Contextualizing land use and land cover change with local knowledge: a case study from Pokot Central, Kenya

Marcus Nüsser¹, Maike Petersen¹, Christoph Bergmann¹, and Paul Roden²

¹Ruprecht-Karls Universitat Heidelberg Sudasien-Institut
²Kenyatta University

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Abstract

Rural communities in the drylands of Sub-Saharan Africa (SSA) derive their livelihoods primarily from their natural resource base. Unprecedented changes in these environments over the past few decades are likely to intensify in the future and land users need to develop sustainable adaptation strategies. This study aims to identify land use and land cover (LULC) changes and their drivers in a Sub-Saharan dryland, between 1986 and 2017, by integrating local knowledge and remote sensing analysis. Local knowledge and environmental perception are used as the basis for defining LULC classes and for training and validation of change detection. This study identifies bush encroachment into former pastures as the dominant LULC change with an increase of woodland by 39% and a decrease of grassland by 74%. This process is perceived as severe degradation by local respondents and is linked to changing management regimes and unreliable rainfall patterns. Deforestation and woodland thinning can be traced back to increased habitation and farming, though the local community also identifies charcoal production as a driving factor. The integration of remote sensing and local knowledge provides a holistic view on LULC change in Pokot Central, Kenya, and offers a solid base for site specific and actor-centred management approaches necessary for sustainable pathways of drylands.

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| LULC class | Characteristics | Local name | Local explanation | Photo |
|------------|-----------------|------------|-------------------|-------|
| Gallery forest | Height > 10 m; Canopy cover > 70%; dominantly single-stemmed trees; with/without subcanopy layer; impenetrable in some parts (Vachellia tortilis (Forsk.) Galasso & Banfi) | Wae jo islawa | Larger communities of mostly higher trees along the rivers | ![Forest Photo](link) |
| Thicket | Height < 10 m; Canopy cover > 70%; impenetrable; with dense subcanopy layer, evergreen (Euphorbia spp.) | Siwr | Impenetrable mix of short trees and shrubs; “one cannot see through” | ![Thicket Photo](link) |
| Woodland (continuum from open to closed) | Height < 10 m; Canopy cover 15-70%; with scattered larger trees; single- but mostly multi-stemmed trees; with subcanopy layer; deciduous (Vachellia spp.; Sansevieria ehrendorferi Schweinf. ex Baker) (Where dominated by multi-stemmed, deciduous Vachellia reficiens (Kyal.) Kyal. & Boatwr. usually no subcanopy layer) | Wae nyo tartar | Dense mix of short trees and shrubs, with few larger trees in between; where people can hardly walk through and where people would not settle | ![Woodland Photo](link) |
| Sparsely vegetated | <15% cover, very scattered trees; bush; no grass layer | Nameywa | Vegetation is very scattered and appears in small “islands” of individual trees and some shrubs; no grass appears after the rainy season | ![Sparse Vegetation Photo](link) |
| Grassland | Cover of woody plants <15%; annual grassland | Korosus | An area where you find plenty of grass | ![Grassland Photo](link) |
| Farmland | Cultivated fields | Plaan | Farmed land; no differentiation between irrigated and rainfed | ![Farmland Photo](link) |
| Bare areas | Land with limited vegetation, such as sandy or rocky riverbeds, wasteland; land recently cleared for future farming or recently harvested farmland | Koron | Bare ground; nothing grows; no grass appears after the rainy season | ![Bare Areas Photo](link) |
