Conservation prioritization of semi-arid savannas in India: a multi-scale landscape approach

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Introduction
The semi-arid savanna grasslands of peninsular India are unique habitats that support a vast proportion of Indiaís agro-pastoralist community. They are also home to critically endangered species such as the Great Indian bustard and other endangered and endemic species such as the Indian wolf (Canis lupus pallipes) and blackbuck antelope (Antilope cervicapra). Unfortunately, savanna grasslands have not received the attention of conservationists or policy makers, resulting in a lack of protection for both the endangered and endemic wildlife as well as the habitat. Given the high human-dependence on these biomes, traditional conservation measures such as large protected areas are not feasible. The management and conservation of these fragmented and human-dominated regions requires delineation of high-priority areas which are most likely to persist in the long-term.

Materials and Methods
Delineation of semi-arid savannas with standard remote-sensing analysis techniques does not yield desirable results due to spectral mismatching with rain-fed agriculture. Therefore, to determine the extent of savanna grasslands in India, we used a multi-scale multi-method landscape level analysis. We first used multi-date NDVI derived from coarse resolution MODIS imageries to create a map of grasslands. We then used a rule-set based on a regression tree to predict areas which are bioclimatically suitable for grasslands. We then focussed on four states in central-south India (Madhya Pradesh, Maharashtra, Karnataka and Andhra Pradesh), and derived medium resolution (30m) maps using a Supervised classification of Landsat ETM+ imageries and extensive ground truthing. We used a filter approach to determine the largest contiguous patches in these four states (>100ha). Finally, we derived high-resolution (5.6 m LISS IV) maps of the largest contiguous patches in these four states. We combined these maps in the software package ZONATION with information on species presence and conservation compatible and incompatible human-use to generate areas of conservation prioritisation.

Results and Discussion
Based on our exercise, we found that Karnataka had only 2.1% of its geographic area under grassland >100 ha; Andhra Pradesh (unified) had 4.2%, Madhya Pradesh had 7.9% and Maharashtra had 12.8%. Within these states, we identified nine areas ranging in size from 34 sq. km to 922 sq. km. for further survey and conservation action. These areas not only have the potential to conserve the inherent biological values of this biome, but at the same time support traditional livelihood practices.

Conclusion
We propose these areas be declared as conservation reserves that allows for mixed use of the landscape, by engaging all stakeholders in developing a joint landscape conservation program.

Acknowledgement