Participatory rangeland managment toolkit for Kenya

Tool 2-3

Rapid community rangeland monitoring tool: guide for ongoing monitoring

December 2020

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Rapid community rangeland monitoring tool: guide for ongoing monitoring

Objective

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

Anticipated output

For a set of monitoring sites created previously, rangeland monitoring data recorded, and monitoring photos taken and archived, for the second, third, etc. visits to each monitoring site (all visits after the first baseline visit).

Participants in this activity

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

Introduction

Rangeland monitoring provides data 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 (each place is slightly different from other areas, even nearby) and time (each year has 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, but 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 costly with each year that passes.

There are many different types of data used in monitoring rangelands, and each has their 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 advantages of this approach is that rapid collection of robust (slow-changing) indicators of rangeland quality is much faster, cheaper, easier and more reliable (more 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.

Use this protocol only after the previous protocol, *Tool 2-2: Rapid community rangeland monitoring tool: guide for ongoing monitoring*, has been completed and all baseline monitoring data and photos are safely recorded and archived. Use this protocol for the second, third, etc. visits to each monitoring site.

Monitoring of rangeland condition helps a community to know whether its management strategy is working or failing.

Steps

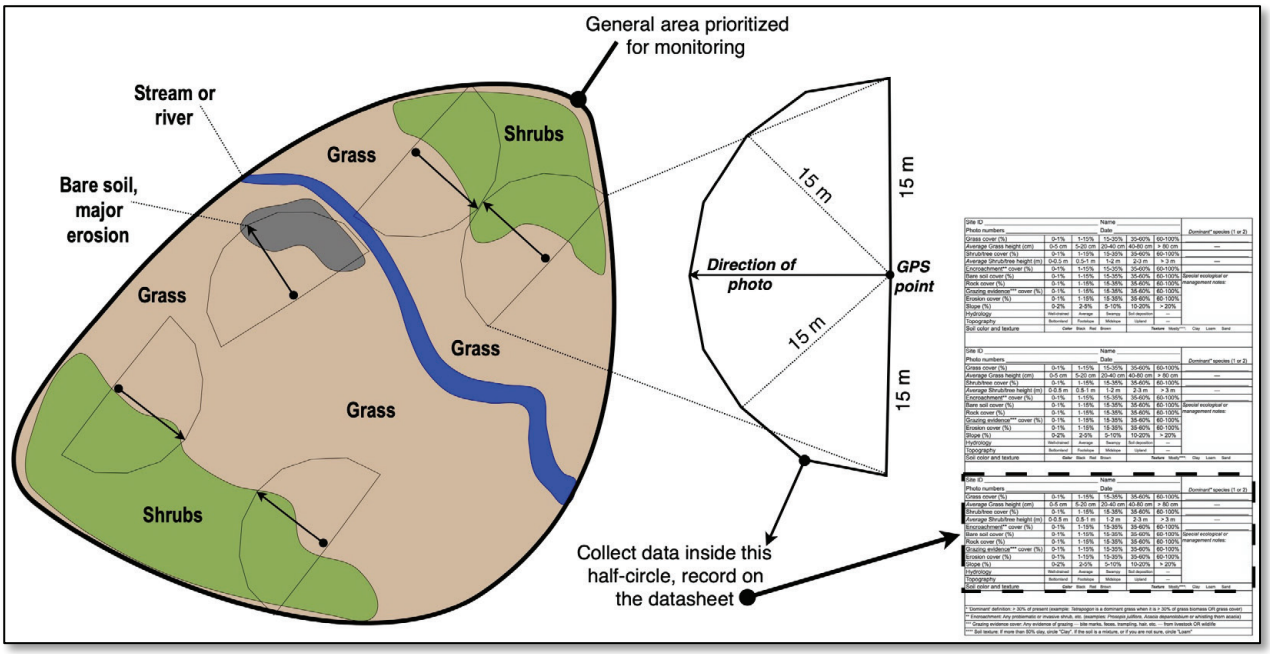
Step 1: Preparation

- Print photos from the first visit to each monitoring site, with the Site IDs for the monitoring sites printed or written on the photos. Make sure you carry the photos with you.
- Load the locations of monitoring sites onto your GPS and carry it with you.

Step 2: Find the monitoring site

- Use GPS to find location (see Figure 2-3-1 for the GPS point).
- Read Site ID from the GPS (pre-loaded onto GPS), and record the Site ID on the datasheet.
- Stand at the GPS point (close to the point is okay).
- Use the printed photo for the monitoring site to find the correct direction for the photos and data recording. Look for landmarks in the printed photos; for example, a special large or dead tree, a large termite mound, or a special or large hill in the distance (see Figure 2-3-2 for an example).

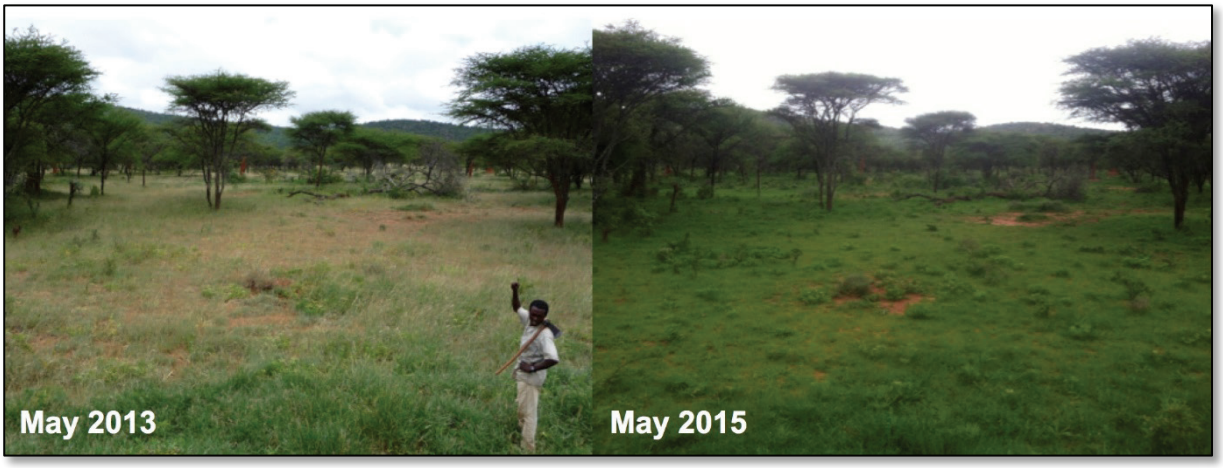
Figure 2-3-1. The best locations for monitoring sites in a general area the community has prioritized as important for monitoring changes in rangeland condition.



Step 3: Take photos of the monitoring site

- Standing at the GPS point, use the printed photo to correctly take new photos. The new photo should be exactly the same as the first photo.
- Hold the tablet horizontally, with a very small amount of 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 (2) photos.
- For an example, see Figure 2-3-2.

Figure 2-3-2. Change in grassland condition over two years near Dida Hara, Borana Zone, 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 2-3-1.
- Focus on the semi-circle inside a 15 m radius from the GPS point, in the direction of the photo (see Figure 2-3-1).
- 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, the cover of that shrub is 25%, so you will circle "15–35%" on the datasheet (meaning that 75% of the raindrops will fall through the leaves to the soil).
- Average height: for all vegetation height measurements (height of grass and shrubs) write the average height (it is not the maximum height). If you measured how tall each and every grass plant is, and then calculated the average, this is the number you want. Then you circle the category that is closest for 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: more detailed methods can also be used, such as a clinometer or the 'string method').
- Hydrology: circle "Well-drained" for sandy or rocky areas where rain passes quickly through the soil and rocks, so the land dries quickly; circle "Swampy" for very wet areas that hold water for some time, so the land dries 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.
- Dominant: a dominant species (for grass, shrubs and encroachment species) has >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* is a dominant Encroachment species when it is >30% of Encroachment species biomass or Encroachment species cover
- Encroachment: Encroachment species include any shrub or tree that invades rangelands quickly, or that causes serious problems for grazing of rangelands; common examples:
    a. *Prosopis juliflora*
    b. *Acacia depanolobium* 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.

- Grazing evidence: includes % cover of any evidence of grazing—bite marks, feces, trampling, hair, etc.— rom 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.
- On the computer, every day, change the filename of each photo to:
    - ***Site_number_date.jpg***

- For example, on one day (15 July 2018) I have taken photos at three monitoring sites in an area named Maji, and with Site IDs 'Maji 1,' 'Maji 2' and 'Maji 3.' After I download the photos for that day, I change the photo filenames to:
    - Maji_1_20180715.jpg
    - Maji_2_20180715.jpg
    - Maji_3_20180715.jpg

Equipment

- GPS unit, with the locations of all monitoring sites loaded onto the GPS
- Tablet (the same type used to take photos on the first visit to each monitoring site)
- Datasheets (one sheet can record data from three monitoring sites)
- Printed copies of photos from the first visit to each monitoring site, with the Site IDs for the monitoring sites printed or written on the photos

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 2-3-1

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%	___
Bare soil cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	*Special ecological or management notes:*
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		

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%	___
Bare soil cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	*Special ecological or management notes:*
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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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%	___
Bare soil cover (%)	0-1%	1-15%	15-35%	35-60%	60-100%	*Special ecological or management notes:*
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		

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 depanolobium* 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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