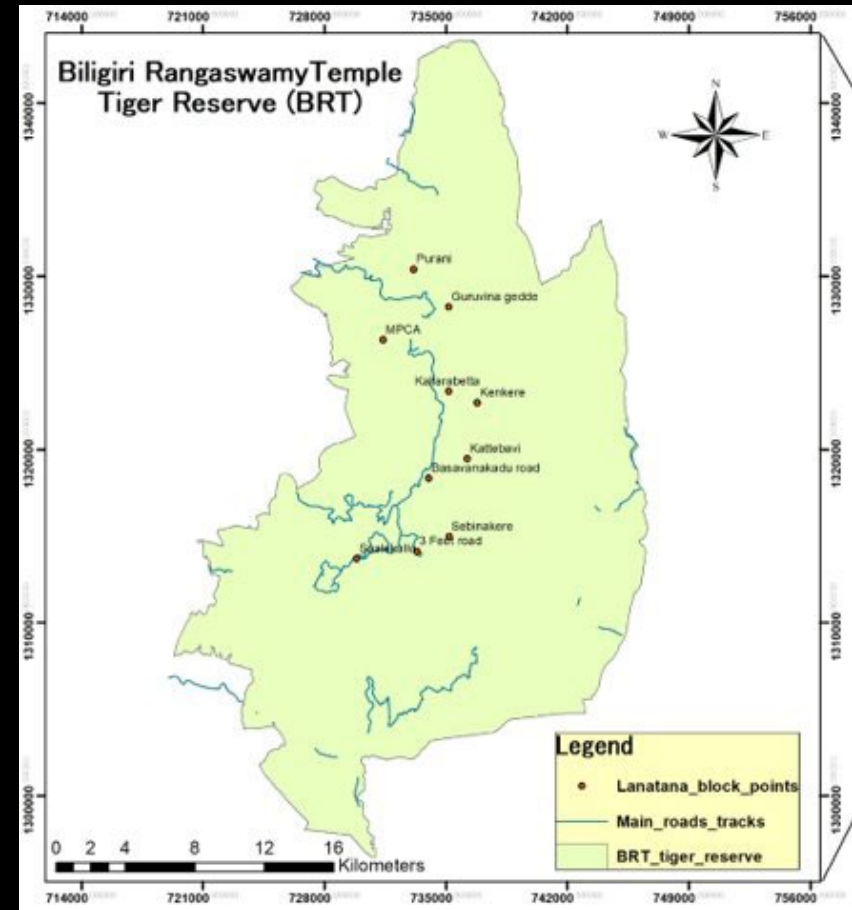
# 3. Monitoring and Restoration

# Experiment in BRT

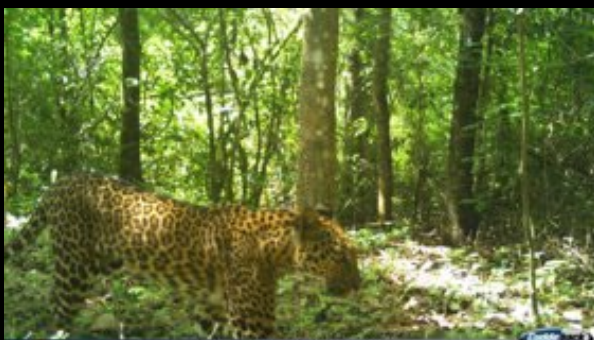
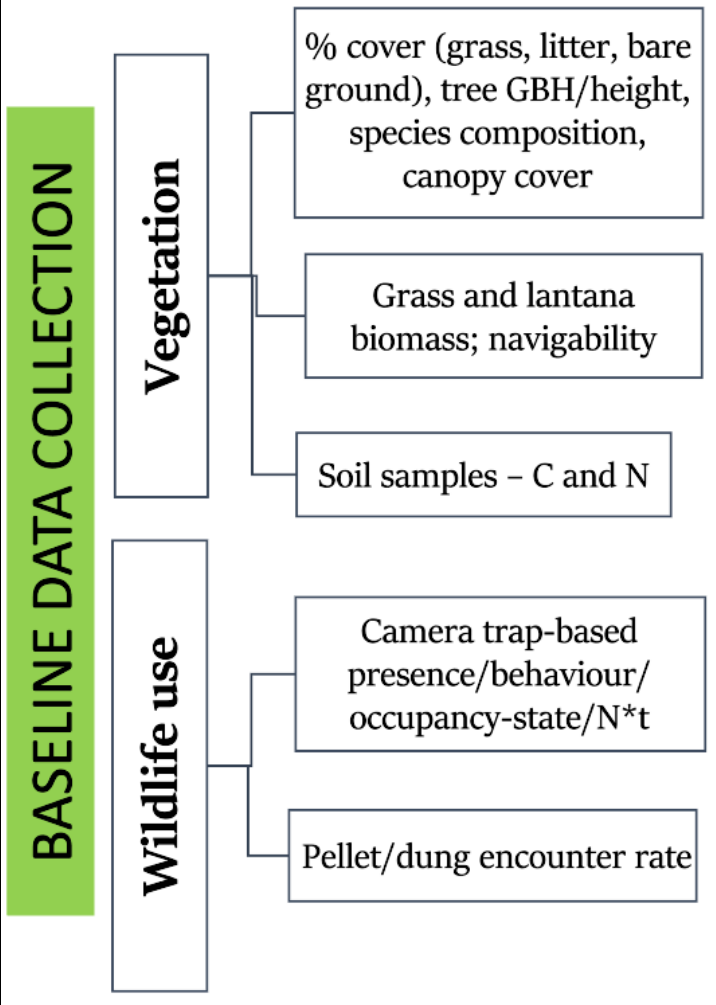
10 Blocks chosen, spread through the dense lantana areas in the BRT Tiger Reserve.

6 Plots marked in each Block:

- Treatment 1: removal of all lantana using
- Treatment 2: removal of all lantana + seeding of native grasses
- Treatment 3: removal of all lantana + cool-season burn
- Treatment 4: removal of all lantana + cool-season burn + seeding of native grasses
- Control 1: no removal/treatment near treatment plots
- Control 2: no removal/treatment 200m from treatment plots



# Regeneration Experiment in BRT – baseline data, lantana removal and grass seeding completed



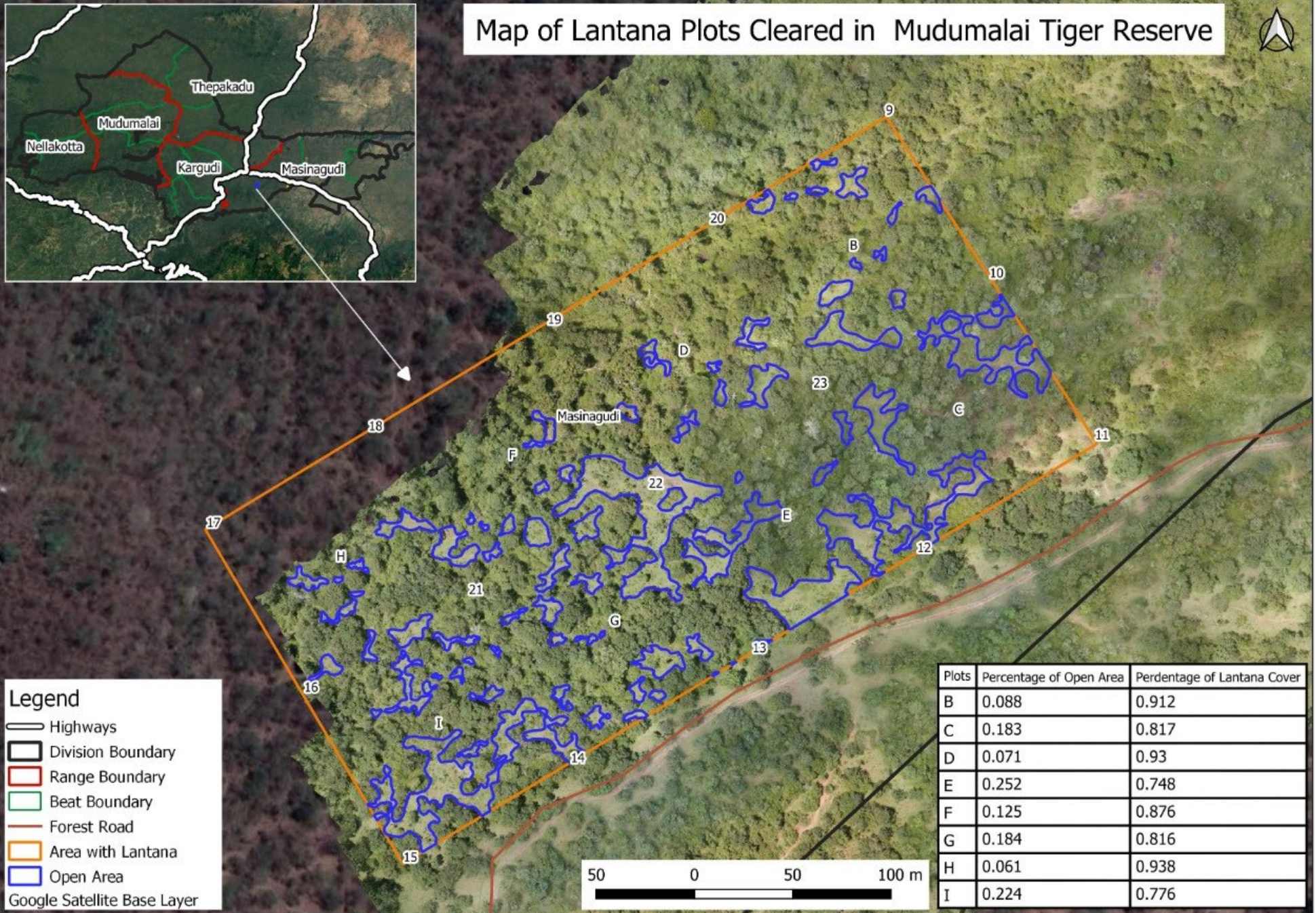
# Regeneration Experiment in BRT

Aerial view of plot before Lantana removal, and Soliga elders educating us on the ideal conditions for a cool season burn.



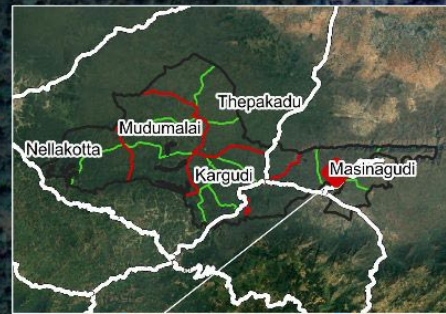
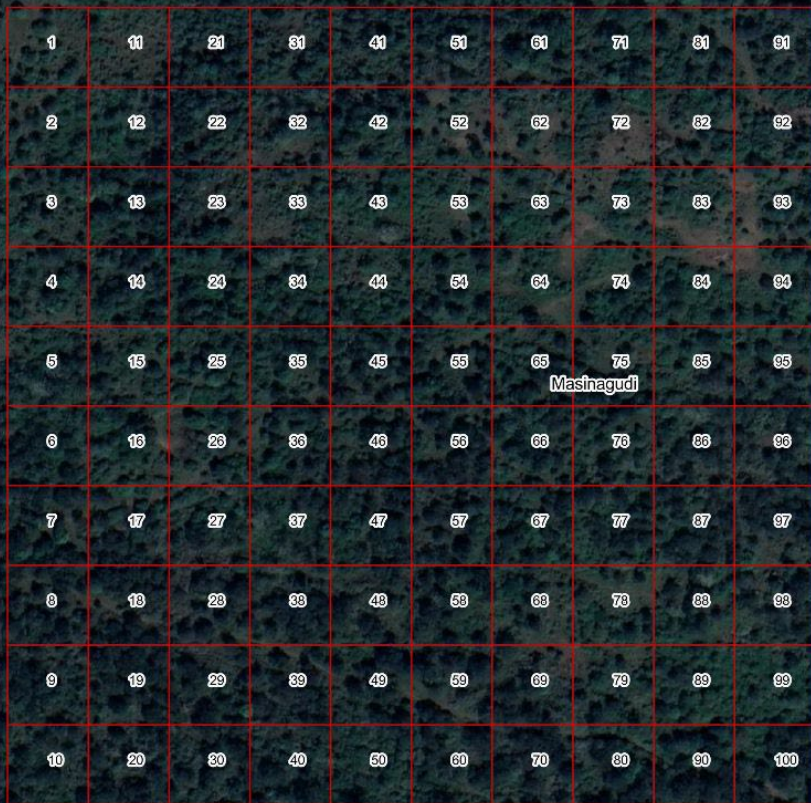
# Scalability - Percentage Area Lantana Cover

Map of Lantana Plots Cleared in Mudumalai Tiger Reserve



# Quantify “dense”, “medium” and “low” Lantana

Map for Lantana Density Assessment  
Mudumalai Tiger Reserve



50x50m grid, attempt on point in every alternate grid.

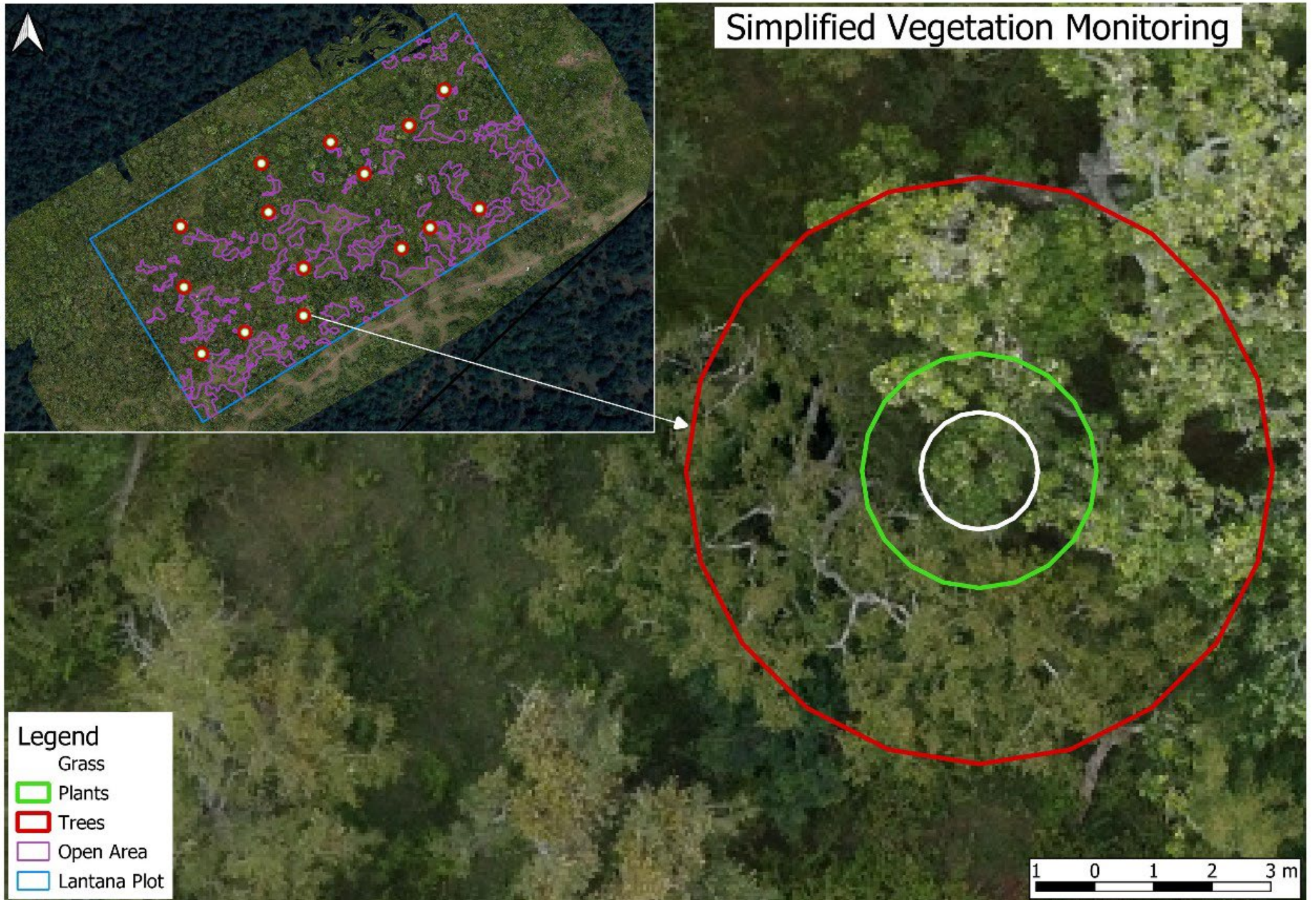
At each point, in 5m radius:

- Number of plants
- Stem thickness for 3 thickest stems/plant
- Canopy height and width
- Weight of biomass



50 0 50 100 m

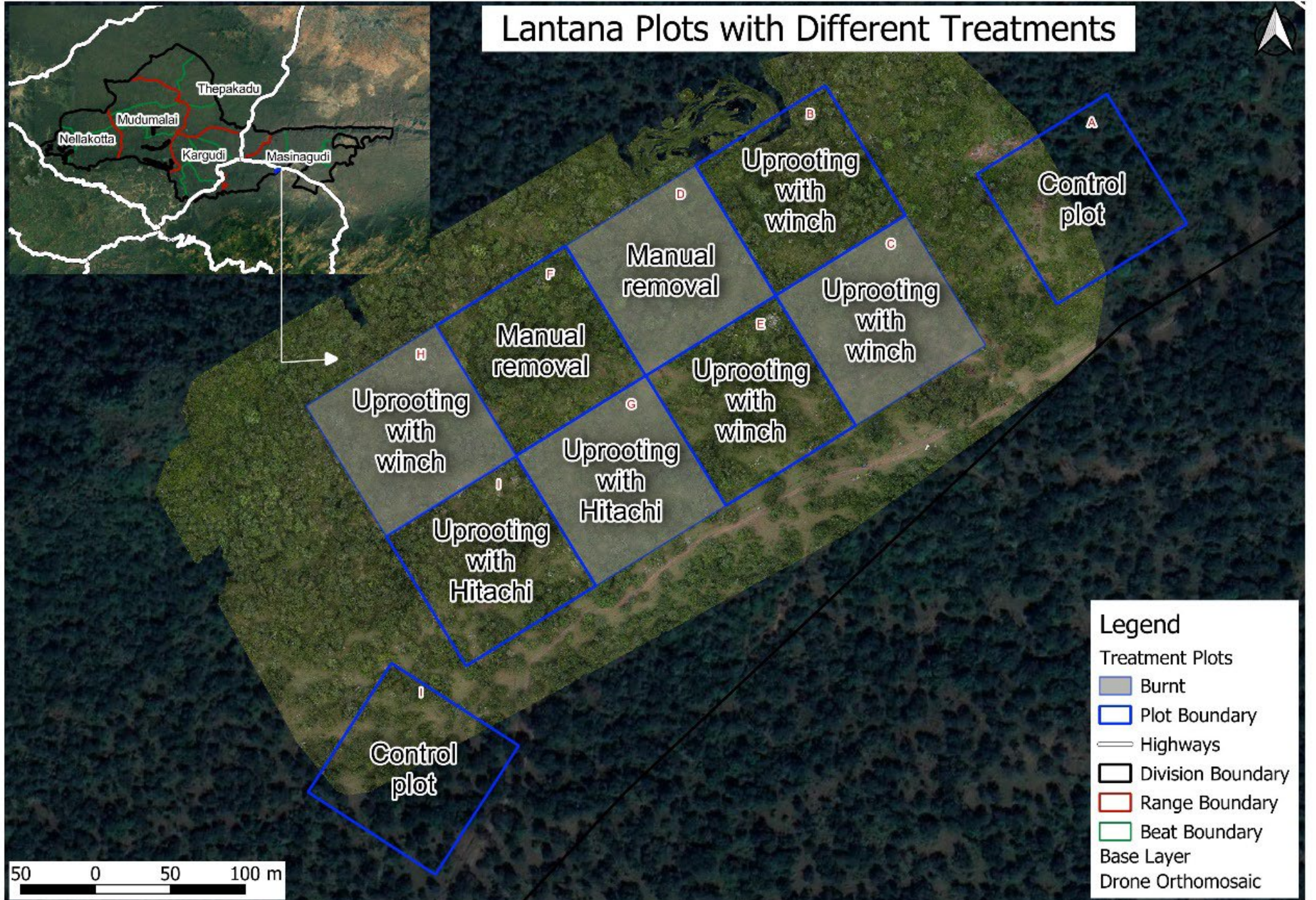
# Vegetation Baseline



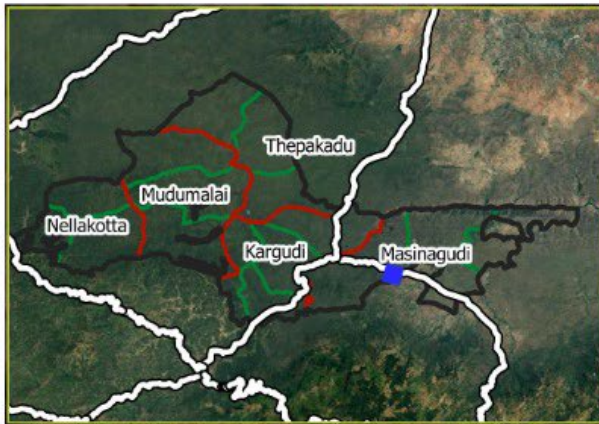


# Grass Understory Experiment in Mudumalai

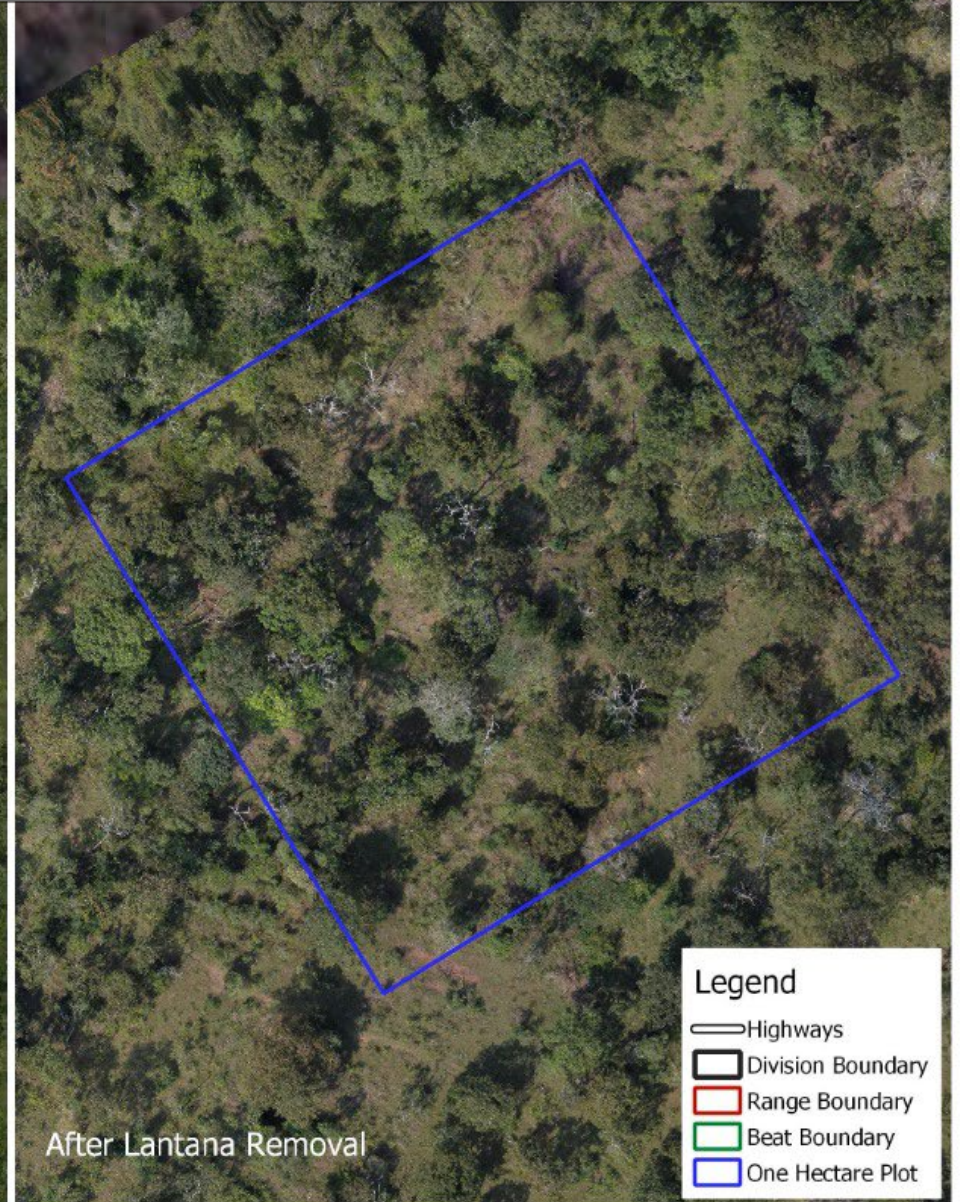
Lantana Plots with Different Treatments



# Assessment of standing trees before and after lantana removal



One Hectare Lantana Plot - Mudumalai Tiger Reserve  
Before and After Removal



## Legend

- Highways
- Division Boundary
- Range Boundary
- Beat Boundary
- One Hectare Plot

# (Eventually AI) based assessment of regeneration



## 4. Summary and Conclusion

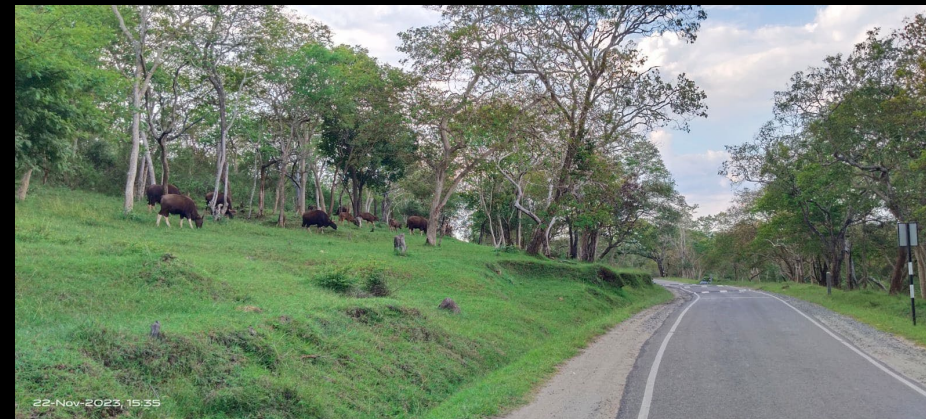
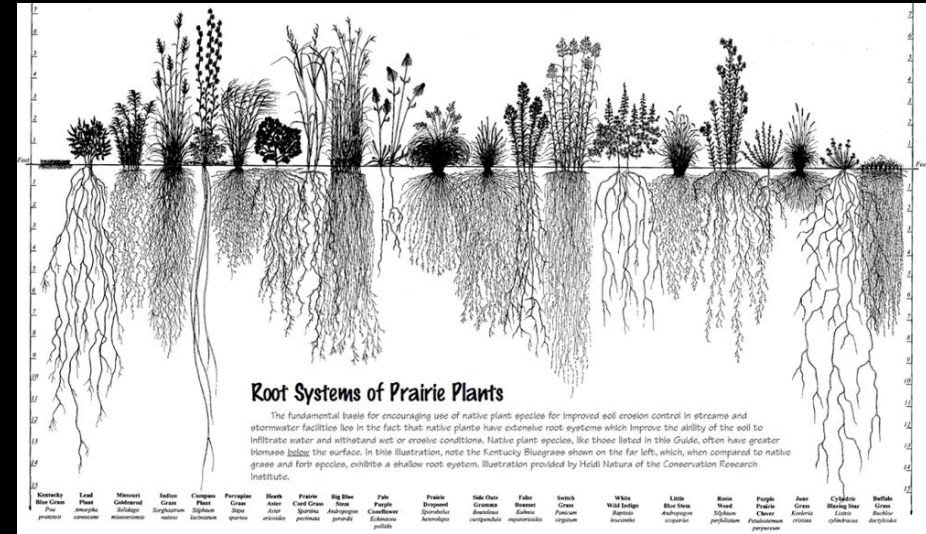
# Biomass availability and Logistics

- How much lantana is there?
- c.50 tons/hectare (20% MC), 15K ha dense lantana in one Park alone 0.75M tons of biomass. or c. \$50M in CORCs.
- Can it be self financing?
- Possibly! With Carbon+Biodiversity Credits.
- What happens when we run out of Lantana?
- Given 35 tons/day (per PA) that is 50 years of supply.
- Grant Funding still needed for low density area – the leading edge of the invasion



# Looking ahead and next steps

- **Challenges:**
- Harmonizing policies
- Burning question!
- Bulkiness limits transport, but feasible within 100km.
- High handling/bagging cost – requires mechanisation/innovation.
- Drying/reducing moisture in monsoons is a key challenge.
- Large variation in biomass yields (20-50 tons) making it un-viable except in dense areas.
- Grant funding still needed for the low density areas or leading edge of the invasion.



# Using invasive as perhaps the only solution?

Experiments with *Senna spectabilis* along similar lines underway, ecologically appropriate removal (with roots, rather than traditional logging operations), and creating high value products (toys)



# The 3C Impact

## Community

- New job creation and skill development
- Specialised, localised/ forest based alternative employment
- Income generation and security

## Conservation

- First large scale removal initiative
- Subsidised process heading towards self financing process
- Buried biochar to improve forest soils and mitigate climate change

**LANTANA**

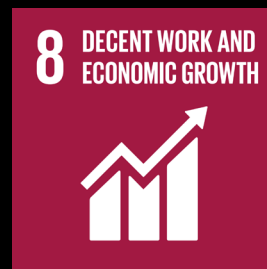
## Consumer

- Awareness and eco-consciousness
  - Availability of sustainable/ carbon positive products



# Multiple bottoms lines, touching on over half of the Sustainable Development Goals

- Proving livelihoods for disempowered forest-based communities (Goals 1, 10)
- Lantana briquettes replacing fuel wood as net positive energy source (Goal 7)
- Allowing communities to access meaningful forest based employment (Goal 8)
- Developing appropriate machines with minimal ecological impact (Goal 9)
- Providing urban consumers with sustainable Lantana based products (Goal 12)
- Burying biochar and implement carbon capture (Goal 13)
- Restoring native biodiversity and promote healthy forests (Goal 15)
- Creating linkages across community groups, governments and the market (Goal 17)





*Thank you!*