

# Participatory Rangeland Resource Mapping in Tanzania

A Field Manual to support planning and management in rangelands including in Village Land Use Planning





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The background features a light-colored illustration of a savanna landscape. On the left, there are stylized trees and a body of water with a small boat. On the right, there are more trees and a larger boat. The central part of the image is a solid orange color where the title and subtitle are located.

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January, 2016

# Acknowledgements

These guidelines on participatory rangeland resource mapping have been compiled by the Sustainable Rangeland Management Project (SRMP) in Tanzania<sup>1</sup>. SRMP identified and developed participatory rangeland resource mapping as a valuable tool for improved planning and management in rangelands including within village land use planning (VLUP).

SRMP aims to secure the land and resource rights of pastoralists, agro-pastoralists, and crop farmers in Tanzania, while improving land management. SRMP has piloted village and district land use planning and rangeland management in Kiteto, Bahi, Chamwino, Chemba and Kondoa districts. SRMP is facilitated by financial and technical support from the International Fund for Agricultural Development (IFAD) and the International Land Coalition (from the Belgian Fund for Food Security), implemented through CARE International and the Tanzania Natural Resource Forum (TNRF), with key partners including the District Councils of the five districts, the Ministry of Livestock and Fisheries Development (MLFD), the National Land Use Planning Commission (NLUPC), the Ministry of Lands, Housing and Human Settlements and Development, and civil society organisations supporting VLUP and rangeland management, including KINNAPA Development Programme, Dodoma Environmental Network (DONET), Bahi Environmental Network (BAENET), and Mtandao wa Mazingira Chamwino (MMC).



1 Adapted from the Mapping Guidelines in Participatory Rangeland Management in Ethiopia by Ben Irwin, Adrian Cullis and Fiona Flintan (2014).

The Future Grasslands Group is an open association of natural resource management (NRM) professionals committed to the recognition and sustainable management of grasslands and their associated resources. The group was set up in 2010 by Adrian Cullis and Ben Irwin, in reaction to the rapid disappearance of grassland and rangeland resources and the severe negative effects that this was having on integrated NRM systems and in particular on livestock production systems. The key aim of the Future Grasslands Group is to contest the loss of grassland resources through innovative and practical management solutions and approaches. Such approaches are based on the development of applied participatory land use and natural resource planning and management techniques and methods.

The fieldwork and experience informing these guidelines would not have been possible without the consent, support, and hard work of local pastoral communities, government representatives, and NGO staff working in pastoralist areas. This manual aims to capture and reflect the knowledge, experience, and inputs that all these actors have provided within this manual.

# Foreword

Tanzania mainland surface area cover 94.5 million hectares with ranging land uses including human settlements, infrastructure, agriculture, livestock keeping and grazing, forestry, wildlife, mining etc. Recent statistics (2012) indicate that the country has about 22.8 million cattle, 15.5 million goats and 6.9 million sheep, which amounts to 28.8 million Livestock Units (LU). These require an average of 2 hectares grazing land annually per LU, amounting to 57.6 million hectares, which is approximately 64% of all surface land. Most of these grazing lands are endowed in pastoralism and agro-pastoralism system as rangelands.

Land use planning in rangelands is highly challenging. There are multiple users and multiple uses of the land and resources, which result in complex access, management and governance arrangements. The distribution of resources is often variable and unpredictable. This requires flexibility of use both spatially and temporally, as well as unfettered movement across the rangeland area. Planning and managing this use must take account of and work with this complexity, rather than try to simplify it. Cross-village sharing of resources is likely to be required and under Tanzania policy and legislation can be formalised through such as joint village land use plans and agreements, and a 'natural resource management sector plan' for the shared resource.

Participatory rangeland resource mapping, as described in this Manual, is an important tool for use in the village land use planning process in pastoral and agropastoral villages. It improves the understanding of rangeland resource use, management and access, and incorporates the complexities described above. Not only does the mapping provide rich amounts of information in a short period of time, it also initiates a process that improves the participation of pastoralists and agropastoralists in village land use planning decision-making. This contributes to better feelings of ownership amongst rangeland users over the VLUP process, and as a result improved incentives to invest in VLUP implementation, and a likely reduction in land use conflicts. The National Land Use Planning Commission recommends the use of this Manual and participatory rangeland resource mapping in village land use planning processes in all pastoral and agropastoral village areas.

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# Preface

Livestock is a key component of the rural economy in Tanzania. Livestock not only provides meat and milk, but also hides and skins, traction-power, and manure. Livestock is a key contributor to exports and Tanzania's Gross Domestic Product. Livestock ranks second within the agricultural sector in terms of contribution to GDP at around 7.4%. This is relatively small despite the large livestock population. This is said to be due to the presence of diseases, which act as barriers to the export of animals. The sector is also facing a problem of non-compliance to new market demands like the Livestock Identification and Traceability System (LITS) and animal welfare. In addition movement of livestock between primary and secondary markets increasingly relies on rail or road transport contributing to a high land value for meat or livestock in such as the Middle East, so making it less competitive.<sup>2</sup>

In the year 2012-2013 milk production reached 2.0 billion litres and meat 563,086 tonnes (beef 309,353, sheep and goats 120,199 and 79,274 pork). Livestock trade saw 1,215,541 cattle, 960,199 goats and 209,292 sheep through local markets worth around 989.3 billion Tshs. Exports of meat reached 2.8 tonnes beef, 1,048 tonnes goat and 58.97 tonnes of sheep meat, worth around 36.17 billion Tshs.<sup>3</sup>

The majority of this livestock comes from pastoral areas. Rangelands are the key resource in the production



2 For example, the value of landed meat from Tanzania in the United Arab Emirates is US\$3.8 per kg, compared to US\$2.4 for meat originating from Australia.

3 1 US\$ = approximately 1,500 TShs



of this livestock. Wet and dry season grazing and water, and movement between them are fundamental components of rangelands. Often grazing areas and sometimes water are shared between villages and can have complex access and governance arrangements. Understanding the distribution of these resources, their status and any challenges or problems in accessing them is key to good village land use planning in pastoral areas. A key tool for such analysis is participatory rangeland resource mapping, which gives an opportunity to communities to describe their resource use and start defining how such resources can be protected and shared. The participatory process in itself is empowering for communities and provides space for all different groups within communities to contribute.

The Ministry of Livestock Fisheries and Development played a key role in the process of developing this Field Manual having taken part in first the testing of the tool, and then its application through the Sustainable Rangeland Management Project (SRMP) project. The Livestock Sector of the new Ministry of Agriculture, Livestock and Fisheries encourages all actors wanting to better understand pastoral resource distribution and use, to use this methodology.

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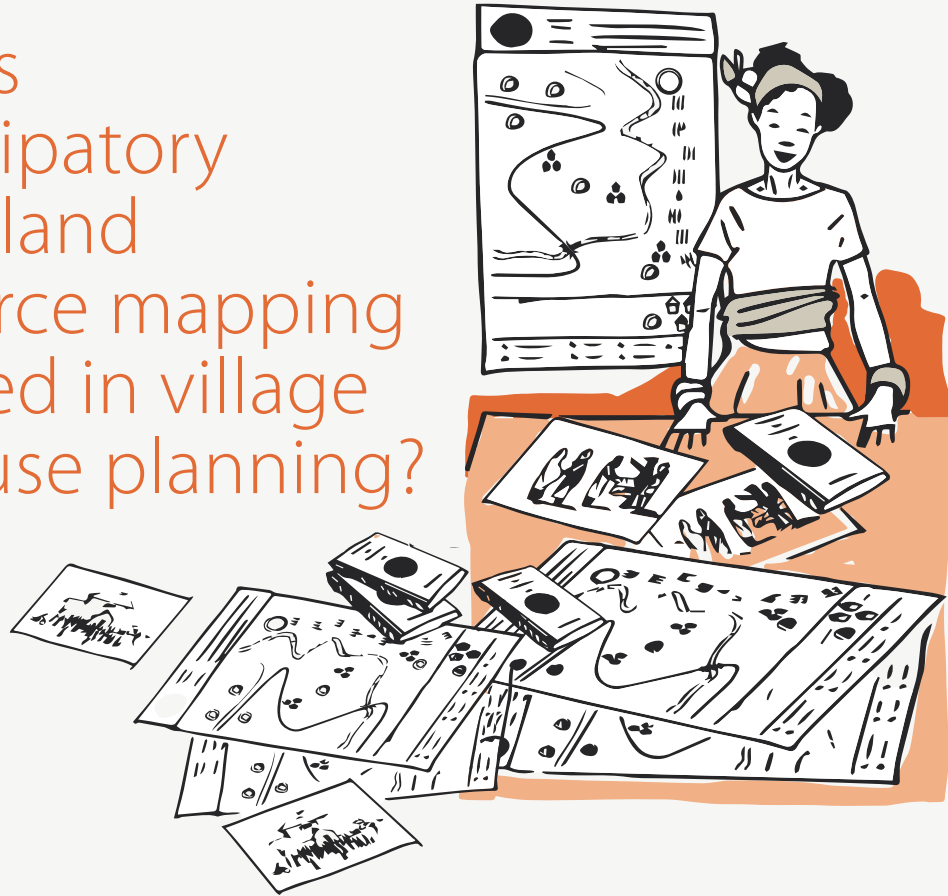
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Why is participatory rangeland resource mapping needed in village land use planning?



Participatory rangeland resource mapping is a valuable process and a set of activities for better understanding and developing sustainable rangeland management within village land use planning (VLUP) and other planning and management processes. It provides space for communities to more strongly contribute to planning and decision-making processes as part of an integrated participatory land use planning approach, as advocated in national government policy, legislation, and guidelines. Participatory rangeland resource mapping can also save time and costs.

### Understanding and developing sustainable rangeland management

The mapping of rangeland resources is a powerful information-generating tool. The mapping exercise is an excellent entry point into community-level discussions about resources and the issues that surround them. Participatory rangeland resource maps can be used to identify and understand pastoralists' uses of rangeland resources, different resource locations, resource access, and resource seasonality. Participatory rangeland resource maps depict important information such as veterinary services, market infrastructure, land use boundaries, and livestock movement. Focused discussions that take place during and after the mapping exercise can identify rangeland management problems and challenges and lead to an analysis of options for solutions for the better and more sustainable management of rangeland resources.

The participatory map provides a visual record of an area and its resources. Ground mapping (on the ground) or sketch mapping (on a piece of paper) represent key community-identified features of the land

from a bird's eye view. They do not rely on exact measurements, but they do show the relative size and approximate position of features. Participatory mapping is a good starting point for discussing important resource and land-based issues. It also helps to introduce and explore the concepts of mapping with communities, enabling them to display resource distribution and to identify important features. A picture paints a thousand words.

The participatory rangeland resource map can also be used for negotiating and preparing rangeland management activities – illustrating the problems and challenges for which resource management solutions need to be found and enacted. Rangeland resource maps provide important baseline data for monitoring and evaluation (M&E) and within adaptive rangeland management systems. A resource map, and all its supporting information, serves as a benchmark to track changes over time.

### Participatory and integrated VLUP

In Tanzania, the development of participatory village land use plans is guided by the Village Land Act No. 5 (1999) and its regulations of 2002 and by the Land Use Planning Act No 6 (2007). The Village Land Act (Sections 12 and 13) grants power to Village Councils and their institutions to prepare participatory village land use plans. The Land Use Planning Act (under Sections 18, 22, 33, and 35) provides for the formation of planning authorities, functions, and procedures for developing participatory village land use plans and approval processes.



The NLUPC has identified pastoralists and hunter-gatherers as vulnerable groups needing particular attention. This vulnerability is entrenched in the lack of land security that pastoralists and hunter-gatherers have had, and in many cases still do.

The NLUPC's Guidelines for Village Land Use Planning, Administration and Management in Tanzania of 2011 (revised version) detail six main steps to follow when developing participatory village land use plans:

- » Preparations at district level;
- » Participatory rural appraisal;
- » Mapping existing village land uses;
- » Participatory village land use planning;
- » Implementation of village land administration: enhancement of security of tenure;
- » Village land use management.



An integrated participatory land use planning approach is an open and accountable process in which local communities play an integral part in decision-making related to the land and resources that they use. It aims to identify the best uses of land and resources through negotiations between different interests based on equity, efficiency, viability, conservation, and sustainability. Participatory land use plans provide the framework and forum for stakeholders to meet, communicate, formulate strategies, and implement them together.

Participatory rangeland resource mapping is a key tool in the development of these plans. Participatory maps allow communities to express themselves spatially through their own understanding of their landscape and its natural resources. These maps can provide an alternative to the languages, images, and written words of those who may hold more power in society. They can provide local communities with power because they give them a way of representing themselves. Because community members create the maps themselves, they feel more ownership over them and maintain an interest in their use.



The dialogue associated with developing a participatory map affords men, women, children, and people of different wealth groups and well-being an opportunity to work together to develop a visual picture of their landscape, natural resources, and settlement and land use systems. Done well, mapping can deepen community understanding of different user groups and commitment to better managing natural resources. Working with community representatives to produce a rangeland resource map can also build the understanding and confidence of development and extension workers. Using participatory approaches invariably results in better resilience-building outcomes.

The process of documenting resource use (visually and in words) as part of the participatory rural appraisal not only empowers communities but also lays the foundation for incorporating and supporting factors such as livestock mobility and agreements between villages over the sharing of resources. It also provides an opportunity for considering all different types of land use including agriculture, mining and settlement, and how to reconcile conflicts that may exist between these and livestock production. This information forms the basis of Steps 4, 5, and 6 in the VLUP process (as above), where participatory resource maps and accompanying reports can be used as supporting documents.



### Protecting the sharing of resources

The Village Land Act (1999) has provisions that indicate recognition of common property for pastoralists, such that land sharing arrangements are possible, including the issuance of Certificates of Customary Right of Occupancy (CCROs) over land held under traditional pastoral tenure (Section 29.2 (iii)). The problem remains, however, of defining current pastoral tenure and practice – how pastoralists acquire, hold, and dispose of land. In addition, the Grazing Land and Animal Feed Resources Act (No. 10, 2010, Section 17(3)) seemingly offers some protection for pastoralists:

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“Subject to other written laws, the Village Council shall prohibit, restrict, limit or control entry into grazing land for purposes of cultivation, mining, establishment of wildlife protected areas or any other use other than livestock keeping.”

Further, the Act states that the Village Council should set aside part of communal land as strategic grazing land in accordance with the Land Use Planning Act (2007).

Where villages share resources, the Acts (more specifically Village Land Act Section 11 and Section 58; and Land Use Planning Act Section 18 and Section 33) stress that villages should produce a “village resource management sector plan” as well as their own village land use plan in order to provide for sharing of resources between a number of villages and for movement across boundaries. The resource management sector plan should deal with and facilitate the sharing of resources, and should be incorporated into district land use framework plans.

The agreement and management of sector plans and by-laws can provide the formal framework for sharing resources, with details of which neighbours can use which resources, how, and when. This can further legitimise shared rangelands resources such as grazing areas.

In order to develop these different processes, structures, and plans, information is required on rangeland resources and related access and management arrangements. Rangeland resource mapping is a key process and tool for this. Where, for example, three villages share resources, rangeland mapping can be carried out with the three villages at once (if they are adjacent to one other) in order to show where and how resources are shared.

### Saving time and costs

The difficulties of dealing with complex issues of multiple use and mobility in pastoral areas often put off land planners, and a lack of resources limits time and personnel for fully understanding situations and/or for long-winded negotiations or conflict resolution. This means that processes and results are often compromised, leading to problems reoccurring later on.

VLUP can be a costly process, in particular where there is a lack of readily available information on resource use, or where there are conflicts over boundaries and/or between different parties. Participatory rangeland resource mapping can help reduce the costs of VLUP because it is an effective way of collecting in-depth information on local resource use and initiating discussions over the sharing of resources and/or related conflicts. Participatory mapping tends to be low-cost and is not dependent on complicated technology.

Rangeland resource maps can be produced in a relatively short timeframe, and can then be documented, reproduced, built upon, and updated.

The information can be used in various ways in planning and monitoring, including transferring it to geographic information systems (GIS) or Google Earth maps (see Stage 4 of these guidelines).

At the same time, mapping highlights areas of concern that can be addressed and resolved by communities and helps the community to reach consensus. If all required information is collected and any disagreements resolved within the community prior to the “official” LUP process being carried out, this will save the time and associated costs of government officials, as they will need to spend less time with communities developing village land use plans.

### Changing approach, attitude, and behaviour

If “participation” is to be really meaningful, the highest levels of participation should be aimed for. This is where pastoralists, working in partnership with and supported by development agents, are making all the decisions concerning management within their rangeland management areas, as defined in the village land use plan and associated agreements.

Achieving this high level of participation will involve a change in attitudes and a change of behaviour for many practitioners – i.e. a change in what they think and how they work. The core of this change is for practitioners to become more facilitating rather than leading or controlling, and to establish supportive and capacity-building relationships and working partnerships that empower local communities to take (back) greater control over their lives.

### How to use this manual

This manual on participatory rangeland resource mapping is structured so that it can be used easily in the field. In each section, the rangeland resource mapping process is divided into separate stages, and then within each stage practitioners are given clear step-by-step guidance on how to undertake specific activities.

The guidelines explain the purpose, methods, and potential outcome of each mapping stage and the steps in each stage. Boxes give examples and scenarios for the practitioner to consider.

It is recommended that practitioners work through the manual with the communities they are working with, following each stage and the relevant steps one at a time and in the sequence set out. However, parts of the mapping process may need to be adapted to the local context, to reflect the aims and objectives of specific mapping work or to address the needs and priorities of different communities.





# Stage 1

## Preparation: organising for mapping

Stage 1 focuses on preparing for the mapping. The steps here are:

- » Step 1. Set the mapping objectives
- » Step 2. Establish the facilitation team
- » Step 3. Identify the mapping participants







# Step 1

## Set the mapping objectives

*Before moving ahead with the mapping exercise, there are some important preparatory steps and activities to be completed. In this first step, the practitioner clarifies exactly why the rangeland resource mapping needs to be undertaken. What are they trying to show on the map? Setting the objectives of the mapping will focus the exercise and ensure that the resulting participatory rangeland resource map includes the desired information. Clear objectives will help the practitioner to explain the mapping exercise to the community. Completing the following steps will help to develop clear and sound objectives.*

### Become familiar with the overall process

Becoming familiar with, feeling comfortable with, and having confidence in the overall mapping process is vital for ensuring a sound foundation for the whole process – this will later help to develop a common understanding of the process and its smooth implementation. Read the full guidelines at least twice before carrying out the mapping exercise.

### Visit the area to be mapped and the community who will be mapping

Getting your bearings in the area to be mapped is recommended. Visit the area and the community and familiarise yourself with the local geography and natural resources. This visit can also be used to start engaging with the local community and to build up trust and rapport with them. Representatives of local government should also be visited to inform them of the planned mapping work and to invite them to observe the process.

### Identify the objectives of the mapping

The objectives of the mapping should reflect the ultimate goal and the needs of the activity e.g. a well-developed (joint/individual) village land use plan that will provide for sustainable use of and sharing of resources. Objectives should be clear and specific. Be careful not to try to accomplish too much in one mapping exercise – it is better to start with one clear and simple objective than trying to accomplish several complex ones. If necessary, the mapping exercise can be followed with more in-depth interviews or smaller focus group discussions.



Examples of objectives of rangeland resource mapping include to:

- » Identify and provide an understanding of natural resources in a rangeland management area – this may include one village or it may include many villages if they share resources such as grazing or water;
- » Identify and understand the problems and issues related to the rangeland resources;
- » Provide a participatory rangeland resource map of the rangeland management area, which will be used as a basis for negotiating and implementing VLUP by different stakeholders and as a key piece of documentation in the rangeland management plan and agreement;
- » Provide a baseline of information that is used for M&E processes and for adaptive management.

More specific objectives of the mapping might be to:

- » Identify and categorise the key natural resources in the area;
- » Understand key (or priority) resources and their role in the rangeland area;
- » Understand patterns of mobility (livestock and people) both within and outside the area;
- » Understand the condition of the resources and which areas of the rangeland might need some specific protection or management;
- » Understand different land uses in the rangeland management area, and areas where land uses are in conflict.



### Develop a checklist of questions for additional information required

Additional information will be required to supplement the participatory rangeland resource maps, in order to fulfil the mapping objectives. For example, if trying to identify or highlight the location of areas of land use change or other pressing land-related issues, it might be necessary to ask questions about how land is accessed and controlled. The information can be collected either during the mapping process or through break-out focus group discussions, which can run parallel to the mapping exercise or can be carried out at a later time. A checklist of guiding questions for the discussions should be developed prior to the mapping exercise.



# Step 2

## Establish the facilitation team

*The success of the mapping process will depend upon the skills of the facilitation team. There are three key roles to fill – those of the mapping facilitator, the note-taker, and the map-copier (though the roles of note-taker and map-copier could be combined if there is a shortage of staff). At least one of the team (preferably the mapping facilitator) should have conducted mapping exercises before.*



The ideal facilitation team should make sure that:

- » It has at least one member who is known to the community and has a high level of rapport and trust with them.
- » All members are local language speakers.
- » All members have an understanding of local culture, norms, and values and of the social, political, and environmental context and history.

At least one member is a woman, as a woman's perception and understanding of a situation may be different from those of men.

It can be useful to have a member of the district Participatory Land Use Management (PLUM) team present for the mapping activity, so that they have a good understanding of the process that the community members have followed and the discussions that accompanied them.

### The mapping facilitator

The main role of the mapping facilitator is to encourage and enable the community group to create or draw the rangeland resource map. The facilitator will need to provide a clear explanation of the objectives for the mapping process and help the community to identify the sort of information they want to present

in the map. The facilitator will need to further develop the information that is initially identified through making suggestions, good questioning, and by being encouraging. To do this, the facilitator will need to have a specific set of skills (see Box 1).

#### The note-taker

The note-taker is responsible for taking detailed notes of the group's discussions and responses to questions from the facilitator. Recording the information correctly is very important, as this information will form a basis for subsequent management planning. The note-taker will need specific skills in listening, observing, and recording, and will be able to keep track of several discussions at once and draw out the key points.

#### The map-copier

During the drawing of the rangeland resource map by the community, the role of the map-copier (or map-drawer) will be to ensure that all the features have been clearly marked or named, and can be understood. The process may have to be halted if gaps need to be filled. The map-copier will need to carefully copy all the information that the community displays on their map. The drawn map will need to be as clear as possible, with a legend explaining the various items of information and symbols used. This is likely to be on a smaller scale than the map drawn by the community, but it should maintain its accuracy.

### Box 1: The skills of a good facilitation team

*A good facilitator is someone who...*

- » Encourages the participants to feel motivated, valued, and willing to participate;
- » Completes the mapping through an exercise that the participants feel they jointly own and control – i.e. the process is not controlled by the facilitator alone;
- » Keeps the participants focused on the task at hand and the topic that has been chosen, while not missing opportunities to explore unexpected but relevant subjects;
- » Shows sensitivity to the feelings/needs of the participants and adapts the session to accommodate their needs, while protecting individuals' contributions from being devalued;
- » Manages power imbalances within the group, ensuring that everyone has an opportunity to take part and that no one feels either marginalised or forced to engage;
- » Ensures that the mapping exercise commences at the agreed time and is completed within an agreed timeframe, without the participants feeling too rushed. If the level of participation begins to drop or is being dominated by one or several members, the exercise should be stopped and rescheduled;
- » Encourages dialogue and discussion between the participants and interest groups, but listens more than talks;

- » Understands when it is the right moment to intervene in the activity in order to resolve an argument or fill in a gap, without disturbing the flow of the exercise or discussion;
- » Energises a group or slows it down as needed.

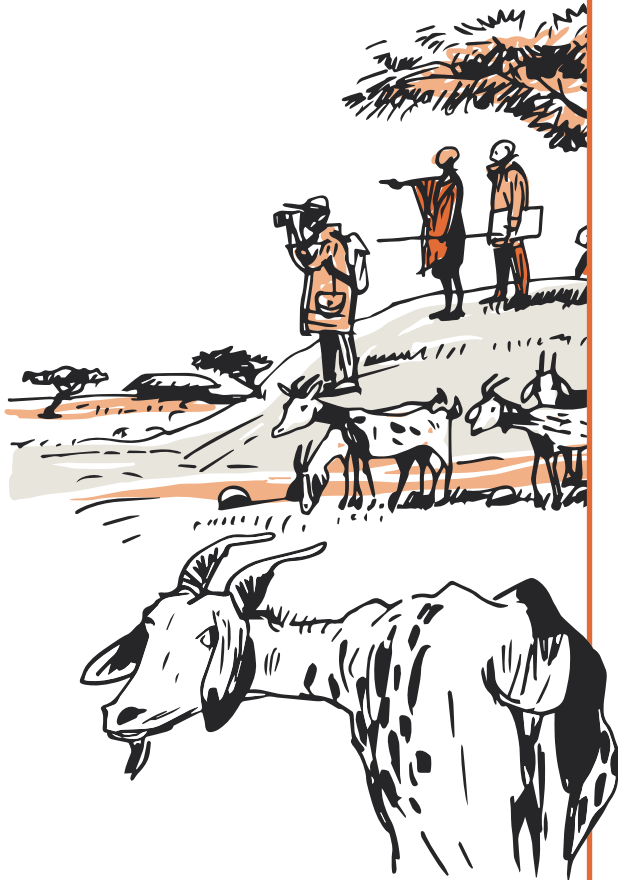
*A good note-taker is someone who...*

- » Listens carefully, including when several people are talking at once;
- » Accurately records points raised, including the main line of discussions and any particularly interesting comments;
- » Balances the need to record as much detail as possible with keeping up with the pace of the discussions and information flow;
- » Tracks the specific participation of the different groupings (men and women, and different interest groups) and supports the facilitator to ensure inclusivity and avoid bias;
- » Appreciates body language, “unspoken” messaging, and underlying tensions and disagreement;
- » Supports the facilitator to identify information gaps and to resolve any misunderstandings;
- » Attends to detail, including descriptions of the location, start and finish times, and the names of all participants.



*A good map-copier (drawer) is someone who...*

- » Fully understands and interprets what the community members are trying to say through their drawing, in order to assist the note-taker;
- » Keeps track of what is being drawn, and in what order, so as to be able to identify the features that have been given the most importance and also any that might have been missed;
- » Has drawing skills, in order to represent the map accurately and to scale on a smaller piece of paper;
- » Can work with a GIS expert, if considered appropriate, to transfer the information to a digital map.



# Step 3

## Identify the mapping participants and other arrangements

*Once established, the facilitation team will need to agree with community leaders on who should take part in the mapping exercise and when and where it should take place. Members of the Village Land Use Management committee should be included in the mapping group. The facilitation team should then hold an introductory meeting with the mapping participants to ensure that they understand the process and why the mapping is important, resolve any potential misunderstandings, and arrange the logistics of the exercise. It may also be necessary to inform or to obtain the agreement of local government officials such as the district PLUM to do the mapping.*

### Agree who should take part in the mapping exercise

The mapping team should discuss with the community who will represent different stakeholder groups, in order that there is good representation from the community but not too large a group that it is unmanageable (see Box 2). For VLUP processes it is appropriate for some members of the village land use management committee (VLUM) to take part in the meeting; however, the group of participants should not be limited to them only. Rather, the group should reflect social divisions in age, status, and well-being. A “well-being” or “wealth” ranking could be conducted in advance to identify these divisions. Younger participants can provide valuable inputs, as they may view and experience the rangelands differently from their elders. When talking about rangelands, it is of particular importance that pastoralists (including those who have a more nomadic lifestyle) are included.



You should also discuss with community representatives whether men and women can carry out the exercise together or whether separate mapping activities need to be conducted. If men and women regularly meet and discuss issues together in the community, then there is little reason to separate them. Whatever approach is taken, it is vital that both women and men have an equal opportunity to contribute.

### Box 2: How many people should take part in the mapping?

The purpose of participatory mapping is to provide the community with an opportunity to contribute to the processes that influence decisions made about their land, resources, and livelihoods. Therefore it is of value if a greater number of participants can take part in the mapping. This also provides an opportunity for different voices and interests to be heard and, if well facilitated, will create a lively and dynamic forum for information exchange. With a well-experienced and confident facilitation team, groups of over 20 people can take part.

However, if there are too many in the mapping group, it is hard for the facilitation team to coordinate the exercise. If the facilitation team does not feel confident about handling a large group, then they should agree with the community that a smaller number of people takes part. Around ten persons could be selected to do the mapping, while others observe and advise. Another option is to split the group into appropriate sub-groups (men/women or adults/youth) and produce a number of maps. Smaller focus



groups are useful for very specific mapping purposes, but their work should always be made available to a wider audience as and when possible. The challenge after this is to consolidate the different maps and information together into a single map.

The make-up of the group should also be given some thought. It may be considered appropriate to include some representatives from local government so that they can see the mapping process under way and perhaps, as a result, be more supportive of it. This is also an opportunity to encourage government to mainstream the process within its own planning activities. However, before inviting government representatives, you should check with the community that they feel comfortable with them being part of the process and that it would not prevent them from openly discussing resources and their use. Only if pastoralists have trust in the project team, or can fully control the results themselves, will they be willing to provide a full picture of the local situation including, for example, illegal (but possibly rational and sustainable) uses of resources.

Experience in Tanzania shows that asking local government representatives to be observers of the process, rather than full participants, has been the best approach – this has provided an opportunity to draw them in for steps such as the drawing of village boundaries once the mapping of resources has been completed.

### Agree where and when the mapping exercise should take place

Discuss with the community when and where the mapping exercise should take place. This should be at a time that is convenient to the community and fits in with their daily/seasonal commitments and work (both men and women). It will be difficult for the community to make time for mapping when their workload is heavy or they are under stress, such as during drought or conflict. It is preferable to carry out the mapping when the temperature is cool – in the early morning or late afternoon. However, wherever possible the mapping should be completed in one day, as it is disruptive to the process to break overnight and it is difficult to protect the map from disturbance.



Normally, the map will be drawn on the ground. This can be done using chalk on a concrete surface, or with a stick on an area of flat soil. It is important that the area is flat and clear of debris or vegetation; there is plenty of space to walk around and to properly view the drawing; the area is protected from livestock or children who might disturb the map; and it is sheltered (from wind, sun, and rain). It is also helpful if the site has a view over the area or part of the area that is being mapped. Participants are likely to get less distracted if the mapping location is some distance from their homesteads. Visit the site prior to the day of the mapping exercise to ensure that it is suitable.

### Hold an introductory meeting

The facilitation team should then organise an introductory meeting for the mapping participants from the community. The meeting should be used to discuss more details about the mapping exercise and should be held a few days before it takes place. At this meeting the mapping team should:

- » Introduce the mapping process, explaining why mapping has an important role within VLUP and how/where it fits in. The mapping activity should be introduced as part of a longer-term process that will ensure the continued use of, and access to, resources and the rangeland for local communities;
- » Provide the group with information about participatory mapping and the process of undertaking it. Explain how much time and effort and what resources are required;

- » Confirm the most convenient time and place for the mapping to be undertaken, and clarify transport and refreshment/meal arrangements;
- » Introduce the mapping facilitation team and begin to build a relationship with the community members;
- » Check the appropriateness of taking photographs and/or filming the mapping process.



### Prepare the mapping equipment

The final step in preparing for the mapping is to ensure that all the right equipment is to hand. This includes:

- » Tools for clearing the site, including a brush to sweep off any debris. If the site is unshaded, then it would be of benefit to put up a tarpaulin to provide shade;
- » A “mapping kit” of items that can be used to map on the ground and to supplement what the community themselves can find to use. This can include items such as string, ribbon, chalk, different-coloured soils, coloured card and pens, stones of different sizes, and other items such as sticks, grass, and leaves;
- » Flipchart paper and coloured pens for copying the map;
- » Notepad and pens;
- » A camera for taking photos of the mapping process and of the final map, and/or video equipment.

### Print out the rangeland resource mapping checklist

In Annex 1 a mapping checklist is provided. This should be printed out and used in the field to ensure that all items are in place and that all necessary activities are undertaken.



# Stage 2

## Facilitation: making the map

Stage 2 focuses on producing the participatory rangeland resource map.

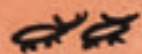
The steps here are:

- » Step 4. Map the rangelands
- » Step 5. Add details
- » Step 6. Complete the map





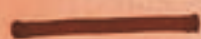
# UFUNGUO



MWADA/MARKET



AGRICULTURAL  
ENCLOSURE MAPS



MPAKA WA KIJIZI/VILLAGE BOUNDARIES



DIMBWI LA MAJI/PONDS



NYIA ZA MIEUO WAWATI  
WA MASHA

LIVESTOCK / CATTLE ROUTES  
(WET SEASONS)



MBUGA/GRASSLAND



MAKAZI YA KUDUMU/PERMANENT  
SETTLEMENTS

(B) BECKON



MABOMA YA MUDA/TEMPORARY  
SETTLEMENTS



# Step 4

## Map the rangelands

*With the preparation stage complete, the facilitation team and the community can begin Stage 2 – making the participatory rangeland resource map. The key resources can be mapped first, with more details following.*

### Facilitate the opening of the exercise and introductions

The activity should begin with a short opening ceremony that reflects normal customary practices. Time should also be given for clarifying the objectives and the mapping process – it may be the case that a participant has joined the group late, and therefore they need to be updated. An introductory session can include:

- » Receiving a blessing for the meeting from a customary leader or leaders, as appropriate;
- » Introducing the mapping facilitation team;
- » Asking the participants to introduce themselves;
- » Explaining the objectives of the exercise and the process, and ensuring a common understanding of these; and
- » Confirming that everyone feels comfortable with taking part in the meeting, as well as with the place and schedule for the day.



### Start the mapping

The facilitator asks the community to begin to create a map of rangeland resources. It is good practice to start the mapping exercise with an activity that is relatively easy, so communities quickly understand what to do. A simple and clear question helps the participants to take immediate control over the content of the map: for example, “Can you show us (map) the main landscape features in your area?” If the community are having difficulty, the facilitator can assist by suggesting a prominent feature such as a ridge, river, or forest edge, and then encouraging the identification of other, related features. This helps the participants to orientate themselves and to scale down landscape features to the mapping site.

The community participants may need encouragement initially to use twigs, stones, pebbles, leaves, ashes, charcoal, string, or even animal dung to represent rangeland resources, supplemented by items provided in the “mapping kit”. However, once started, experience shows that they will quickly take control of the mapping and be inventive with the use of materials that are locally available.

Once the key features have been mapped, the facilitator asks the group to map specific information in line with the first objective of the mapping exercise. For example, this may be to show the key natural resources that the community use. In such a case the mapping group might identify and display different grazing and browsing areas, water sources, grass harvesting areas, and permanently cropped fields. The group can provide site-specific and increasingly detailed information relevant for livestock management, e.g. information such as where browsing and plant species are found, where mineral soils or springs and salt licks are located, or areas that they associate with animal disease. Ensure that seasonal use of resources is illustrated. In order to ensure that all rangeland uses and users are represented, the facilitator should ask about different groups, e.g. “Have you shown the resources that pastoral women use?”

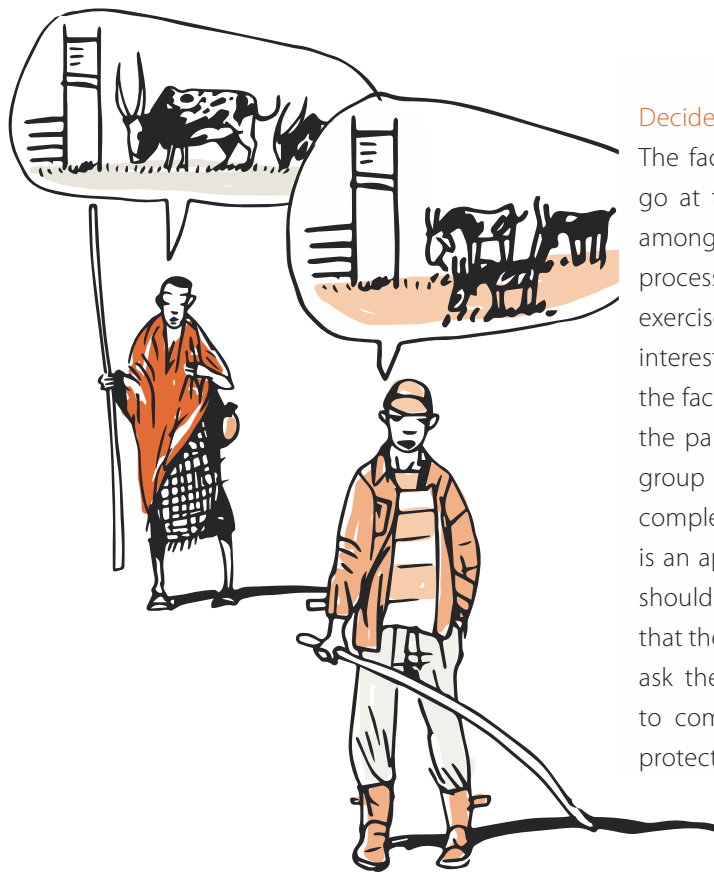
Experience shows that it is better practice not to start with a boundary around the area (see Box 3). Doing so may limit the development of the map to those resources and features within the boundary, and other resources used by the community outside the boundary may then not be mentioned or included. If, however, the mapping group insists on drawing a boundary first, then the facilitator will have to try to ensure that its presence does not mean that resources outside it are ignored.

### Make a legend for the map with appropriate symbols and colours

To finish the rangeland resource map, the community should make a legend that clearly describes the different features of the map, using symbols and colours. The facilitator should ensure that they use the same symbol and colour for all features of the same type e.g. using twigs for forest patches, and stones for settlement. The map-copier should try to use these same symbols and colours on the paper map.

### Note all the accompanying discussions

The note-taker will record all the discussions that go on while the map is being created. Most of the information will be generated by the checklist of questions read by the facilitator, but it is also important to record additional issues, debate, and facts of interest that arise during the exercise. The note-taker should also try to record who is speaking and who is mapping. Where there is disagreement, the note-taker should record the different points of view, including which group of users has which set of views. When names of places are given, the map-copier and note-taker should try to record them correctly, but the need for detail should not mean that discussions already in flow are disturbed. It may be necessary to wait until the mapping exercise is completed before such details are noted and any gaps are filled.



### Decide when it is appropriate to break or stop

The facilitator should not rush the activity but should go at the community's pace, encouraging discussion amongst the participants to clarify the mapping process. But the facilitator should also beware of the exercise running on too long. If the group begins to lose interest and the level of participation begins to drop, the facilitator should stop the exercise and discuss with the participants when it would be convenient for the group to restart. As the participatory map is reaching completion, the facilitator will also need to gauge when is an appropriate time to stop. Preferably the mapping should be finalised in a single day; however, if it is clear that there are still major gaps to fill, the facilitator should ask the participants to return the following morning to complete the exercise. The map will need to be protected from disturbance overnight.

### Box 3: Important elements to consider while mapping rangelands

#### 1. Mapping boundaries

Boundaries may restrict the scope of the map. Try to avoid drawing the boundaries of the area to be mapped when first starting the mapping process. This may limit the development of the map unnecessarily and result in important features outside the boundary being missed out or ignored. For example, areas of forest or grazing that are used infrequently by the community may be beyond the boundary initially set, and thus a map with a boundary marked early on in the mapping process can present a partial or false picture of resource availability, access, and use. In addition, by starting with the administrative (or other) boundaries, the facilitators may unwittingly imply that these boundaries are particularly important.

Mapping is used as a tool for improving the management of shared resources in different areas, and therefore it is important that resource management arrangements are not misunderstood or missed out entirely from the map. It is better practice to develop a rangeland resource map with all the identified resources first, and then to ask the participants to draw any relevant boundaries. In marking boundaries on the map, participants will identify those resources that might be managed by one village and those that require management by several villages.



### *2. Mapping seasonal variations in resource availability and resource use*

Pastoralists and hunter-gatherers use different resources at different times of the year. This is due to two factors: availability of the resource and management of the resource. This seasonal variation in resources and their use is important information and needs to be highlighted on the map, through the use of different pictures, symbols, or colours.

Lowland dry areas where pastoralists operate are characterised by distinct dry and wet seasons. Resource availability and resource management actions are very different during these different seasons. If a particular objective is to understand seasonal change, it might be necessary to draw two separate participatory rangeland resource maps to fully understand the differences.

### *3. Mapping mobility*

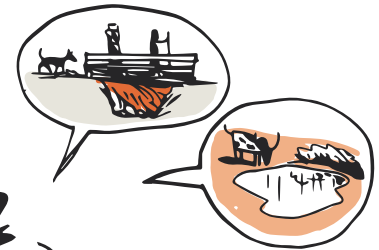
Mapping mobility patterns of livestock and people is another important function of rangeland resource mapping, but it can be a challenge. Distances moved may be large or small, depending on the season and even the particular year. It can be difficult to show all the necessary detail and the extent of people and animal movements on an already cluttered rangeland resource map, so a separate mobility map may be preferred (this is discussed further below).



# Step 5

## Add details

*The rangeland resource map will be a source of baseline information throughout the sustainable rangeland management process. Additional details beyond the spatial location of resources will need to be added to the map.*



### Focused discussion with the mapping group to add details

Based on the objectives of the mapping exercise as agreed with the community, additional information and details will need to be added to the rangeland resource map. Once the basic map is drawn, the facilitator should go through the mapping objectives with the mapping participants and his/her checklist of questions so that the group can add detailed information to the map.

### Mapping mobility and livestock routes

For example, one objective may be to understand patterns of mobility (livestock and people) both within and outside the area.

A key feature in the management of natural resources and therefore within VLUP is the movement of livestock (and people) to access water and grazing. However, as described previously, mobility mapping is complicated and needs careful questioning and prompting of the mapping group in order to generate the required information (see Box 4).

Where movements are numerous and complex, mapping them all can obscure other details and make the map cluttered. Therefore it may be necessary for a separate map to be drawn, or for the map-copier to put the mobility patterns on a separate map. An alternative is to draw the mobility/livestock routes on a copy of the map drawn on tracing paper, which can then be placed on top of the original map when required. Use of GIS after the map has been drawn can be useful for combining/layering the different datasets and maps.

To make a separate mobility map or to show mobility on the existing map, a checklist of questions for the facilitator to ask might include the following:

- » Where do you travel with your different types of livestock for grazing or browsing?
- » Where do you travel with your different types of livestock to find water for them?
- » Where do you travel to collect or use other natural resources and for what purpose?
- » When and how often do you make these journeys?
- » Why do you make these journeys?
- » Who makes these journeys?
- » What resources do you bring back with you from these journeys?
- » Who from “outside” the community travels into this area to make use of the resources and why?

The note-taker should make careful notes of all these movements and related discussions.

#### Box 4: Mapping mobility

Mobility maps show where, why, and when people and livestock travel. Mobility information can include:

- » Date and frequency of travel;
- » Route, distance, and destination;
- » Reason for travel;
- » Difference between men, women, boys, and girls;
- » Travel routes linked to the flow of resources, including cash.

Mobility maps may be drawn to show the movement of different pastoral groups from different villages, or one group's movements. Individual or household mobility can also be shown. Mobility routes can be mapped for different livestock species, and maps can show seasonal usage and the provision of any holding or grazing areas, water points, dipping tanks, etc. along them.

A mobility map can also show which areas are most regularly visited and therefore may be under pressure and at risk of over-use. As a result, these may need special management or protection. Alternatively, the map can highlight which areas are not being visited often or at all and are therefore potentially being under-used. It is important to find out the reasons for the mobility patterns and why some areas are visited more often than others. Solutions may then be identified to resolve any problems such as over-use, under-use, and conflicts over resource use.



It is possible to produce maps of normal movements of animals for early warning purposes. These maps can cover large areas and even an entire region. By understanding and monitoring animal movements, unusual movements can be detected as an early sign of stress and are therefore an important early warning tool in pastoral areas.

### Mapping key resources and/or resources of specific management importance

A second objective may be to understand the condition of the resources and which areas of the rangeland might need some specific protection or management.

The rangeland resource map should highlight the location and condition of key natural resources (e.g. water, grazing areas, fodder banks), as well as areas that need specific management actions (e.g. dry season grazing reserves).

“Rangeland productivity hotspots” are key resources that pastoralists need most to maintain the productivity of their livelihoods based on livestock husbandry. These “hotspots” can be shown on the map.

A checklist of questions that focus on grazing, for example, would include the following:

- » What makes a grazing area a “good” grazing area? What makes a grazing area a “bad” grazing area? Which of the grazing areas that you have drawn on the map are “good” or “bad”?
- » What can be done to improve the grazing areas that you have mapped?
- » Which grazing areas are of greatest importance to your livestock production system?
- » Where are the grazing areas that you were able to access in the past but are not able to access now? Why are you not able to access them?
- » Where are the grazing areas that are most likely to be a cause of conflict?

### Adding boundaries, borders, and land use divisions

In Step 4, it was advised that the boundaries of a village, or other unit of focus, should not be drawn too early on in the mapping process. However, for the purpose of defining a rangeland management sector plan, joint village land use plan, or a CCRO for a shared grazing area, it is essential to identify boundaries, borders, and divisions that are relevant for the protection and management of the area. Now is an appropriate moment for the boundaries of the rangeland management area and/or the village to be drawn on the rangeland resource map.

The boundary (and indeed the map itself – see below) will need to be discussed and confirmed with the wider community, local government, and neighbouring groups. Neighbouring groups in particular may dispute the boundary and therefore, following the mapping exercise (and before the map is used for any official purpose), a process of negotiation and consensus building may be needed to reach settlement and agreement. It may be appropriate to show the boundary as a dotted line, implying that there is movement across it.

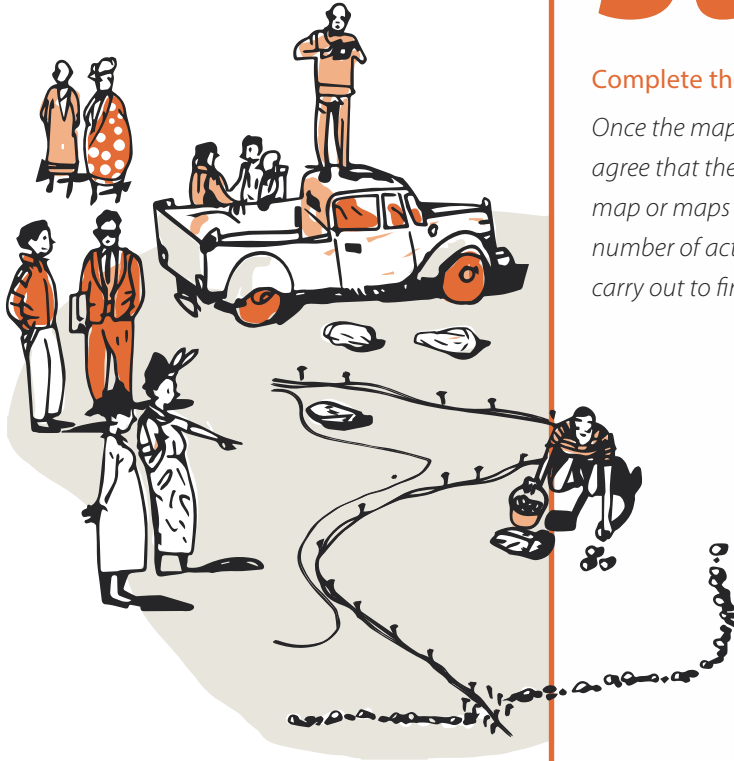




Boundary disputes were resolved in Kisanga with the assistance of a small research project by students and staff of ITC and University College of Lands and Architectural Studies (UCLAS – now Ardhi University), in conjunction with CARE Tanzania (the Msitu Yetu project). Boundaries were disputed due to unclear demarcation, tenure insecurity, and insufficient dialogue between disputing groups. As a first step in understanding the situation, community members were assisted to draw a sketch map of the area. In order for the researchers to find their bearings, several landmarks were marked by GPS. Landsat Thematic Mapper (TM) satellite images with a 30-metre resolution served as a mapping background.

Showing the conflicting boundaries on a map made the problem areas spatially explicit and helped focus the efforts of the villages involved to mitigate the problems. Though GIS mapping itself is by no means the solution to boundary disputes, the immediate visual output assisted in discussions. Much of the quality and usefulness of the data recorded with a combination of personal digital assistant (PDA) and GPS depended on the skills and knowledge of the operator; specific knowledge is required to prepare the right configuration in order for use of the tools to become straightforward.

Other boundaries, borders, and divisions that may be displayed on the map include administrative boundaries; land use divisions; commercial land holdings; state holdings; and wildlife management areas. The note-taker should carefully document all the discussions on boundary, border, and division issues.



# Step 6

## Complete the map

*Once the mapping team and the participants agree that the participatory rangelands resource map or maps have been completed, there are a number of actions that the mapping team should carry out to finalise this stage of the process.*

### Facilitator

At the end of the mapping session, the facilitator should thank the group for their participation, information, and time. It should be explained once more why this information is useful and how it will be used. The community should be given the opportunity to ask any questions they may have. Finally, arrangements should be made for the next meeting, when the mapping participants will present their rangeland resource map to the larger community for discussion and verification (Step 7).

### Note-taker

At the end of the mapping session, the note-taker should check that the notes are complete and, if not, spend the necessary time with the participants filling in information gaps and clarifying place names and other details.

### Map-copier

Immediately after the participatory map has been completed, the map-copier should take a photo of it to supplement the drawn copy. It can be useful to do this from high up, looking down on the map (standing on top of a vehicle, for example), so that the whole map can be included in one photo. The map-copier should use this and the field drawings to transcribe the details of the final map onto paper (flipchart paper or larger).



The map-copier should ensure that the legend used on the paper map is the same or similar to the one produced by the mapping participants. The same, or similar, colours should also be used.

The following details should be included on the participatory rangeland resource map (or on the back of the map):

- » Date that the map was created;
- » Place that the map was created;
- » Names of the mapping team;
- » Names of the community members who prepared the map;
- » North should be indicated on the map, but the orientation of the map as drawn by the community should not be changed to align with north.

Additional copies of the rangeland resource map can be made on A3 (or A4) paper – this can be done either through a scan and reduction or by hand-copying. These smaller maps can then be easily included in reports. Any duplication should ensure that the original features and details of the map are retained.

Once the paper map is finalised, it should be checked by the participants, or at least a sub-group of participants, before being presented to the larger community (in the next step).

Against the mapping checklist (Annex 1), ensure that all steps in the mapping process have been completed.



# Stage 3

## Verification: Confirming the map

This stage focuses on follow-up steps once the participatory rangeland resource map has been produced.

These include:

- » Step 7. Share with stakeholders
- » Step 8. Write the report
- » Step 9. Return the map to the community

  
MILIKU YA LARWA KIBALIA  
**HUDUMA  
ZINATOLEWA  
HAPA**



**RAMANI YA KIJJI CHA NGABOLO KU  
MIFUGO**









# Step 7

## Share with stakeholders

*Once the rangeland resource map has been created, it is important to confirm and verify the information collected. This can be done through a meeting where the mapping group presents the map to the larger community including the Village Council for feedback, as well as using other sources to check the information (through “triangulation”).*

### Organise a feedback meeting

A community feedback meeting should be organised as soon as possible after the mapping exercise in order to present the map to the community and other stakeholders. It is more appropriate for the mapping participants themselves to do this rather than the mapping facilitation team, though participants may need assistance from the team to resolve any disagreements. The team should take note of any discrepancies or corrections that need to be made. The Village Council and all the members of the Village Land Use Management (VLUM) committee should be included in this meeting.

In general, it has been found that this meeting results in some additional information and in relatively few major disagreements. If, however, major inaccuracies are found that result in increasingly heated disagreement, it is recommended that the meeting be allowed to continue to completion and that a sub-group meets to reconcile any outstanding issues. It is important that the final rangeland resource map has the broad approval of the community, including both leaders and the majority of the people.

Managing disputes may require that the mapping team engages in triangulation work to help reconcile differences of opinion (see Box 5). In such cases, the community can be encouraged to set up a dispute resolution committee to work with the mapping team.



### Box 5: Triangulation of the map

There are a number of sources and ways that the mapping facilitating team can check the information. The process of doing this is called “triangulation”. Examples include:

#### *i) Interviews and focus group discussions*

The committee and the mapping team can arrange to meet with concerned community members who directly manage and use the natural resources under discussion. It is recommended that these meetings are held at the specific rangeland location under dispute.

*ii) Ground-truthing*

The facilitation team and committee can physically check the mapping features on the ground by visiting, walking, and observing the mapped area. This could also be done using GPS, which would provide information that could be fed into GIS tools.

*iii) Multimedia: audio and video*

Many pastoralists are non-literate and accustomed to communicating orally. Much local knowledge about the land is shared in the form of stories and legends and is told visually (with actions). Using multimedia (video or audio) can provide an important way of recording information that may be more reflective of local indigenous knowledge systems. The making of mapping videos and tapes can be done at the same time as the mapping exercise and/or as separate sessions where a community is recorded explaining what has been included on the map.

*iv) Official maps*

Official maps can be sourced from local (or national) government or NGO offices. These can be used to check some of the key features of the community maps to review the general accuracy of their positioning. Maps showing features such as soils, water, topography, and vegetation can also be useful.



# Step 8

## Write the report

*The rangeland resource map is an important stand-alone document in itself, but the report that accompanies it will also provide crucial background information for the VLUP process. It is vital for the note-taker to write up the report on the mapping process and related discussions as soon as possible after the exercise.*

The mapping report can follow this structure:

## Rangeland mapping report

- 1** Title page with date, author, and contact details
- 2** Acknowledgements
- 3** Introduction
- 4** *Field site details*
  - Date
  - Name of community
  - Location
  - Main type of livelihood system
  - Names of participants and sex
  - Names of the mapping team and associated roles and responsibilities
- 5** The primary and secondary objectives of the mapping exercise
- 6** *Copy of the map*
  - A scale copy of the map and a photograph of the original map as drawn by participants

- 7** *Notes of the discussions that accompanied the mapping*  
Where the mapping has more than one objective, it is important that this information is presented, reflecting the points raised by the participants.
- 8** *Notes on disputes*  
This section of the report should document any disputes or disagreements that arose from the mapping exercise, and how the disputes were resolved.
- 9** *Notes on levels of participation*  
A short reflective section is useful on the selection process of participants and levels of participation, including particularly engaged or particularly troublesome community members.
- 10** *Conclusions and next steps*  
End the mapping report with any conclusions and proposed next steps, including an associated timeline.





# Step 9

Return the map to the community  
and share with other stakeholders

*Returning the participatory rangeland resource map to the community for their use, together with other stakeholders, is important.*



It is important that at least three scale copies of the map(s) are returned to the community, together with an equal number of copies of the mapping report and photos taken. This could be done through an official community meeting where the map is received by the community leader(s). If possible, the map and report should be in Kiswahili as well as in the local language (if considered necessary). In order that community resource maps can be used as a reference document, it is recommended that they are laminated so that they can be used repeatedly in community meetings without the risk of damage. For VLUP purposes, it is important that the VLUM team has at least one copy. If possible, the mapping participants should also be given their own copy.

In addition, following consultation with the mapping participants and local community leaders, copies of the map and report could be given to:

- » Local and regional government offices responsible for land use planning, natural resource management, and pastoral development, including the Participatory Land Use Management (PLUM) team and the District Executive Director, for use in VLUP and district-level planning processes;
- » Other NGOs and civil society organisations operating in the area;
- » Local dryland research institutes and universities.

Once the rangeland resource mapping activity is completed, the facilitation team and the local community will continue to work together on the next steps of the VLUP process (see Stage 4). It is important to maintain contact with the community on a regular basis in order to continue developing a good working partnership, which can be built upon in future activities.

#### **Box 6: Recognising intellectual property rights**

It is important that agencies involved in mapping recognise that the information presented in the map is primarily the property of the community in which the mapping exercise has taken place, even though it is produced as a result of a facilitated exercise. The mapping team does not therefore “own” the information, the map, or indeed copies of the map. Planned future use of the map for information, coordination, and advocacy purposes should be discussed and agreed with the community. Particular care should be given to agreeing to the use of participatory rangeland resource maps for advocacy purposes. If needs be, follow-up meetings can be organised with community members to seek their support and approval for planned uses.



# Stage 4

## Application: using the map

The steps to be taken in using the participatory rangeland resource map are:

- » Step 10. Planning
- » Step 11. Management
- » Step 12. Monitoring and evaluation



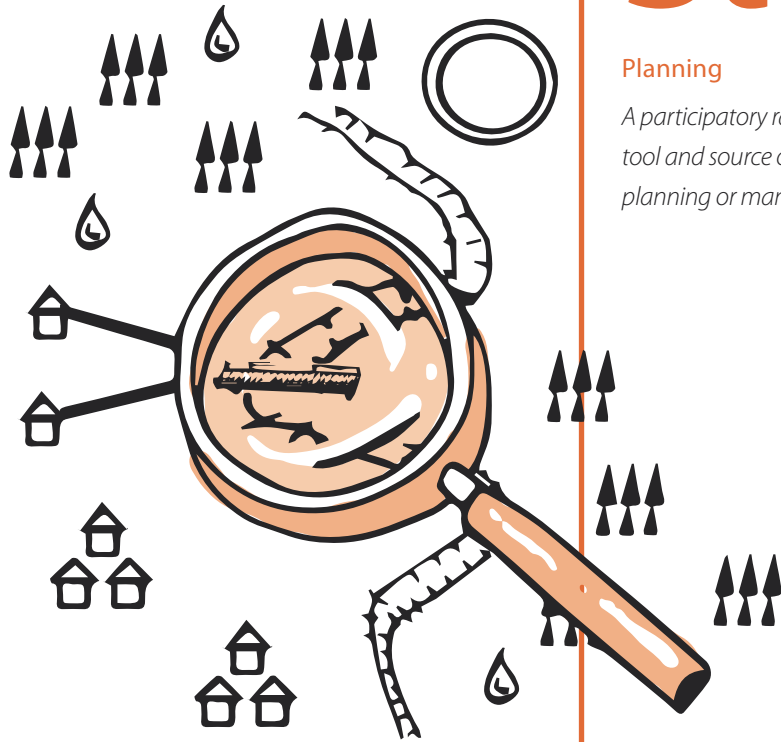
# Ramani ya Matumizi Bora ya Ardhi Kijiji cha Mongo wa Mono na Yaeda Chini

0 5 10 15 20 25 Kilometer



Base maps: Series 8714, Yaeda 683  
Thana 684 and Haidom 801  
Survey and Mapping Division,  
Ministry of Lands, Tanzania, 1975  
Grid: UTM Zone 29 South  
Map created: 12/02/2007 UCRT





# Step 10

## Planning

*A participatory rangeland resource map is a valuable tool and source of information for VLUP and other planning or management processes.*



Once Stages 1, 2, and 3 have been completed, the rangeland resource map is ready to be used in the planning, management, and monitoring of rangeland resources. Of particular importance is its use in village land use planning as a detailed documentation of local resource use and management, which can form the basis for negotiations and decisions about use and sharing of resources, and dividing village land into different land uses. It can also be used as a baseline for M&E.

In order to develop and implement a good village land use plan, detailed information on current resource use and management is required. The rangeland resource map and accompanying report present a comprehensive visual and written source of such information. This includes up-to-date information on the following: resources including shared resources, land types and uses, general land use trends, key areas of concern or conflict, governance structures, and areas or resources that may need special attention or protection. However rangeland resource mapping is only one tool amongst many that can provide appropriate information for VLUP processes.

Rangeland resource mapping may also have important applications in climate change planning. Mapping different climate change scenarios can help to assess and plan for anticipated impacts of increases in temperature and changes in rainfall patterns, and subsequent changes in vegetation and seasonality. This is an area of work that could be usefully developed and expanded.



In Duru Haitemba, Babati in Manyara region, participatory digital mapping was used, with the intention of empowering mapping participants and communities through knowledge sharing and raising awareness during and after the mapping exercise. The community mapping and participatory GIS (PGIS) proved to be useful tools for examining conflicts and their spatial and temporal distribution. This work was carried out in conjunction with the LAMP project. Data was collected through sketch maps, GPS ground-truthing, and Aster 2005 satellite images, to establish land cover and use in the study area so as to visualise conflicts from sketch maps. ArcGIS 9.1 and ERDAS Imagine 8.7 software was used for analysis and visualisation of conflicts and changes in grazing resources, and for image classification to establish land cover and use in the study area.<sup>4</sup>

4 C.G. Mandara (2007) Participatory GIS in Mapping Local Context of Conflicts over Pastoral Resources. A Case Study of Duru Haitemba – Babati, Tanzania. MSc thesis submitted to the International Institute for Geo-Information Science and Earth Observation, Enschede, Netherlands.

Although the visual hand-drawn map may be the most readable and useable presentation of this information for local communities, the local PLUM team is likely to require the information to be presented in a more formal manner. This can be achieved in a number of ways, including:

- » Key landmarks drawn on the map can be ground-truthed with a GPS reading and transferred into GIS. Readings should be taken with the community members who produced the hand-drawn map in order to ensure that the correct landmark is detailed. Alternatively, Google Earth can be used to make GPS readings, and the community assisted to locate landmarks from their hand-drawn map on a Google Earth map of the same area. The Tanzania GIS User Group (TZGISUG) supports users and enthusiasts of GIS in the country. Authorities in Longido District, with support from the Tanzania Natural Resource Forum (TNRF) and the International Institute for Environment and Development (IIED), have developed landscape- (rangeland-)scale maps of pastoral resources and pastoral livelihood dynamics. These maps will be used by district actors to develop by-laws for the protection and better management of critical pastoral resources, to guide public good-type investments in support of climate-resilient development, and to resolve issues of competing and contradictory land use planning at different scales and by different jurisdictions. Community perception maps and Google Earth were used to understand and map local livelihood dynamics. By integrating maps produced by communities with Google Earth maps, it has been

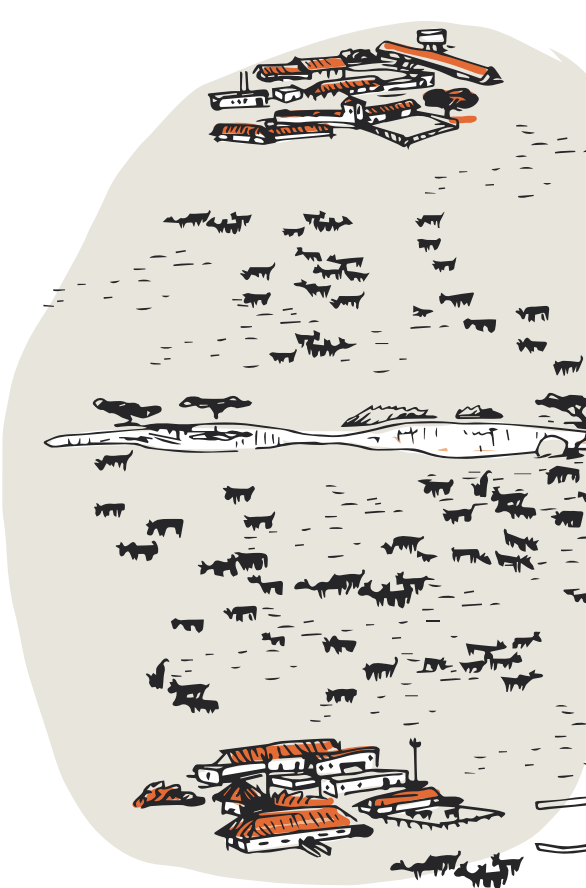
possible to document local knowledge and display it in a medium that is easily understood by government planners. This facilitates dialogue, understanding, and ultimately respect between government staff and citizens – core foundations on which to build participatory inclusive processes for the design of appropriate planning and resource governance for climate-resilient development. The ward-level Google Earth maps are combined into a single district-wide map and presented for discussion and validation at a series of community meetings from ward to district level. They are cross-checked and further information is added before a final map is produced and approved by the full District Council. At this stage, the Google Earth maps are converted into paper maps.<sup>5</sup>

- » Information from the hand-drawn map can be transferred onto a topographic map. This should be carried out in the presence of some, if not all, of the community mapping participants. This may still require ground-truthing of key landmarks and boundaries using GPS. In Tanzania, topographic maps can be obtained from the NLUPC.



5 T. Rowley, C. Hesse, A. Harfoot, and H. Zwagastra (forthcoming) Participatory Digital Map Making Using Local Knowledge and Open Source GIS to Inform Appropriate Spatial Planning in Support of Climate Resilient Mobile Livestock Keeping in Arid Areas of Kenya and Tanzania. PLA Notes. IIED, London.

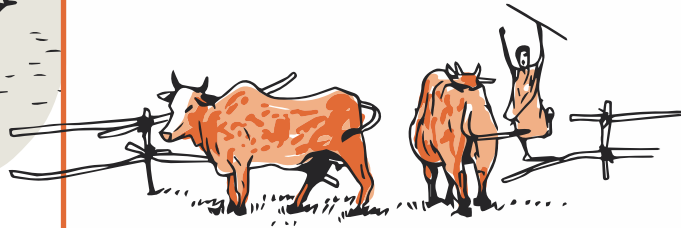
- » Information from the hand-drawn rangeland resource maps can be transferred onto a satellite image. This should be carried out in the presence of some, if not all, of the community mapping participants. This may still require ground-truthing of key landmarks and boundaries using GPS. High-resolution satellite images are expensive, although once acquired a single image could cover more than one village. In Tanzania, Landsat 5 TM, Landsat 7 ETM+, and Landsat 8 TM images (1994, 2001, 2008) are available. In a project supported by the Jane Goodall Institute in Gombe National Park, high-resolution satellite imagery was interpreted with local communities. Local names of mountains, streams, scattered settlements, and other landscape features were almost entirely missing from existing mapping records. A participatory mapping methodology was successfully tested by the TACARE Project in five villages adjacent to the park. The methodology used satellite imagery to record local perspectives and knowledge of landscapes and land uses and values. Local people have limited experience in reading maps, but were able easily to recognise geographic features on 1-m IKONOS satellite imagery prints at a 1:7,000 scale. Villagers were able to relate to locations on the ground and “travel mentally” around the images to locate other land features. They were able to map village boundary markers such as trees, stones, small streams, forest patches, paths, and bridges; fields of oil palm, banana, and cassava; and places of worship such as churches, mosques, and traditional belief places.



# Step 11

## Management

*The rangeland resource map and resulting land use plans will identify different land uses and resources that require their own specific management regimes and actions.*



If rangeland resources are to be properly managed, they require not only a clear management plan but also its implementation. Tanzanian policies and legislation encourage good management of all resources, but in particular shared resources that might otherwise be a source of conflict. For example, where resources are shared between two or more villages, a natural resource management sector plan should be drawn up and implemented. A clear and detailed rangeland resource map is an important contribution to this. Enabling ownership of the management plan through community planning and decision-making is the foundation of sustainability of any plan that the community is expected to implement. Using the rangeland resource map is a clear way to achieve this. The map has been produced by and is owned by the community, and therefore this information can be used as the basis for developing a management plan, discussing resource issues, and agreeing on management activities.



# Step 12

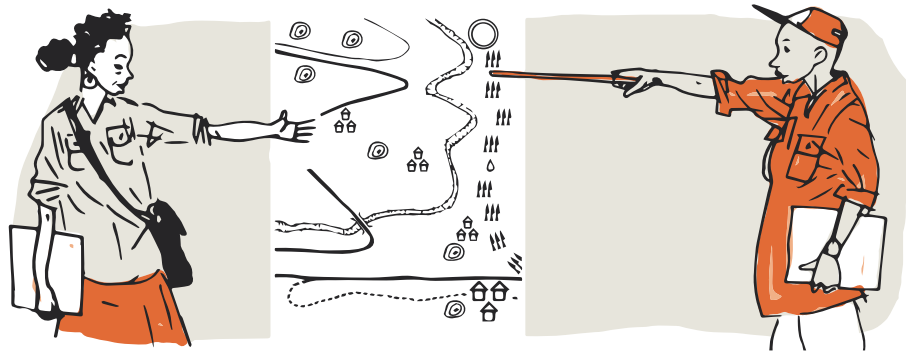
Monitoring and evaluation





A rangeland resource map and related information is a good baseline from which to monitor and evaluate changes in land and resources, and their use and management. Monitoring of rangeland resource management plans using participatory rangeland resource maps enables resource managers to assess the impact of management actions. Annual resource maps can be used to discuss management progress and changes in resource conditions. Rangeland monitoring maps will assist in providing information related to new management issues arising that need to be addressed in a revised management plan.

Monitoring is particularly important for resources or land that are under heavy use and/or are especially at risk. Participatory rangeland resource maps can be produced/updated at regular intervals as a contribution to this monitoring. Information generated from this monitoring on changes and trends should be evaluated and fed back into the management process, so that processes and action can be adapted to take them into account.





**Annex**  
Checklist  
for rangeland  
resource mapping

# 1

## Getting started

### Introduction

- All team members understand the objectives of the mapping exercise.
- The facilitation team has produced a checklist of questions to be answered.
- A “mapping kit” of materials is available for use by the community.

### The facilitation team

- The team has at least three members.
- The team includes men and women.
- All team members have been trained in mapping and participation techniques.
- All the team have read the mapping guidelines.
- Team roles are identified (facilitator, map-copier (drawer), and note-taker).
- All the team speak the local language (if not, a translator has been provided).
- At least one team member comes from the local area.

### Approaching the community

- Local government offices are aware and approve of the activities and objectives.
- Local elders/leaders are aware and approve of the activities and objectives.
- It has been clearly stated to the community who the team would like to participate in the mapping process. The selection of participants should reflect the team's objectives and be socially representative. The mapping group includes at least six people.
- The arrangements for the exercise have been clearly stated for participants, including time, payment, transport.
- A time and a place for the exercise are agreed.

# 2

## Making the map

### The mapping process

- The team is introduced to the community.
- The objectives of the mapping are clearly explained to the community.
- A discussion takes place on what should be displayed on the map and at what scale.
- The mapping is started with a simple question, such as: "What are the main physical features of the area?"
- The boundary is added after the map is completed (not at the start).
- All resources are mapped, including those nearby/far away (depending on your objectives).
- Places and names are clearly labelled.
- A legend explaining symbols is provided.
- A discussion is carried out during the mapping based on checklist/questions.
- All participants contribute to the exercise.
- Interest in the exercise is maintained by all participants.
- Time is given for questions.

### Note-taking

- Clear and detailed notes are available of all discussions, including questions and answers.
- Issues of debate, dispute, and facts of interest are noted.
- All notes are typed up and a copy attached to the paper map for future reference.

### Copying the map

- The community has given permission for the map to be copied.
- A copy of the map is made on flipchart paper (or larger), as drawn by the community (i.e. no changes in orientation of map or details/symbols).
- A legend explaining symbols is provided.

### Closing the activity

- The participants are thanked.
- The importance of the map and its benefits/opportunities are discussed.
- Time is given for questions.
- Next steps are discussed and agreed.
- Arrangements are made for the next meeting.

# 3

## Follow-up

### With the community

- The maps drawn by both men and women are shared and discussed.
- Any necessary amendments to the map are made.
- The community is given a complete copy of the map (preferably laminated).

### Report writing

- A report of the exercise is written up immediately.

*The following are included in the report:*

- Field site details (name of group, number of participants, site/location, gender, livelihoods);
- The objectives of the exercise;
- A clear copy of the map;
- Summary of discussions and questions/answers;
- Follow-up to be provided, when, and by whom.



- Copies of the report and the map (full-size hard copy and soft copy) are sent to head office.
- Copies of the report and map are filed in the facilitation team's office.
- Copies of the report and map are given to the local government office.



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