Community level patterns of landscape services across multifunctional landscapes in rural Tanzania (SUSLAND)

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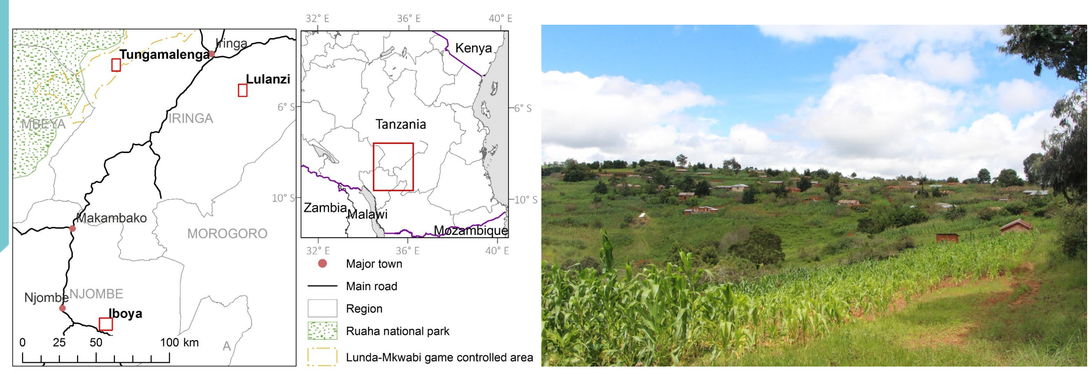
Land use changes from global to local scales

Poverty, conversion of forests to agricultural land and reliance on wood-based energy are globally recognized bottlenecks behind land changes. At broader scales, external socio-economic changes drive these transitions. ***At local scales***, the interlinked socio-ecological processes trigger land use changes, relate closely to ***values and preferences*** that people set on different land use choices and strategies. Landscape services can be defined as benefits that people receive from the environment (MA 2005).

The objectives of this work are: 1) to map, quantify and explore ***place-based landscape services as perceived by local communities*** in three multifunctional rural landscapes, 2) explore differences in ***spatial clustering, extent and intensity*** between landscape services, and 3) evaluate potential of ***spatially sensitive participation to support understanding, learning and use of maps among community stakeholders*** and in relation to land use planning.

The study is realized in the Southern Highlands, Tanzania, which, like most of the rural Tanzania, suffers from severe land challenges related to population growth, expansion of settlement and agriculture and overuse of forest resources.



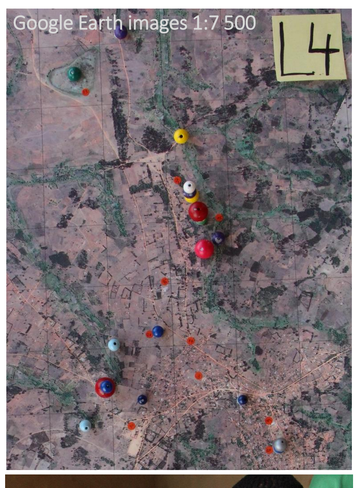
Participatory mapping of landscape services

Place-based stakeholder knowledge of landscape practices and values can be efficiently collected through ***participatory mapping***. Semi-structured surveys including mapping component (***participatory GIS***) were organized in three villages in Southern Highlands, Tanzania in February 2016 (n=313). The survey was targeted to community inhabitants. We developed a landscape service typology that captures the tangible and intangible benefits obtained from everyday landscape among the local communities mapped as points on a satellite image map (Table 1).

Initial results were shared with the communities in ***workshops*** in March 2017 (n=97). In the workshops results were interpreted in groups of men, women and community experts and compared with the map of village land use plan. Each participant was interviewed to ask about map reading capacity, personal learning experiences and usability of maps to express opinions.

Table 1. Selected landscape services and their indicators in the context of Southern Highlands, Tanzania.

Landscape service	Landscape service indicator
Provisioning	
Food	Cultivation
	Keeping domestic animals
	Beekeeping
	Collection of wild food
	Hunting wild animals
Raw materials	Tree planting
	Extraction of building materials
	Collecting handicraft and natural medicine materials
Fuel	Cutting/collecting firewood or wood for charcoal
Water	Fresh water source
Cultural	
Social relations	Sites for social gatherings
Religious and spiritual values	Religious or sacred place
Culture and heritage values	Sites for traditional practices, local culture or historical value
Aesthetic value	Beautiful, attractive place



What is SUSLAND?

Sustainability, scale relations and structure-function-benefit chains in the landscape systems of the Tanzanian Southern Highlands (SUSLAND, 2014–2018) is a Finnish Academy -funded research project between University of Turku and University of Dar es Salaam. More information at tanzania.utu.fi and follow us in Facebook at www.facebook.com/ututanzania

Results

In total the 313 respondents mapped 6117 landscape service indicators (Fig. 1 & 2), on average 18.4±5.1 places (min 7, max 34). The results provide spatially explicit information of the characteristics of landscape service provision and communities' relationships with different services (Fig. 3).

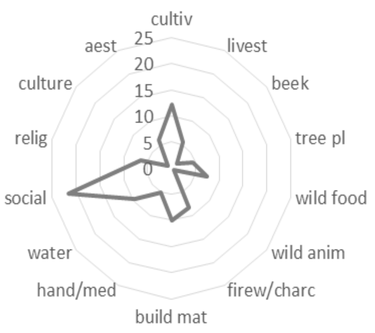


Figure 1. Relative proportion (%) of mapped places per each landscape service indicator.

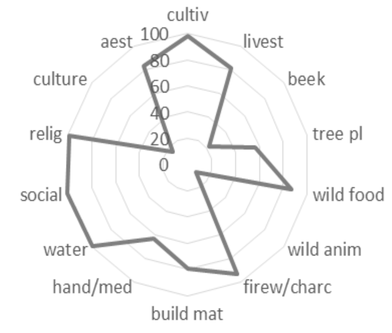


Figure 2. Relative proportion (%) of respondents that mapped each landscape service indicator.

Provisioning services show a scattered pattern, distributed close to resources where the daily activities happen. This is explained not only by ***individual family strategies of subsistence livelihoods*** but also by the fact that families have different ***parcels of land scattered*** in the landscape. ***This creates the uniqueness of local landscape benefits/demands*** in each village.

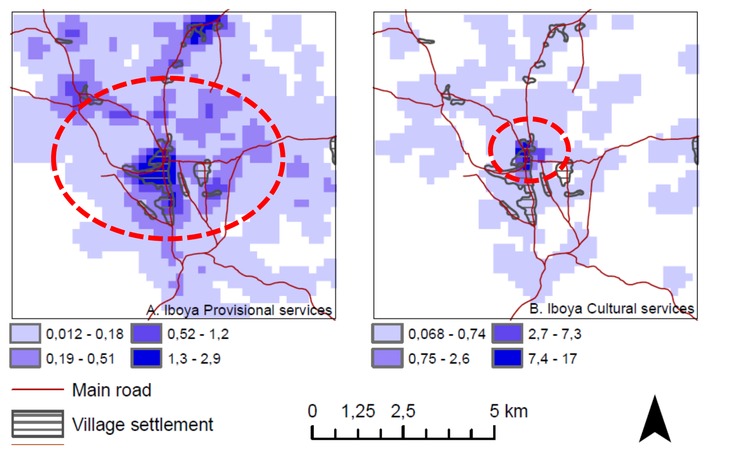


Figure 3. Lower spatial intensity, larger extent observed for provisioning than cultural service (Kernel density analysis, points/ha, 200 m cell)). Nearest neighbor statistics reveal most clustered services are social interaction, water sources, and religious/sacred places.

Shared sites of cultural services crucial for the wellbeing of people. Subsistence-based livelihoods are determinant not only for spatial patterns of provisioning services but ***also for cultural services that that are often subordinate to these.***

Enhanced argumentation with spatially explicit data is particularly related to ***visual power of maps and satellite image*** used in the background (Fig. 4). Interview quotes highlight this:

"Satellite image helped increase understanding because some areas are not well understood by just walking in the village." (male, 28 yrs.)

"Because the map was clear and I could see everything therefore it triggered my mind." (female, 45 yrs., expert group).

Documentation from discussions among the groups clearly shows that maps are useful in showing use of resources and values on land from the perspective of the villagers.

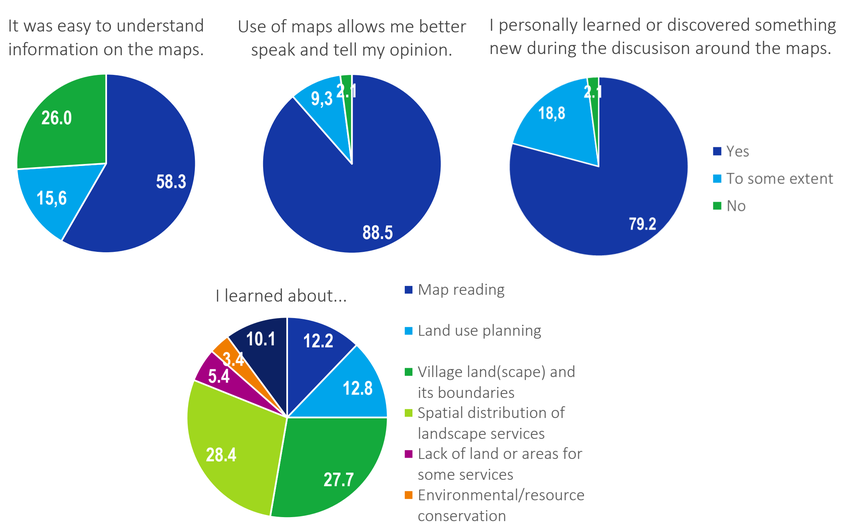


Figure 4. Relative share of responses to interview questions after workshop.

Implications for land and forest management

Land and forest management challenges are inherently spatial and require ***spatially sensitive participation*** which allows local-level, spatially specific discussions between stakeholders. In ***data scarce contexts*** potential of such place-based knowledge is of outmost importance to advance understanding of land use, its management and planning.

Institutionalization of spatially sensitive participation is needed to promote participation. Collaborative, bottom-up landscape governance realized with different tools and approaches should be promoted ***in local level planning guidelines.*** It has also potential for learning and capacity building among stakeholders.

Refenrences

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