



The GMBA Moshi-La Paz Research Agenda on

Land use effects on tropical and subtropical mountain biodiversity

1. The use of highland vegetation and husbandry systems (food)

- ✓ What is the sustainable annual biomass production of herbaceous (including grass) and woody vegetation in (sub-) tropical highlands?
- ✓ What is the differential contribution of dominant (tussock grasses, shrubs) and subdominant species to overall yield and biodiversity?
- ✓ What is the role of nitrogen fixing plants and their phosphate limitation for overall yield?
- ✓ What is the impact of grazing and trampling on pasture species diversity (including wildlife and other trophic levels)?
- ✓ How can these impacts be modified by shepherding or the use of fences?
- ✓ What is the significance of animal type, stocking rate and animal weight for pasture integrity?
- ✓ How does plant diversity affect the capacity to recover after disturbance (resilience, ecosystem integrity)?
- ✓ How do wild and domestic animals interact on common pasture land?

2. Fire ecology

- ✓ What is the optimal fire frequency for sustainable yield and biodiversity?

- ✓ What is the differential effect of fire on dominant (tussock grasses and shrubs) versus subdominant species?
- ✓ Are there alternatives to burning to improve forage quality while at the same time maintain or increase biodiversity?
- ✓ How does burning affect runoff and the export of solid organic and inorganic matter and dissolved nutrients?
- ✓ What is the relative significance of climatic vs. anthropogenic controls of fire?

3. Highland cropping, hunting and gathering, and medicinal plants

- ✓ Upper montane crops and medicinal plant gardens: genetic treasures—how to treat and protect them?
- ✓ What are sustainable cropland rotation systems on high elevation slopes?
- ✓ Establishing wild medical plant inventories of mountain regions.
- ✓ What is the effect of wildlife management on richness of mountain biota?

4. Regeneration and re-vegetation outside forests

- ✓ What is the effect of animal grazing and fire on regeneration/re-vegetation?
- ✓ What are the techniques and their success of land surface

stabilization on steep slopes with local plant species?

- ✓ The significance of persistent soil seedbanks and natural seed migration into disturbed mountain areas for biodiversity and revegetation success?
- ✓ How to cope with scrub invasion in grassland? Leave it, destroy it, or use it?

5. Upper montane forest and the high elevation treeline (fiber & fuel)

- ✓ Livestock and mountain forests – what is the optimal balance between food and fibre production at high biodiversity?
- ✓ How would the natural high elevation of tree lines look? How do climate and disturbances control them?
- ✓ Regeneration mechanisms and rates of forest regeneration in former high elevation pasture lands (native vs. exotic species).
- ✓ Remnants of the former climatic treeline. A source for reforestation and biodiversity?
- ✓ Firewood in the upper montane forest - how to use it sustainably?
- ✓ What are the effects of non-tree biomass harvesting (e.g. shrubs, cushion plants) on biodiversity?
- ✓ What are the differential effects of high elevation forests and non-forest vegetation on habitat quality and animal biodiversity?

6. Cross cutting research issues

- ✓ While significant for biodiversity, all of these themes have links to watershed management, hence the evaluation of hydrological consequences and erosion risk (which affect biodiversity) are central to all forms of land use.
- ✓ In all these fields, there is indigenous knowledge and experience which needs to be implemented and documented.
- ✓ For each theme, simple and common methods as well as common protocols need to be adopted, and training is needed (field courses).
- ✓ Interaction of land use with climate change need to be considered in view of the most rapid climatic change happening in tropical mountains (+0.33 K /10 years, Vuille et al. 2003, Climatic Change, 59: 75-99)
- ✓ Results need to be communicated in a way that is usable by local stakeholders. Most promising is the practical involvement of local people in the research work and field demonstrations.

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