Is India's dominant vegetation savannah?

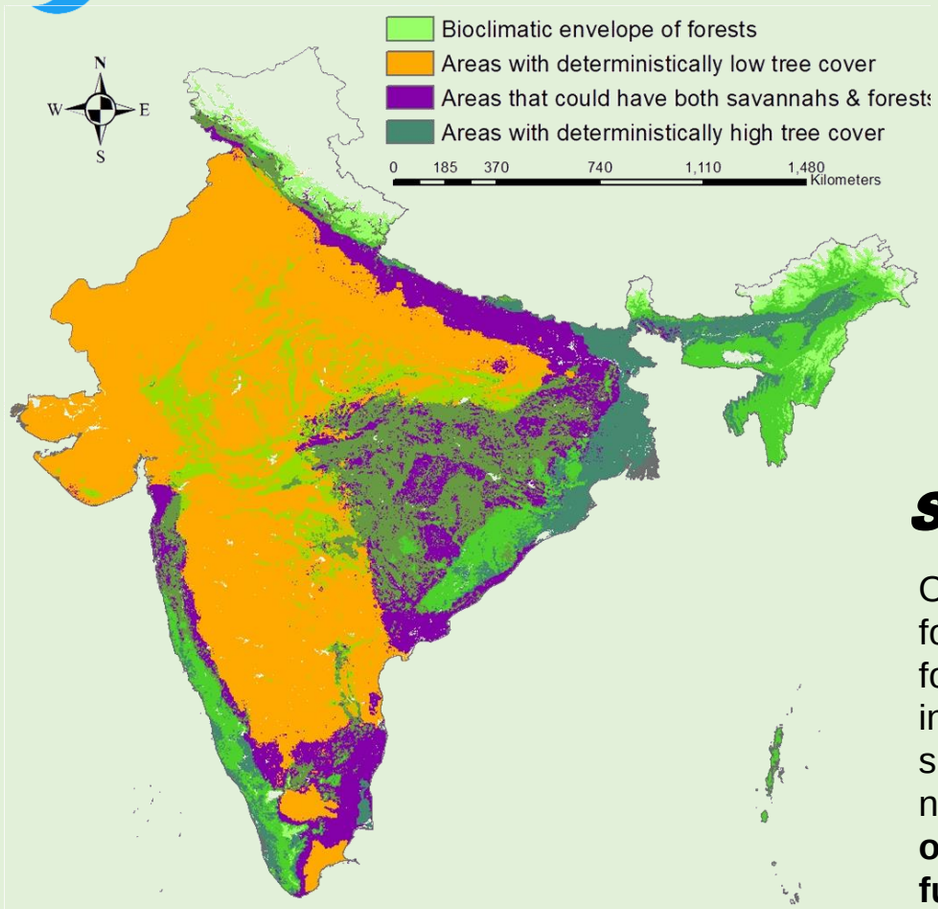
Reforesting in India for climate change mitigation without compromising native savannahs

Trisha Gopalakrishna, DPhil Candidate
@trishuphigh trisha.gopalakrishna@ouce.ox.ac.uk

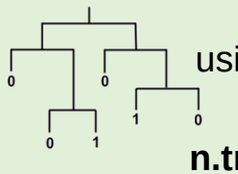
What?

India is known for its **forest centric vegetation**, mainly because how land was **managed in colonial times**[1]. However, recent studies have shown that the **dominant vegetation type** in India is **savannahs and grasslands**[2]. These Indian savannah and grasslands will be compromised when reforested for climate change mitigation benefits.

Here I model the bioclimatic envelope of forest systems of India (includes current forest area) and areas that have (1) deterministically low and high tree cover and **(2) areas that could have savannahs and trees (bi-stable states)**[3] **and hence should be reforested with caution**



How?



Boosted Regression Trees Algorithm using **9073 ground control forest points**

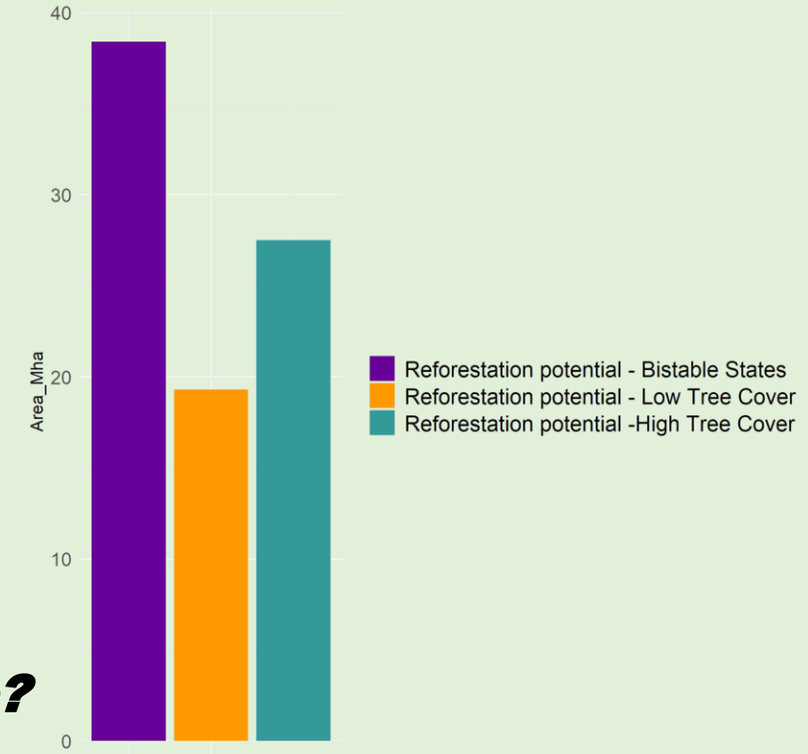
10 fold cross validated data partitions

n.trees=1000, interaction depth=5, min nodes=10, shrinkage=0.001

Generalized Additive Modelling with **tweedie distribution**

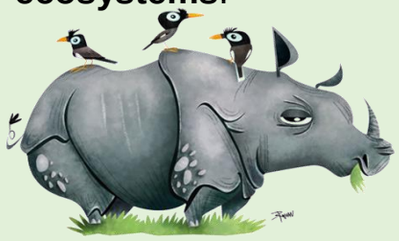
19 environmental variables used in modelling bioclimatic envelop of forests, 4 (including fire presence) used to model savannahs

TERRACLIMATE · Climate Hazards Center UC SANTA BARBARA · ISRIC World Soil Information · Shuttle Radar Topography Mission



So?

Of the **93 Mha** of the bioclimatic envelope of forest, **40% (38 Mha)** lies in areas that could be forests and/or savannahs. Reforestation activities in these areas need to be planned strategically, such that India's savannahs and grasslands are not compromised. Else**, there is a great chance of losing endemic fauna, flora and ecosystem functions and services from non-forest ecosystems**.



[1]- Ratnam, J., Tomlinson, K. W., Rasquinha, D. N. & Sankaran, M. Savannahs of Asia: Antiquity, biogeography, and an uncertain future. *Philos. Trans. R. Soc. B Biol. Sci.* **371**, (2016).
[2]- Kumar, D. *et al.* Misinterpretation of Asian savannas as degraded forest can mislead management and conservation policy under climate change. *Biol. Conserv.* (2020)
[3]- Staver, A. C., Archibald, S. & Levin, S. A. The global extent and determinants of savanna and forest as alternative biome states. *Science (80-.).* **334**, 230–232 (2011).

Thank you!
Nicola Stevens, PhD, Trapnell Research Fellow in African Environments, University of Oxford.
Sami Rifai, PhD, ARC Centre of Excellence for Climate Extremes, University of Sydney.