

Geoportti methodological storylines

Participatory landscape services mapping with local residents in the rural villages of Tanzania

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RATIONALE OF THE WORK: Our goal was to study what type of services landscapes provide to local communities in Tanzania, in order to narrow down the knowledge gap on how landscape turn into different local level benefits, both tangible and intangible. Better understanding of perceived benefits supports protection and management of landscape and land-related assets, especially amidst many land use pressures and political interests on the land.

We used participatory mapping methods in the collection of place-based information on landscape service utilization among the three local communities in Tanzania. As the method engaged the communities into feedback discussions on how they use their landscapes, the research had wider impact on the villages. Development of feasible participatory mapping methodology is prominent to advance more inclusive and spatially explicit planning in the Global South.

KEY RESULTS: The study generated place-based knowledge on the provisioning and cultural landscape service benefits and values attached to them. The landscape service benefits were most abundant in the village centers especially in terms of cultural services. The scattered spatial patterns of provisioning services are realizations of human benefits from the structure of the biophysical landscape. The participatory mapping approach enabled the collection of local-level, spatially explicit information and allowed discussions between stakeholders. The use of maps and satellite images to facilitate participation were emphasized as powerful tools of engagement and learning, and for creating discussion.

RESEARCH DATA: The landscape service point data consists of ten provisioning and four cultural service benefits mapped by the participants. Kernel density surfaces, generated from the service point data, describe the spatial extent and intensity of the landscape service benefits over the village areas. As these data products contain information on individuals' activities, they are treated with the required protection of privacy and cannot be openly shared, at least for the moment. If you are

interested in the data produced in this study, please contact the authors. **METHODOLOGY:** Below, we describe in more detail the participatory mapping campaign and the feedback campaign.

Participatory mapping campaign

We organized facilitated semi-structured surveys with a participatory mapping component in three study villages in the Southern Highlands of Tanzania during February-March 2016. In total, we surveyed 313 residents in the villages. We had two surveying teams and a single survey interview took on average around 35 – 45 minutes. The campaign took 5 weeks in total.

The mapping campaign had the following steps:

Firstly, we used ward- and district-level population statistics to estimate the age and gender distribution requirements for the sample of the residents. We designed the sampling spatially to include respondents from different parts of the villages. The village executive officer, following our requests, contacted the potential participants.

Secondly, we organized a meeting in which the research team and the village leaders agreed upon the survey schedule, we familiarized ourselves with the villages and demonstrated how satellite image printouts will be used in the mapping. During the meeting, we mapped locations of interest and other features that would help us orient the participants on the image (e.g. schools, churches and where to the main roads lead to).

Thirdly, we individually surveyed each participant using local Swahili language. The surveys started with an orientation to the satellite image map including locating the respondent's home. Then we asked few socio-demographic background questions (age, marital status, household size, livelihood sources, and relationship to the area).

Then each respondent started mapping his/her provisioning and cultural landscape benefits on the image maps with wooden beads. The survey ended with additional socio-demographic questions on the level of education and household income. These questions were placed at the end of the survey because of their sensitive nature.

For a more detailed description of the survey structure, [download the used form here](#).

For the mapping task, we used a mosaicked 2012–14 high-resolution Google Earth images on a scale of 1:7500. We printed the images on A0 size papers and the participants identified the services by using different-colored wooden beads (1–2 cm in diameter). Based on the satellite image scale and the size of the beads, we estimated the accuracy to be within 200 meters.

The second member of the mapping team simultaneously transferred the locations of the wooden beads on to the computer. For this, we used a QGIS workspace with the same satellite image on the background. We created a point vector file for each participant and used a predefined visualization file to visualize the data while digitizing. We also photographed the results and later used the photographs to crosscheck the digitized spatial data. For practical reasons, we wrote the answers to the background questions and the points' attribute information on printed survey forms. We then later entered this information to spreadsheets and joined them with the GIS data using a common identifier (participant id + point id).

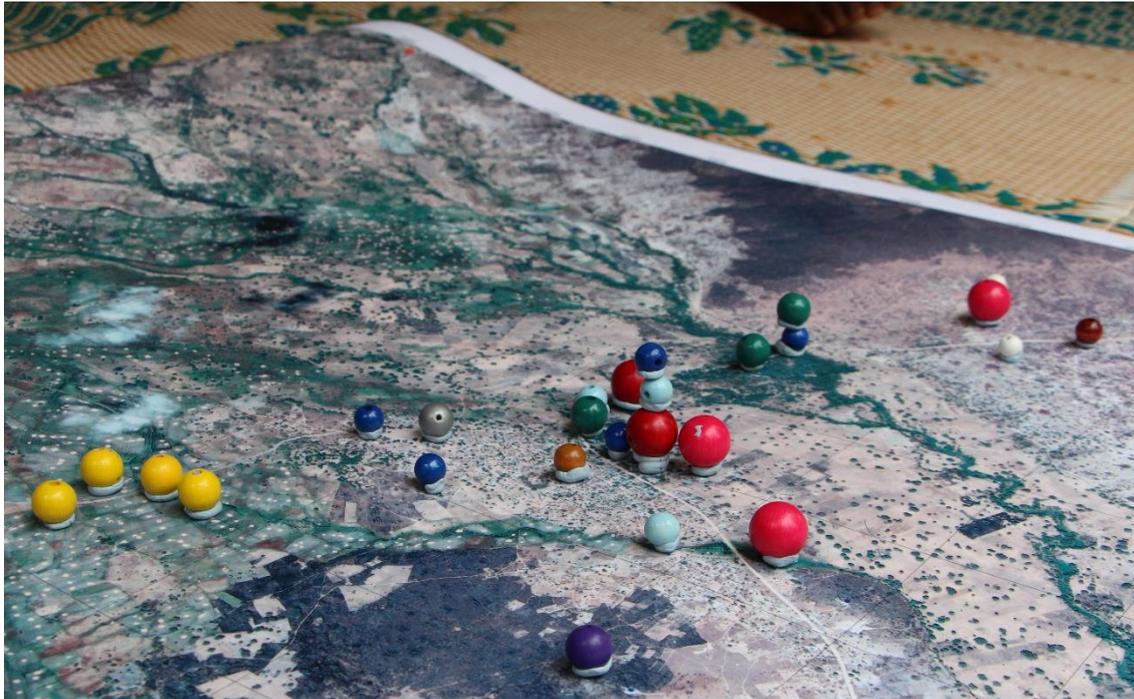


Figure 1 Example of one participant's place-based services in Tungamalenga village. The colors indicate different types of perceived landscape services.

Feedback campaign

We shared the initial results with the communities in workshops in March of 2017. The workshops had multiple aims: to share the results in a reflective discussion, share the collected local knowledge, build the capacity among community members to reflect/analyse their landscape and resource use, deepen the interpretation of the results, and rank the landscape service benefits.

We organized three workshops in each village, with at least 20% of the mapping campaign participants. Three researchers facilitated the workshops and made observations and took notes of the main topics of discussions. We strived to create a casual and respectful atmosphere in the discussions. In these workshops, the participants interpreted and discussed the mapped locations that were overlaid on the same satellite images and printed on A0 papers (1:7500) in groups of women, men and community experts (i.e. people in leadership positions in the village).

The workshops started with an introduction to the contents of the maps with respects to the initial mapping campaign, after which we asked the participants to discuss for example about the pattern of provisioning and cultural landscape services and future needs and threats on these services. We also displayed the existing village land use plans to the participants who visually compared them with the mapping campaign results and discussed how the plan follows the actual landscape service pattern. Each group then ranked the landscape services from the perspective of their importance for the well-being of the community. Provisioning and cultural services were ranked separately. Then the groups discussed together differences between men's and women's value rankings which revealed some gender differences. After the workshops, we individually interviewed each participant about their map-reading capacities and the use of maps from the perspectives of personal learning and the usability of maps to express opinions.



Figure 2 Participant group ranking the landscape service benefits during in the feedback campaign in Tungamalenga.

TAKE HOME MESSAGE: We have listed here some tips and ideas, which are critical when engaging communities to participatory place-based mapping campaigns:

- Take note of practical issues such as language, availability of suitable spaces to do the surveys in, availability of electricity and the likely lack of fast internet connectivity. At times having strict timetables can also become a challenge. Things like not being able to access the village due to heavy rains or participants not being available due to common village activities such as funerals can ruin your timetables easily.
- The type of participatory data you collect defines the analysis options that you have. For example, it is wise to consider whether mapping workshops could produce similar information to surveying each participant individually. Workshops support engagement and lower the amount of time required to collect the information, while the data collected in them is not able to capture the individuals' service utilization patterns. In addition, you can consider other methods than the point approach. For example, a polygon approach was used in [the participatory mapping of Village Land Use Plans in the same region](#).
- Be consistent in the way that you present the questions to the participants and pay attention to how you guide them in the use of the map. For example, when we talk about cultivation services, do we mean the agricultural areas of the entire family or the individual participant? Some participants might also find the questions difficult to understand and/or have difficulties in identifying locations from the map. These issues can affect the quality of the collected data.

- Another important factor is the design of the survey. A few things need special consideration. First, the things that are mapped need to have local relevance. In our case, co-designing of the ecosystem service typology with our Tanzania colleagues and previous experience of working in similar contexts was important. Second, challenges with the service typology can arise when for example a single category includes multiple different types of information. In our case for example, the category building material ended up including both collection of clay and wood for building, which are collected in very different locations. If seen useful and if suitable attribute information has been collected, categories can also be separated in the analysis phase. Third, test the survey before starting the actual campaign with a smaller sample of participants. This will help you to refine the methodology and save you from some challenges in the field.
- Lastly, make sure that your work follows good practices of research ethics. The participants are the main data producers and owners. Make sure to share your information and try to work in a way that will also benefit the local communities.

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