



## Tool 2-2

### Rapid community rangeland monitoring tool: guide to starting monitoring

November 2018



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# Rapid community rangeland monitoring tool: guide to starting monitoring

## Objective

This tool describes the steps for launching a simple approach for rapid collection of rangeland monitoring data useful in tracking rangeland degradation and restoration.

## Anticipated output

A set of monitoring sites with basic site information (site IDs, latitude and longitude of locations) created, the first (baseline) rangeland monitoring data recorded, and the first (baseline) monitoring photos taken and archived.

## Participants in this activity

- Members of the rangeland management institution and other community members
- Personnel from the facilitating organization

## Introduction

Monitoring rangeland condition and evaluating the effectiveness of management are important aspects of strengthening the Second Leg of rangeland management and will ultimately determine the success of the participatory rangeland management (PRM) process. Communities need to develop their own monitoring and evaluation (M&E) systems as part of taking up or strengthening their rangeland management roles. Rangeland monitoring provides data that is useful for a variety of purposes. The most common use of rangeland monitoring data is to know whether rangeland quality is declining (degradation) or improving (restoration). Since livestock production (milk, meat and sales of live animals) depends on the resources animals consume from rangelands, rangeland quality or condition—how much biomass is produced and the forage quality of the biomass—is an important concern for any livestock producer.

Rangeland monitoring is helpful because it addresses some of the important challenges in managing rangelands through grazing management and other approaches. These challenges include: (i) slow change; (ii) high variability; and (iii) the importance of a long-term management strategy. Rangeland quality changes slowly over many years, which is difficult to observe. Collecting even a little data over two or more years can show changes that cannot be observed by the eye alone. Rangelands are variable in space with each place is slightly different from other areas even nearby; and time with



each year having a different rainfall pattern. This variation also makes observation of changes difficult. To overcome the first two challenges, a long-term management strategy is needed and monitoring is required to know whether the strategy is working or failing. If degradation goes on for many years, solutions will become more difficult and more costly with each year that passes.

There are many different types of data used in monitoring rangelands and each has its own advantages and disadvantages. The most commonly used approaches are collection of detailed field data and use of satellite remote sensing. These approaches are useful but they require highly trained scientific staff. While detailed field data focuses on only a few areas (many areas are needed to be effective), remote sensing is less accurate than field data and often cannot be used to make useful management recommendations on the ground.

For these reasons, this tool takes a different approach more useful to communities: simple, rapid, robust field data collection in combination with photo monitoring. The main advantage of this approach is that rapid collection of robust and slow-changing indicators of rangeland quality is much faster, cheaper, easier and more reliable and precise than alternative monitoring approaches. Photo monitoring has the added advantage of being easily interpreted even by non-technical persons, making monitoring information more accessible and useful to stakeholders ranging from donors to community members.

After this protocol has been completed and all baseline monitoring data and photos are safely recorded and archived, use the next protocol, “Tool 2-3: Rapid community rangeland monitoring tool: Guide for ongoing monitoring” for the second, third and subsequent visits to each monitoring site.

## Steps

### Step 1: Select the monitoring sites

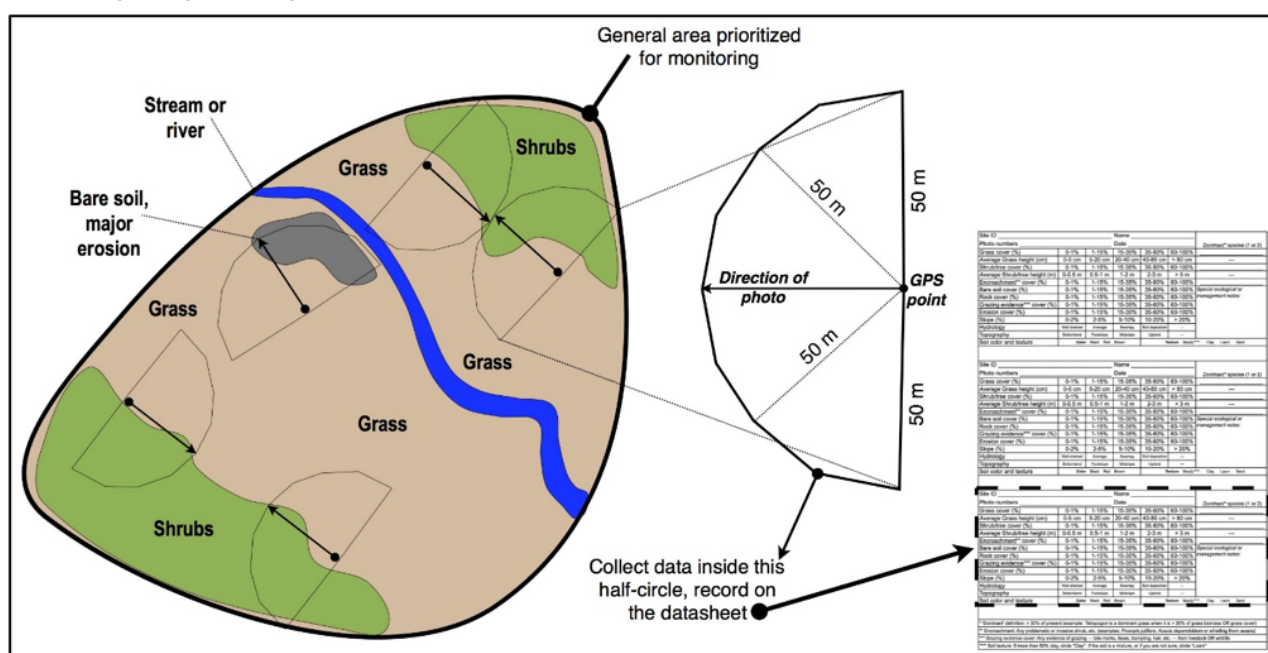
- Consult community members to prioritize a “general area” for rangeland monitoring. You must locate monitoring sites in important rangeland areas. Ask the community members where it is useful and important to monitor rangelands. For example:
  - a. Important pastures used for intense grazing
  - b. Degraded areas where good grasses have been lost, grass cover is decreasing, soil erosion is increasing, etc.
  - c. Areas the community is restoring through planned grazing, resting, re-seeding, etc.
- It is best to locate monitoring sites in transition areas in rangelands since being on a transition lets you see the change directly through photography over time. For example:
  - a. Where a shrubby area meets a grassy area
  - b. Where an area with good grass or shrubs meets an area with severe erosion
  - c. Where different soil types meet, for example, where red soil meets black soil
  - d. Where areas with different hydrology meet, for example, where a swamp meets a grassland or shrubland
  - e. See Figure 2-2-1 for an example of a complex “general area” prioritized for monitoring by a community showing the best locations for monitoring sites.
- Do not locate monitoring sites in “sacrifice zones” with major degradation such as:
  - a. Bomas or settlements: a minimum distance of 200 metres from any boma or settlement is recommended.
  - b. Water points: a minimum distance of 200 metres from any pond, borehole, dam, river, etc. should be kept.

A community can manage what it monitors.



- Do not locate monitoring sites outside of rangelands.
  - a. Crops: sites close to crops are okay. However, a minimum distance of 50 metres from crops should be kept. Also, do not include crops in the photos or the data.
  - b. Private exclosures and fenced areas: sites close to fenced private grazing exclosures are okay (minimum distance of 50 metres from exclosures or fences is recommended). Do not include private areas in the photos or the data. Note: if you are monitoring exclosures or paddocks, ignore this rule.
  - c. Streams: sites close to streams are okay (no minimum distance) but do not include streams in the photos or the data.
- Do locate monitoring sites in different areas. It could be that only one or two of the sites in Figure 2-2-1 would be monitored. If you can monitor several areas, place them some distance from each other (>10 km).

Figure 2-2-1. The best locations for monitoring sites in a general area the community has prioritized as important for monitoring changes in rangeland condition



## Step 2: Record basic site information for the monitoring site

- After you have selected a good site for monitoring, use a Global Positioning System (GPS) device to save the location of the monitoring site.
- Make a new site ID for the monitoring site. Make the site ID using:
  - a. the name of the local area or the name of the closest settlement/village/town/hill/etc.; and
  - b. the number of the monitoring site in the local area.
- c. For example, if you have created three new monitoring sites in an area named Maji, the site IDs would be as follows:
  - For the first site, the site ID is: Maji 1
  - For the second site, the site ID is: Maji 2
  - For the third site, the site ID is: Maji 3



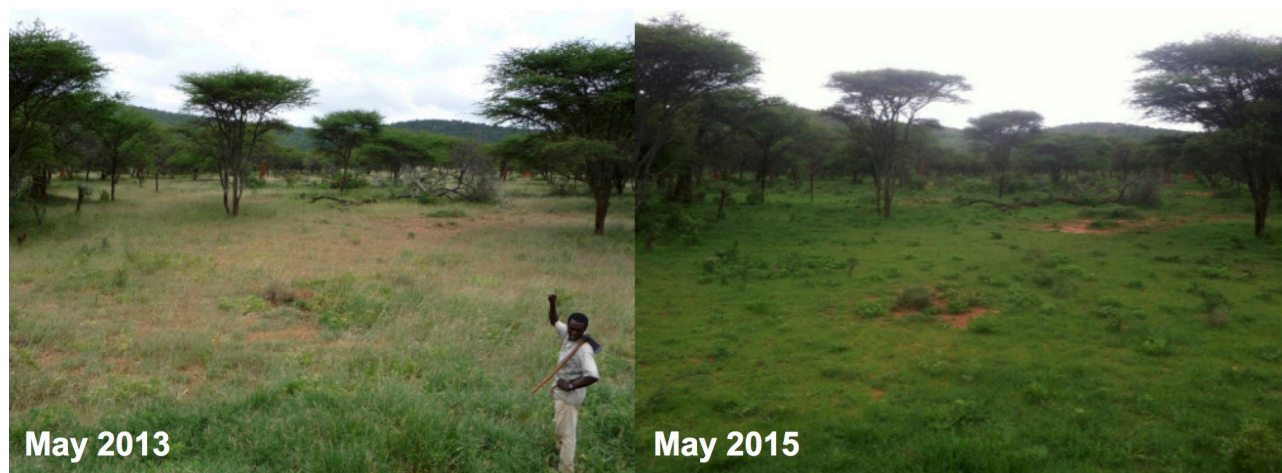
- List the GPS waypoint numbers and site IDs. After you GPS the location point of a monitoring site and give it a site ID, make a list on paper with the waypoint number saved on the GPS, and the site ID.
  - For example, for the 3 new monitoring sites, Maji 1, Maji 2, and Maji 3:
 

Waypoint number	Site ID
001	Maji 1
002	Maji 2
003	Maji 3
  - As you continue to add more monitoring sites, make sure you write all monitoring site IDs and waypoint numbers on the list. If you do not do this, or you lose the list, all monitoring data will be lost. Keep the list safe and make a second copy to keep in the office or at home.

### Step 3: Take photos of the monitoring site

- Stand at the GPS point. If you are standing in a transition area, take the photo along the transition (see Figure 2-2-1). For example, in an area where grass meets shrubs (see Figure 2-2-1), take the photo so that it includes both the grass and the shrubs.
- If it is not a transition area, take the photo in a direction to include a landmark; for example, a special large or dead tree, a large termite mound, a special or large hill in the distance.
- Hold the tablet horizontally, with a very small portion of the sky at the top of the photo.
- Check that the tablet is fully zoomed out as wide as possible.
- Keeping your hands still, take two photos.
- For an example of a photo taken like this, see Figure 2-2-2.

Figure 2-2-2. Change in grassland condition over two years near Dida Hara, Borana Zone in Ethiopia in a site restored by thinning excess shrubs and prescribed fire. This site was bush-thinned in 2006 and burned in 2007.



Note that the grass is expanding in cover and the trees and shrubs have grown taller. The live and dead trees and the hills in the distance were used as landmarks to take the exact same photo two years later.

### Step 4: Record rangeland data for the monitoring site

- After you have taken the photos, record rangeland data using Worksheet 2-2-1 found on p. 7 of this tool.
- For most variables, circle the correct response. For dominant plant species, write the name(s) of one or two dominant species. Local names are acceptable.



- *Measuring cover*: for all cover measurements (cover of grass, shrubs/trees, encroachment, bare soil, rocks, grazing evidence and erosion), think like a raindrop. For example, if rain falls on a shrub, some raindrops fall on the leaves or wood and some raindrops pass through to the soil. If 25% of the raindrops fall on the leaves and 75% falls through to the soil, the cover of that shrub is 25%, so on the datasheet you will circle the appropriate value, which is 15–35%.
- *Average height*: for all vegetation height measurements (height of grass and shrubs) write the average height, not the maximum height. Therefore, if you measured the height of each and every grass plant and then calculated the average, the number you would get is what should be recorded. On the worksheet, circle the category that most closely matches the average height.
- *Erosion*: record the cover (%) of visible erosion, including sheet erosion, gullies and rills (small gullies) and pedestals (the roots stand above the soil because of soil loss).
- *Slope*: circle 0–2% for very flat areas and 2–5% for almost flat; >20% is a very steep slope, 10–20% is steep but not very steep, and 5–10% is in the middle. Note that more detailed methods such as a clinometer or the string method can also be used.
- *Hydrology*: circle “well-drained” for sandy or rocky areas where rain passes quickly through the soil and rocks, the land drying quickly; circle “swampy” for very wet areas that hold water for some time, the land drying slowly; circle “soil deposition” for areas where erosion is depositing soil from a hill above; and circle “average” for all other areas.
- *Topography*: circle “bottomland” for the lowest areas of the landscape (flat areas at the bottom of a hill or close to streams and swamps); circle “footslope” for areas where the slope of a hill begins (close to bottomlands); circle “midslope” for areas in the middle of the slope of a hill; and circle “upland” for the highest areas of the landscape.
- *Encroachment*: encroachment species include shrubs or trees that invade rangelands quickly or that cause serious problems for grazing of rangelands. Common examples include:
  - a. *Prosopis juliflora* or mathenge
  - b. *Acacia depanelobium* or whistling thorn acacia
  - c. *Solanum incanum* or sodom apple

Note: encroaching shrubs are also included in the shrub/tree cover and average shrub/tree height measurements)
- *Dominant*: dominant species for grass, shrubs, and encroachment species have >30% of the biomass or cover of those present. Species with low cover or biomass cannot be dominants. For example:
  - a. *Cenchrus ciliaris* is a dominant grass when it is >30% of grass biomass or grass cover
  - b. *Indigofera spicata* is a dominant shrub/tree when it is >30% of shrub/tree biomass or shrub/tree cover
  - c. *Acacia tortilis* is a dominant shrub/tree when it is >30% of shrub/tree biomass or shrub/tree cover
  - d. *Prosopis juliflora* (mathenge) is a dominant encroachment species when it is >30% of encroachment species biomass or encroachment species cover
- *Grazing evidence*: includes % cover of any evidence of grazing—bite marks, feces, trampling, hair, etc.—from livestock or wildlife.
- *Soil texture*: if the soil is more than 50% clay, circle “clay”; if the soil is more than 50% sand, circle “sand”; if the soil is a mixture, or if you are not sure of the percentage of clay, silt and sand, then circle “loam”.

## Step 5: Daily wrap-up

- At the end of every day, download photos from the tablet to a computer so that the photos are not lost.
- Change the filename of each photo on the computer every day to:
  - Site\_number\_date.jpg



- For example, if on July 15, 2018 you took photos at three monitoring sites in an area named Maji, and with site IDs Maji 1, Maji 2 and Maji 3, after you download the photos for that day you would change the photo filenames to:
  - Maji\_1\_20180715.jpg
  - Maji\_2\_20180715.jpg
  - Maji\_3\_20180715.jpg

## Equipment

- GPS unit
- Tablet for taking photos (photos are easier to frame with a tablet than a camera)
- Datasheets (one sheet can record data from three monitoring sites)

## Reporting/mapping format

- Basic information on monitoring site: excel spreadsheet (.xlsx) with site ID and latitude and longitude
- Latitude and longitude of monitoring sites (from GPS): GPS exchange format (.gpx) or Google Earth format (.kml or .kmz)
- Photos: store in .jpg format, with filenames formatted as Site\_number\_date.jpg
- Rangeland data: enter into Excel spreadsheet (.xlsx) after site ID and latitude and longitude, with one row for each monitoring site and all variables in columns.



# Rapid community rangeland monitoring

## Worksheet 2-2-1

### Datasheet for recording rangeland data

Site ID _____			Name _____			Dominant* species (List the names of 1 or 2 species)
Photo numbers _____			Date _____			
Grass cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	_____
Average Grass height (cm)	0-5 cm	5-20 cm	20-40 cm	40-80 cm	> 80 cm	—
Shrub/tree cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	_____
Average Shrub/tree height (m)	0-0.5 m	0.5-1 m	1-2 m	2-3 m	> 3 m	—
Encroachment** cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	Special ecological or management notes:
Bare soil cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	
Rock cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	
Grazing evidence*** cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	
Erosion cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	
Slope (%)	0-2%	2-5%	5-10%	10-20%	> 20%	
Hydrology	Well-drained	Average	Swampy	Soil deposition	—	
Topography	Bottomland	Footslope	Midslope	Upland	—	
Soil color and texture	Color Black Red Brown			Texture Mostly****: Clay Loam Sand		

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Photo numbers _____			Date _____			
Grass cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	_____
Average Grass height (cm)	0-5 cm	5-20 cm	20-40 cm	40-80 cm	> 80 cm	—
Shrub/tree cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	_____
Average Shrub/tree height (m)	0-0.5 m	0.5-1 m	1-2 m	2-3 m	> 3 m	—
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Bare soil cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	
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Erosion cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	
Slope (%)	0-2%	2-5%	5-10%	10-20%	> 20%	
Hydrology	Well-drained	Average	Swampy	Soil deposition	—	
Topography	Bottomland	Footslope	Midslope	Upland	—	
Soil color and texture	Color Black Red Brown			Texture Mostly****: Clay Loam Sand		

**Instructions:** For most variables, circle the correct response. For 'dominant' plant species, write the name(s) of one or two dominant species. Local names are acceptable but can become problematic.

\* 'Dominant' definition: > 30% of present (example: *Tetrapogon* is a dominant grass when it is > 30% of grass biomass OR grass cover)

\*\* Encroachment: Any problematic or invasive shrub, etc. (examples: *Prosopis juliflora*, *Acacia depanobium* or whistling thorn acacia)

\*\*\* Grazing evidence cover: Any evidence of grazing — bite marks, feces, trampling, hair, etc. — from livestock OR wildlife

\*\*\*\* Soil texture: If more than 50% clay, circle "Clay". If the soil is a mixture, or if you are not sure, circle "Loam"



This document is part of the Participatory rangeland management toolkit for Kenya, an initiative led by the International Livestock Research Institute (ILRI). This tool was developed by ILRI, with financial assistance from the United States Agency for International Development Feed the Future Kenya Accelerated Value Chain Development (AVCD) program.

Photo credit: ILRI/Jason Sircely

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