Tool 2-2

Rapid community rangeland monitoring tool: guide to start monitoring

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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 created, with basic site information (Site IDs, latitude and longitude of locations) recorded, 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 committee 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 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 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 produce.

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 more 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.

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, etc. 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.

> What a community monitors, it can also manage.

- It is best to locate monitoring sites in transition areas in rangelands (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

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.

  a. Bomas or settlements: minimum distance 200 m. from any boma or settlement

  b. Water points: minimum distance 200 m from any pond, borehole, dam, river, etc.

- DO NOT locate monitoring sites outside of rangelands:

  a. Crops (sites close to crops are okay—minimum distance 50 m. from crops—but 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 50 m. from exclosures or fences)—but 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 1 or 2 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
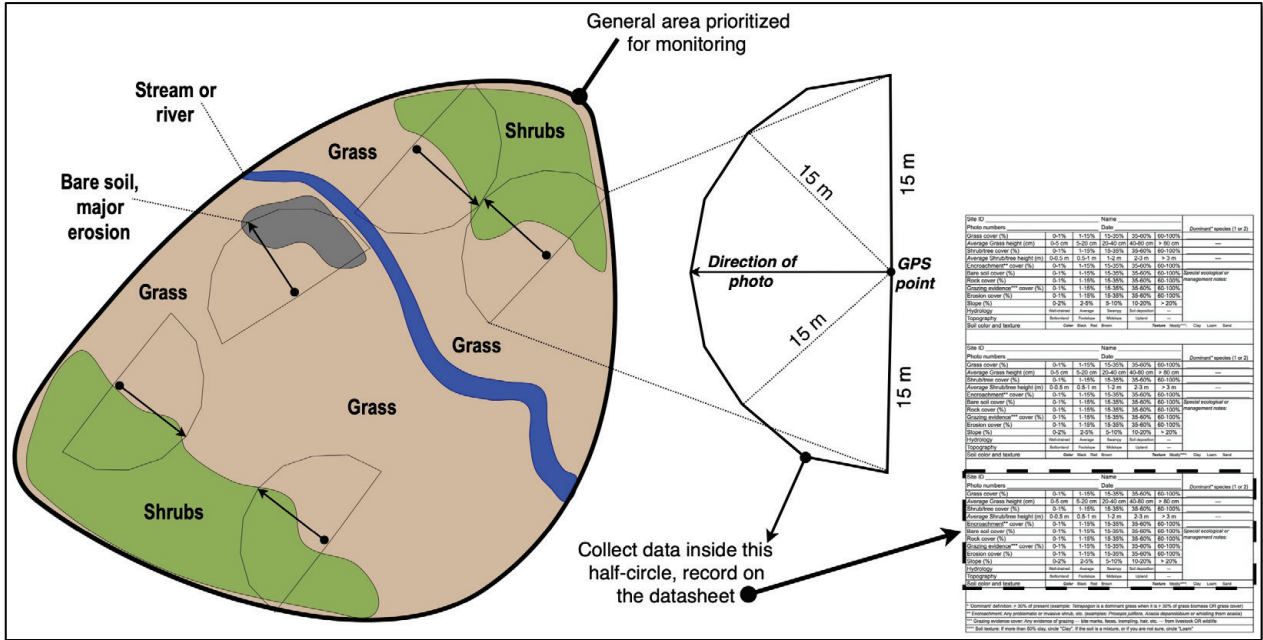
Step 2: Record basic site information for the monitoring site

- After you have selected a good site for monitoring, use a GPS 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.

For example, I have created 3 new monitoring sites in an area named Maji:

- For the first site, I give the Site ID: 'Maji 1'.

- For the second site, I give the Site ID: 'Maji 2'.

- For the third site, I give the Site ID: 'Maji 3'.

- List the GPS waypoint numbers and Site IDs. After you GPS the point of a monitoring site and give the site a 'Site ID', make a list on paper with the 'Waypoint number' saved on the GPS, and the Site ID.

a.　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

b.　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*. So 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 (Figure 2-2-1). For example, in an area where grass meets shrubs (see also Figure 2-2-2), 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 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 2-2-2.

Figure 2-2-2. 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.
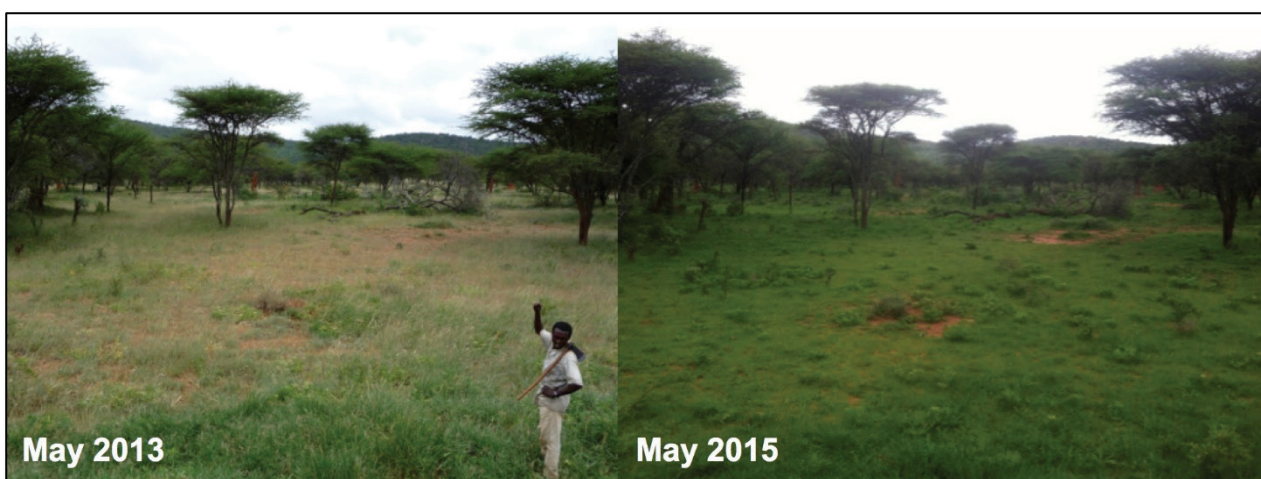
Step 4: Record rangeland data for the monitoring site

- After you have taken the photos, record rangeland data using Worksheet 2-2-1.

- Focus on the semi-circle inside a 15 m radius from the GPS point in the direction of the photo (see Figure 2-2-1).

- 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 are:

   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.—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.

- 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 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

- 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%	_____
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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Photo numbers _____			Date _____			
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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	—
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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"

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