Guide to Monitoring Boma Sites
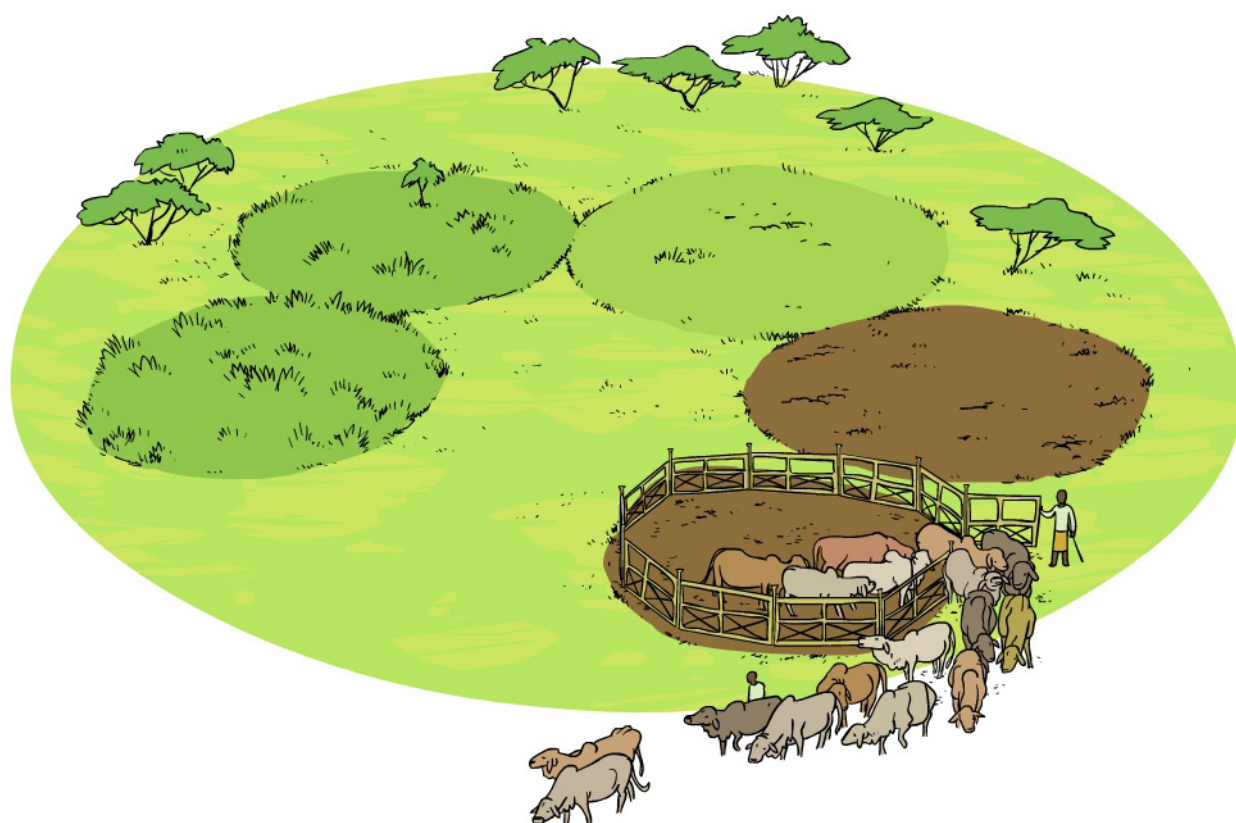
Version 3 – March 2011

*By Lauren Porensky, Corinna Riginos,
Jennifer Balachowski, and Jayne Belnap*

Table of Contents

What is this guide for?

This guide provides a simple set of instructions for monitoring the short- and long-term effects of bomas (temporary cattle corrals) on the land. The data sheets and methods presented here are designed to help land managers answer questions such as:

- How can bomas best be used to improve grass cover and quality?
- How long should a boma be used to get the desired results?
- Do bomas need to be used differently in different parts of the landscape?

This guide is also designed to facilitate pooling and sharing of boma monitoring data across the Laikipia-Samburu region and more broadly across East Africa. Sharing boma monitoring results will help all of us learn how bomas can best be used to restore and improve the land in this region.

Using this guide

This guide provides a quick and easy set of methods for monitoring boma sites. Definitions, methodological information, and information on monitoring in general can be found in the manual *Monitoring Rangeland Health: A Guide for Pastoralist Communities and Other Land Managers in Eastern Africa*. This manual can be found at:

http://www.mpala.org/Monitoring_Guide.php

Other questions about this guide or boma monitoring can be sent to Lauren Porensky (lemcgeoch@ucdavis.edu) or Corinna Riginos (criginos@gmail.com).
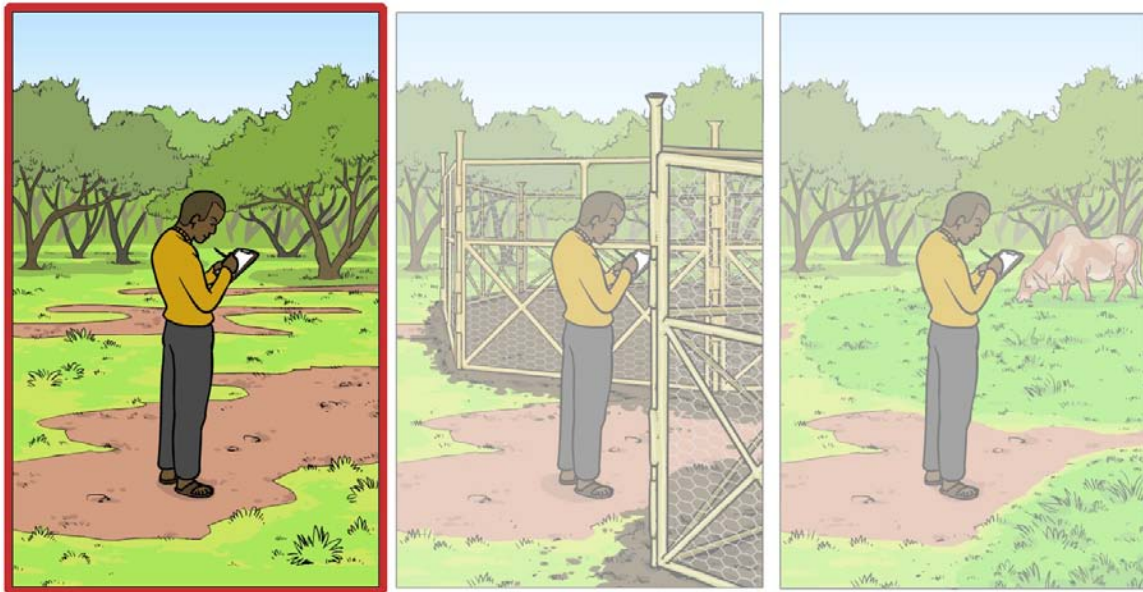
It is important to collect some baseline data on the boma site and surrounding area before the boma is put there. This will help you to see change in the boma site over time and will provide some context for understanding why these changes occur. These data need only be collected once, just before the boma is established.

1) Starting Conditions – In the General Area AROUND the New Boma Site (Within ~100 m of Boma Site)

Tools needed: pencil, data sheet (Page A) and a stick, square, or pin for measuring plant cover and gaps between plants.

Note: For boma sites that are part of a "daisy" (cluster of bomas right next to each other), you can use the same general area data for all bomas within the daisy. Just make sure to collect data from the area surrounding the whole daisy.

Photo of area:
Indicate whether you have taken a photo of the area before the boma is used.
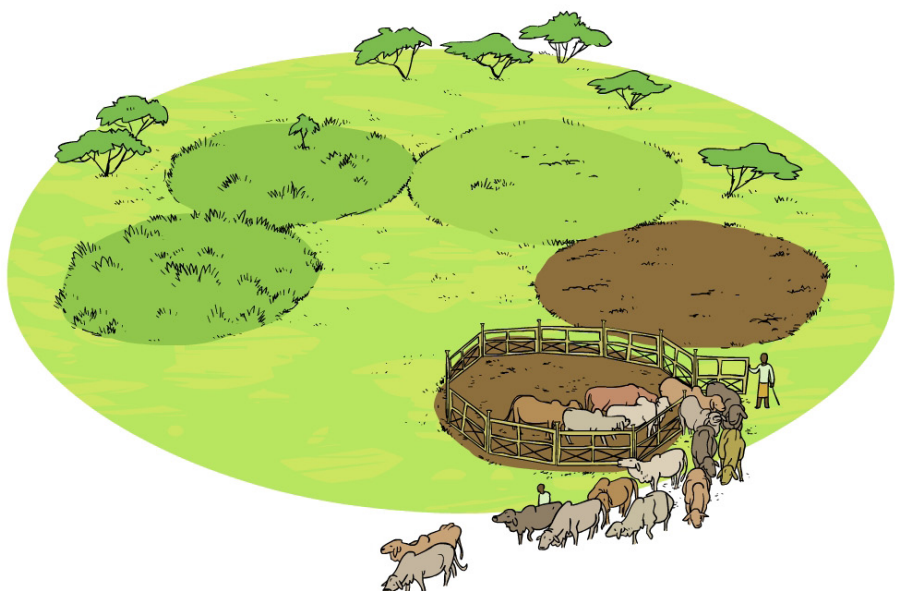
Always take the photos facing the same direction (such as North) and include in the photo a piece of paper that clearly indicates the name of the site as well as the date and direction.

Soil surface rockiness:

Estimate the percent of the soil surface that is covered by loose rock (pieces of rock more than 5 mm in diameter) or bedrock. Tick all that apply. Rockier soils may have lower potential to be productive and therefore may not respond as well after the boma is abandoned.

Soil colour:

Describe the colour of a small amount of wet soil. Different soil types may respond differently to bomas. Soil colours in Laikipia and Samburu are generally red, reddish brown, gray, or black. You may tick more than one colour if necessary.

Slope:

Record the percent slope of the general area. You can use the slope diagram (Appendix A) to help decide on the slope of the site. Slope is an important feature to measure because flat and gently sloping areas have higher potential to be productive than steep areas and may respond better after the boma is abandoned.

Landscape position:

Record the position of the area in the landscape – is it at the top of a hill on a ridge, on a hillside, or at the bottom of the hill in a valley? In general, sites in valley bottoms have higher potential to be productive and may respond differently from sites on hillsides or hilltops.

Signs of erosion:

Record any signs of erosion that are present in the general area around the new boma site. Tick "none", "few", "some", or "many" depending on how common these signs of

Pedestaled plants

Small gully

4

erosion are. Do not tick anything if the sign of erosion is not present. Definitions and photographs of these different features of erosion are presented in *Monitoring Rangeland Health*.

Plant base cover:

Record the percent of the ground that is covered by plant bases. See page 14 (Collecting Vegetation Data) for more information about how to measure plant cover.

Perennial grass and forb cover:

Record the percent of the ground that is covered by perennial grass or forb leaves, stems, or bases. Include data for all perennial grass and forb species (including star grass). See page 14 (Collecting Vegetation Data) for more information about how to measure plant cover.

Star grass (Cynodon) cover:

In many places, "star grass" (Cynodon) is the grass that is most likely to colonise the boma site after abandonment. It is therefore useful to know how much (if any) was in the area before the boma was put there. Record the percent of the ground that is covered by star grass leaves, stems, or bases. Use the same method for measuring star grass cover as you use for measuring bare ground and perennial grass cover. If star grass is not the plant species that usually first colonises old boma sites in your area, you may want to choose a different species to monitor instead. See page 14 (Collecting Vegetation Data) for more information about how to measure plant cover.

Shrub cover:

Record the percent of the ground that is covered by shrub leaves, stems, and branches. Cover of shrubs may change during or after boma use and can also affect the kinds of plants and animals that come back after the boma is abandoned. See page 14 (Collecting Vegetation Data) for more information about how to measure plant cover.

Tree cover:

Record the percent of the ground that is covered by tree leaves, stems, and branches. Tree cover may change during or after boma use and can also affect the kinds of plants and animals that come back after the boma is abandoned. See page 14 (Collecting Vegetation Data) for more information about how to measure plant cover.

Undesirable plant cover:

Record the percent of the ground that is covered by undesirable plants (for example, unpalatable or invasive species). For many management objectives, it may be useful to know whether undesirable plant cover increases or decreases after boma abandonment.

Make sure that all data collectors know which species the manager(s) have decided are undesirable. If applicable, use the space provided to indicate specific species of concern. See page 14 (Collecting Vegetation Data) for more information about how to measure plant cover.

Bare ground:

Record the percent of the ground that is not covered by any plant leaves, stems, or bases, nor any litter, rock, or lichen. For many management objectives, it may be useful to know whether the percent bare ground changes after boma abandonment. See page 14 (Collecting Vegetation Data) for more information about how to measure percent bare round.

Ground with large gaps (more than 1 m) between plant bases:

Record the percent of the ground that has large gaps (more than 1 m) between plant bases. Knowing how much of the landscape has large gaps between plant bases gives important information about the potential for erosion at the site. Areas with many large gaps between plants have high potential for erosion, whereas areas with few large gaps will be less susceptible to erosion. See page 14 (Collecting Vegetation Data) for more information on how to measure this.

Grasses with seed heads:

Estimate the proportion of grasses in the area that currently have seed heads. This will help you understand how much seed is available to go into the soil – and promote grass growth after abandonment –around the boma site.

Purpose of locating boma in this area:

Why was the boma put in this area? Tick all reasons that apply to your situation. If some of your reasons are not already listed, write them in under "Other". This question may need to be answered by the manager(s) if the field data collectors do not know the answer.

Livestock use over the past year:

In general, over the course of the past year, how much did livestock use this area? Estimate whether livestock used the area "not at all", "a little bit", "moderately", or "a lot". Prior use by livestock could affect how the site changes after boma use.

Wildlife use over the past year:

In general, over the course of the past year, how much did wildlife use this area? Estimate whether wildlife used the area "not at all", "a little bit", "moderately", or "a lot". Prior use by wildlife could affect how the site changes after boma use.

Number of other bomas within 200 m:

How many other bomas—including both active and abandoned sites—are present within 200 m of the new boma site? If bomas are arranged in "daisies" (many bomas placed very close together), count the number of nearby daisies rather than the number of nearby bomas. Other nearby bomas may affect the regrowth of grass or trees at a new boma site.

2) Starting Conditions INSIDE the New Boma Site

Tools needed: pencil, data sheet (Page B), ruler, small shovel, and a stick, square, or pin for measuring plant cover and gaps between plants.

Note: For boma sites that are part of a "daisy", it will be best if you can collect data for each boma site within the daisy. If this is not possible, choose one boma site within the daisy that you feel is a good representative of all the bomas.

Photo of site: See above.

Soil surface rockiness: See above.

Soil depth:

Record the depth of the soil. Tick "bedrock exposed" if bedrock is exposed anywhere inside the boma site. If there is no bedrock exposed, then dig a small trench to see how deep the soil is. If you hit bedrock between 0 and 50 cm, record the depth as "shallow". If you hit bedrock between 50 cm and 100 cm, record the depth as "medium". If you do not hit bedrock by 100 cm, record the depth as "deep".

(Note: for boma sites that are part of a "daisy" and are in a homogenous part of the landscape. you need only record soil depth for two or three of the individual boma sites).

Sites with deeper soils have higher potential for production and may respond differently from areas with shallow soils.
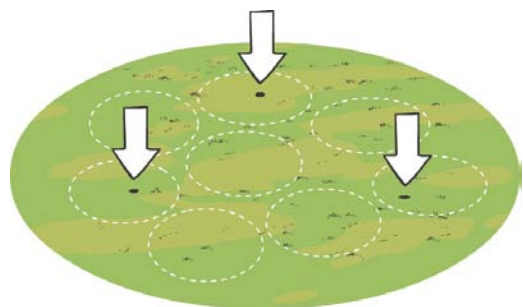
Slope: See above.

Upslope signs of erosion:

    Record any signs of erosion that you see in the area immediately uphill of the boma site. Tick each sign of erosion that it is present. Do not tick if it is not present.

Downslope signs of erosion:

    Record any signs of erosion that you see in the area immediately downhill of the boma site. Tick each sign of erosion that it is present. Do not tick if it is not present.

Plant base cover: See above.

Perennial grass and forb cover: See above.

Star grass (Cynodon) cover: See above.

Shrub cover: See above.

Tree cover: See above.

*Undesirable plant cover:* See above.

Bare ground: See above.

Ground with large gaps (more than 1 m) between plant bases: See above.

Number of large trees (more than 2 m):

    Record the number of large (taller than 2 m) trees inside the boma site. The number of trees can affect how the livestock and wildlife use the boma, as well as what kinds of plants come back after the boma is abandoned.

Grasses with seed heads: See above.
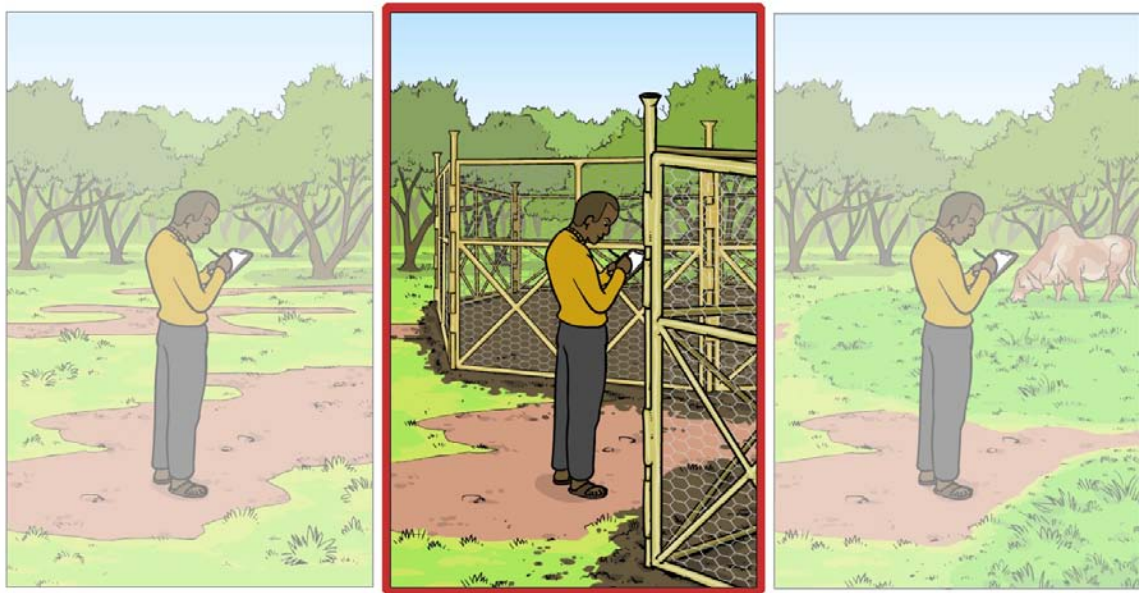
In addition to collecting baseline data, it is also important to collect some data about how the boma has been used. This will help you understand why the site changes the way it does. These data need only be collected once, at the time immediately after the boma is used.

Tools needed: pencil, data sheet (Page B), ruler, small shovel, and a stick, square, or pin for measuring plant cover and gaps between plants.

Note: For boma sites that are part of a "daisy", it will be best if you can collect data for each boma site within the daisy. If this is not possible, choose one boma site within the daisy that you feel is a good representative of all the bomas.

Date when use began and ended:

Record the date when the animals were moved into the boma and when they were moved out of that boma site.

Type of fence:

Record the type of fence that is used to enclose the animals in the boma.


Metal fence

Thorn brush fence

Number of animals:

Record the number of each type of animal that is being kept in the boma.

Diameter of boma and daisy:

Record the approximate diameter of the individual boma site, as well as the diameter of the whole daisy if the boma is part of a daisy (you may want to wait until the whole daisy has been abandoned to measure the daisy diameter).
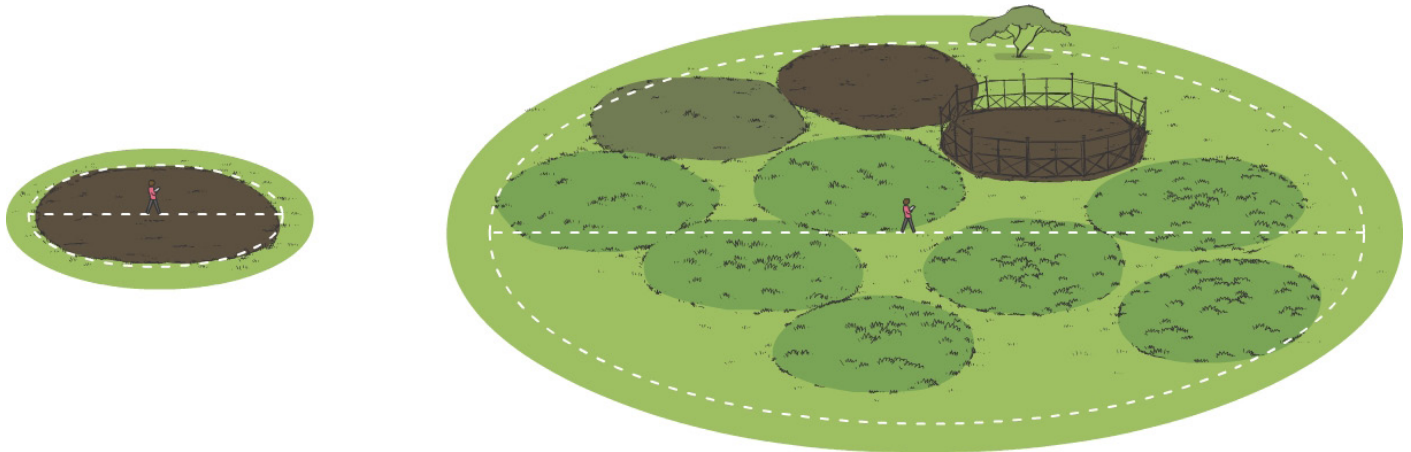
Diameter of single boma   Diameter of daisy

Trees cut:

Record whether any trees were cut inside or around the boma site.

Rain during boma use:

Record the approximate amount of rain that fell during the time that the boma was in use.
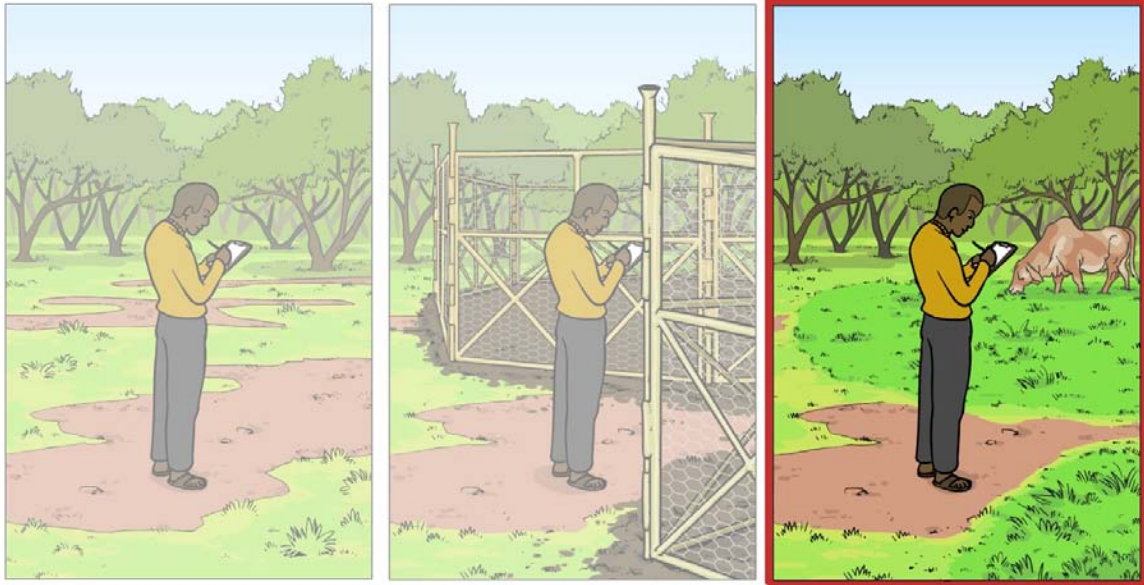
Depth of dung layer:

Record the depth of the dung layer (in centimeters) at the time when the boma site is abandoned. It may help to dig a small trench in the middle of the boma site to determine the depth of the dung layer.

Seeds sown after use?:

Record whether any seeds were sown into the boma site. If seeds were sown, note the species of seeds sown.

Data on boma recovery and changes after abandonment should be collected repeatedly. The frequency at which you collect recovery data will depend on your management objectives and the resources you have available for boma monitoring. You may decide to collect data on changes inside the boma site more frequently than you collect data around the boma site. For example, you might collect data around the boma site once per year but inside the boma site every 3 months, since that area is more likely to change rapidly after boma abandonment.

Tools needed: pencil, data sheet (Pages C-D), and a stick, square, or pin for measuring plant cover and gaps between plants.

Time since abandonment:

Record the number of months or years since the boma was abandoned.

Photos of area and site?: See above.

Early July 2010

Late August 2010

11

Rainfall since abandonment:

   If the boma site has been abandoned for less than one year, record the approximate amount of rain that has fallen since abandonment. If the site has been abandoned for more than one year, record the approximate amount of rain that fell during the most recent 12 months. Use the box to record any other observations about recent rainfall or weather.

1) In the General Area AROUND the Abandoned Boma Site (Within 100 m of Boma Site)

   Record observations and measurements about plant base cover, perennial grass and forb cover, star grass cover, shrub cover, tree cover, undesirable plant cover, bare ground, ground with large gaps, grasses with seed heads, livestock use, wildlife use, other nearby bomas, and signs of erosion as you did for this area before the boma was established. (See above for detailed descriptions of each measurement.) For livestock and wildlife use, estimate use since abandonment if the site has been abandoned for less than one year. Finally, record one additional piece of information:

Grass colour:

   Estimate the proportion of grass leaves in the area that are green. This will help you understand the productivity and palatability of the grasses in this area, especially when compared to the grasses inside of the abandoned boma site (see below).

2) INSIDE the Abandoned Boma Site:

   Record observations and measurements about plant base cover, perennial grass and forb cover, star grass cover, shrub cover, tree cover, undesirable plant cover, bare ground, ground with large gaps, number of large trees, grasses with seed heads, and signs of erosion as you did for this site before the boma was established. (See above for detailed descriptions of each measurement.) In addition, record three new pieces of information:

Grass colour:

   Estimate the proportion of grass leaves within the site that are green. This will help you understand the productivity and palatability of the grasses in the site, especially when compared to the grasses in the surrounding area (see above).

Livestock use over the past year (or since abandonment):

In general, over the course of the past year, how much did livestock use this site? If the site has been abandoned for less than one year, estimate use since abandonment. Estimate whether livestock used the site "not at all", "a little bit", "moderately", or "a lot".
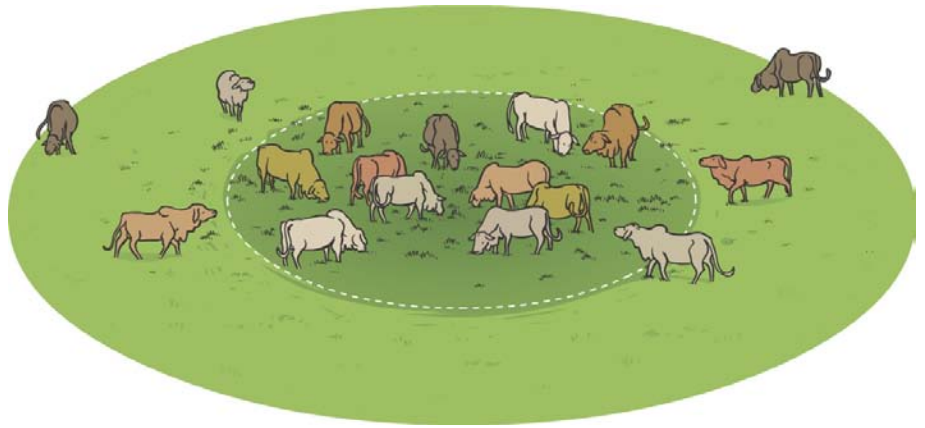
Wildlife use over the past year (or since abandonment):

In general, over the course of the past year, how much did wildlife use this area? If the site has been abandoned for less than one year, estimate use since abandonment. Estimate whether wildlife used the site "not at all", "a little bit", "moderately", or "a lot".

Other observations*:*

Spend a few minutes looking around the site. Use the box to note any observations you make that may not be covered by the other questions. Are there particular species of grasses or forbs that are common at the site, apart from star grass? Do you see any termite activity? Do certain wildlife species seem to be attracted to the site? Has the fence disintegrated? What else is going on? Try to keep your eyes and mind open. Sometimes the most interesting findings come from unplanned observations!

How to Collect Vegetation Data at Each Sample Point
## (see below for information on where to sample)

When choosing a method for collecting data on plant base cover, perennial grass and forb cover, star grass cover, shrub cover, tree cover, undesirable plant cover, bare ground, and the percent of ground with large gaps, consider how much time you have for data collection and how accurate you want your data to be. We suggest three methods. All of these methods are relatively quick and easy to use. The visual estimation method is less accurate than the step-point or stick-point methods. Data sheet page E is designed to collect boma monitoring data using the stick-point method. This data sheet can be used for collecting data both inside and around the boma site.

Plant cover and bare ground

1. **Stick-point method**: For this method, you will need a stick 1 m long with marks or notches every 20 cm on it. At each sample point, put the stick down on the ground in front of you. Count each different type of plant that is directly under or over each mark on the stick. Only count each type of plant once. If there are no plants, rocks, lichen, or litter under or over the mark, then record that point as bare ground. This method is presented in more detail in *Monitoring Rangeland Health* (http://www.mpala.org/Monitoring_Guide.php), and Data sheet page E has been specifically adapted for monitoring boma sites using this method.

2. **Step-point method**: For this method, you will need a thin wire or pin. For each step (or every 2 steps) that you take, put the pin down a few centimeters in front of your foot (without looking down, do you don't bias where you put the pin), so that one end of the pin is touching the ground and the other end is pointing straight up. Count the different types of plant (e.g., tree, shrub, grass, plants, etc.) that the pin touches. If the pin is under a tree or tall shrub, keep the pin straight up and record if the shrub or tree is hit. If the pin is too short, you will have to imagine that the pin extends upwards and decide whether the pin would be touching the tree or shrub. Only count each type of plant once. Be sure that you are not stepping on (or pushing down) the plants that are
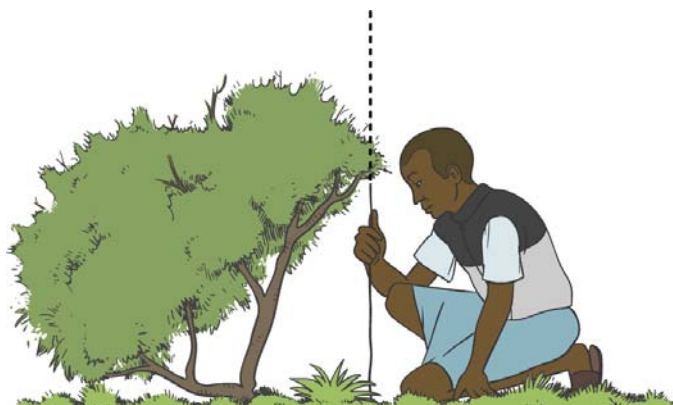
touching the pin. If the pin or wire is not touching any plants, rocks, lichen, or litter, then record that point as bare ground.

3. **Visual estimates**: Visually estimating plant cover is quick and easy, but less accurate than the two quantitative methods below. When making a visual estimate, it helps to use a square of a fixed size (1 x 1 m, or 50 cm x 50 cm). At each sample point, put the square down on the ground and estimate the percent of the square that is covered by each type of plant (e.g., tree, shrub, grass, star grass, etc.) or bare ground.
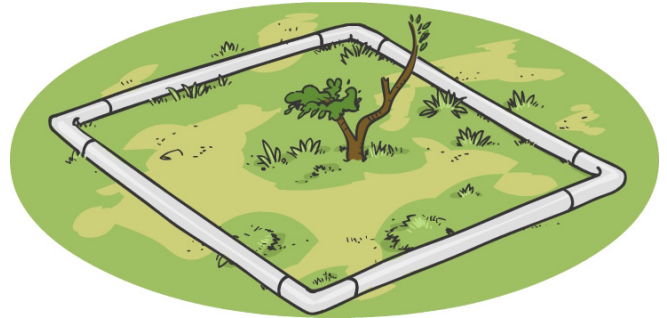
Ground with large gaps (more than 1 m) between plant bases

To measure this, you will need a stick 1 m long. Alternatively you could use one side of a 1 x 1 m square, if you are using the visual estimates method for measuring percent plant cover (see above).

At each sample point, observe whether the 1 m long stick is touching any plant bases anywhere along the stick. If there are no plant bases touching the stick, then count this sample point as being in a gap more than 1 m between plant bases. This method is presented in more detail in *Monitoring Rangeland Health* (http://www.mpala.org/ Monitoring_Guide.php).


No plant bases are touching the stick, so the stick is recorded as being in a gap greater than 1 m between plant bases.

At least one plant base is touching the stick, so the stick is recorded as not being in a gap.

Where to Collect Vegetation Data

Generally, you should collect vegetation from a variety of sample point locations for each measurement. For example, if you are measuring plant cover inside the boma site, collect data from multiple sample points within the boma site, or along several lines ("transects") that cross the boma site, and calculate the average cover value across all sample points.
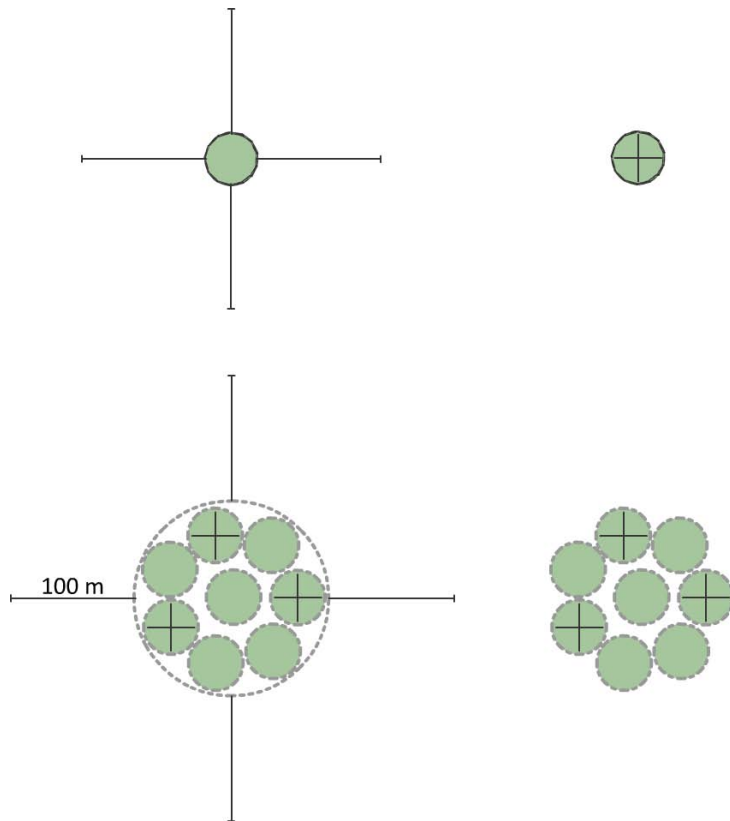
Sampling transects located around and inside single bomas (top) and daisies (bottom). You will best capture the characteristics of the entire site if you sample in the four compass directions (North, East, South and West).

Collecting data in the general area AROUND the boma site

The simplest way to collect data in the general area around the boma site is to collect data along four lines (transects), one in each compass direction from the boma site. Each transect should be 100 m long starting from the edge of the boma or daisy.

Plant cover and bare ground

For the **step-point** method of measuring plant cover, collect data (put down one pin) every 4 m or 4 steps along the transects that you are walking. This will give you a total of 25 sample points per transect, or a total of 100 sample points overall. The total percent cover of each type of plant is simply the number of times you counted that type of plant over all four transects.

For the **visual estimates** and **stick-point methods** of plant cover, collect data at sample points every 20 m along each 100 m transect.

For the **visual estimates method**, this will give you a total of 20 sample points across all four transects. Average the cover values for all 20 sample points to get the overall percent cover of each type of plant or bare ground.

For the **stick-point method**, you can calculate percent cover by simply counting the number of times you recorded each type of plant across all four transects. This is because

you will have collected data from 20 sample points, and at 5 marks along the stick at each sample point – for a total of 100 points.

Gaps more than 1 m between plant bases

For measuring the percent of the ground in large gaps (more than 1 m) between plant bases, collect data every 20 m along the same four transects you use for collecting plant cover data. This will give you a total of 20 sample points. To calculate the percent of the ground with large gaps between plant bases, multiply the number of 1 m sticks (1 at each sample point) that were not touching any plant bases by 5.

Note: For any of these methods, you may feel it is helpful or necessary to collect data at more sample points than the number we have suggested. Collecting data from more sample points is always better. There is no correct number of sample points. We have suggested a minimum number of sample points that enables simple calculations, but you may decide to collect data in a different way. Whatever you do, just make sure to collect data from multiple sample points in a variety of different locations around the boma site.

Collecting data INSIDE the boma site

To collect data inside the boma site, you can also collect data along four transects (one in each compass direction). These four transects should be inside the boma site. The length of each transect, and the spacing of your sample points along those transects, will depend on the size of the boma site. Each transect should start about 2 m from the centre of the boma site (so that the centre is not oversampled) and extend to about 1 or 2 m from the edge of the boma.

For example, if your boma is 20 m in diameter, you could collect data along four transects, each 10 m long. If you are using the visual estimates or stick-point method, you can collect data every 2 or 3 m along the transect. For the visual estimates method, percent cover is the average percent cover across all 20 sample points. For the stick-point method, your total percent cover is again the total number of times that you recorded each type of plant.

The important thing is to collect data at multiple sample points around the boma. If possible, it will help to collect data in a way that simplifies the calculations of percent cover or percent of the ground in gaps more than 1 m between plants. For example, for the visual estimate and stick-point methods, it is easiest to collect data at five equally spaced points along four transects, for a total of twenty sample points.
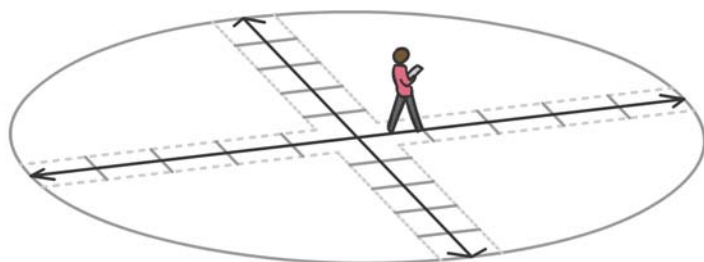
Start each transect about 2 m from the centre of the boma site (so that the centre is not oversampled) and extend to about 1 or 2 m from the edge of the boma.

Note: Data sheets A-D are "summary" data sheets. Some of the data recorded on these sheets – such as grass, shrub, and tree cover – should be the summarized results after you have collected data at many sample points per boma site. Data sheet E provides space to record "raw" (un-summarized) vegetation data if you use the stick-point method. You will have to devise separate data sheets if you use another system (such as visual estimates or the step-point method) for collecting raw vegetation data.

Boma Monitoring Data Sheet

Location

Property name: _____   GPS easting: _____

Area within property:_____   GPS northing:_____

Boma name / ID: _____   GPS datum: _____

Notes:

Starting Conditions

Date: _____   Observer name: _____   Photo of area?_____

In the general area AROUND the new boma site (within 100m of site):

Soil surface rockiness:
- ○ No rock
- ○ Less than 50% loose rock
- ○ More than 50% loose rock
- ○ Less than 50% bedrock
- ○ More than 50% bedrock

Soil colour:
- ○ Red
- ○ Black
- ○ Gray
- ○ Brown

Other:_____

Slope:

_____%

Landscape position:
- ○ Hilltop
- ○ Hillside
- ○ Valley bottom

Other:_____

Signs of erosion:

	None	Few	Some	Many
Gullies…………………	○	○	○	○
Rills/channels………….	○	○	○	○
Litter Dams……………	○	○	○	○
Pedestals……………...	○	○	○	○
Water flow patterns….	○	○	○	○

Plant base cover:

_____%

Perennial grass and forb cover:

_____%

Star grass (*Cynodon*) cover:

_____%

Shrub cover:

_____%

Tree cover:

_____%

Undesirable plant cover:

_____%

Species of concern:

_____

Bare ground:

_____%

Ground with large gaps (>1m) between plant bases:

_____%

Grasses with seed heads:
- ○ None
- ○ Few
- ○ Some
- ○ Many

Purpose of locating boma in this area (tick all that apply) :
- ○ Good location for livestock
- ○ Stop / reduce erosion
- ○ Increase grass cover
- ○ Improve grass quality
- ○ Remove rank grass
- ○ Predator avoidance
- ○ Attract wildlife for tourism
- ○ Improve habitat for wildlife
- ○ Improve habitat for livestock

Other: _____

Livestock use over the past year:
- ○ Not at all
- ○ A little bit
- ○ Moderately
- ○ A lot

Wildlife use over the past year:
- ○ Not at all
- ○ A little bit
- ○ Moderately
- ○ A lot

Number of other bomas within 200m:
(if bomas are arranged in daisies, count no. of daisies)
- ○ 0
- ○ 1
- ○ 2
- ○ More than 2

Boma Monitoring Data Sheet

Location

Property name: _____ GPS easting: _____

Area within property: _____ GPS northing: _____

Boma name / ID: _____ GPS datum: _____

Notes:

Starting Conditions

Date: _____ Observer name: _____ Photo of site? _____

INSIDE of the new boma site (before boma is installed):

Soil surface rockiness:
- ◯ No rock
- ◯ Less than 50% loose rock
- ◯ More than 50% loose rock
- ◯ Less than 50% bedrock
- ◯ More than 50% bedrock

Soil depth:
- ◯ Bedrock exposed
- ◯ Shallow (less than 50cm)
- ◯ Medium (50-100cm)
- ◯ Deep (deeper than 100cm)

Slope:

_____%

Signs of erosion (tick if present immediately around site): **uphill downhill**

	uphill	downhill
Gullies………………………	◯	◯
Rills/channels…………….	◯	◯
Litter Dams……………….	◯	◯
Pedestals………………….	◯	◯
Water flow patterns………◯		◯

Plant base cover:	Perennial grass and forb cover:	Star grass (*Cynodon*) cover:	Shrub cover:	Tree cover:	Undesirable plant cover:	Bare ground:	Ground with large gaps (>1m) between plant bases:	Number of large trees (>2m):	Grasses with seed heads:
									◯ None
									◯ Few
					Species of concern:				◯ Some
_____%	_____%	_____%	_____%	_____%	_____	_____%	_____%	_____	◯ Many

Boma Use

Date when use began: _____ Date when use ended: _____ Observer name: _____

Type of fence:
- ◯ Brush/Thorns
- ◯ Metal
- ◯ Other:

_____

Number of animals:

Cattle:
- _____ cows
- _____ calves
- _____ weaners
- _____ bulls
- _____ steers

Sheep: _____
Goats: _____
Camels: _____
Donkeys: _____
Other: _____

Boma diameter (m):

_____

Part of daisy?
- ◯ No ◯ Yes

Daisy diameter (m):

_____

Trees cut inside boma?
- ◯ No
- ◯ Yes

Trees cut around boma?
- ◯ No
- ◯ Yes

Rain during boma use:
- ◯ None
- ◯ Little
- ◯ Some
- ◯ Lots

Depth of dung layer (cm):

_____

Seeds sown after use?
- ◯ No
- ◯ Yes

Species:

_____

_____

Boma Monitoring Data Sheet

Location

Property name: _____   GPS easting: _____

Area within property:_____   GPS northing: _____

Boma name / ID: _____   GPS datum: _____

Notes:

Time Since Abandonment: _____   Date: _____   Observer name:_____Photo of area?_____

If <1 year since abandonment,	OR, if >1 year since abandonment,
rainfall since abandonment:	**rainfall over last year:**
◯ Less than 50 mm	◯ Less than 200 mm
◯ 50-100 mm	◯ 200-400 mm
◯ 100-200 mm	◯ 400-600 mm
◯ 200-400 mm	◯ 600-800 mm
◯ More than 400 mm	◯ More than 800 mm

Rainfall and weather notes:

In the general area AROUND the abandoned boma site (within 100m of site):

Plant base cover:	Perennial grass and forb cover:	Star grass (*Cynodon*) cover:	Shrub cover:	Tree cover:	Undesirable plant cover:	Bare ground:	Ground with large gaps (>1m) between plant bases:	Grasses with seed heads:
					_____%			◯ None
					Species of concern:			◯ Few
								◯ Some
_____%	_____%	_____%	_____%	_____%	_____	_____%	_____%	◯ Many

Grass colour:
- ◯ NO green leaves
- ◯ FEW green leaves
- ◯ SOME green leaves
- ◯ MANY green leaves

Livestock use over the past year (or since abandonment):
- ◯ Not at all
- ◯ A little bit
- ◯ Moderately
- ◯ A lot

Wildlife use over the past year (or since abandonment):
- ◯ Not at all
- ◯ A little bit
- ◯ Moderately
- ◯ A lot

Number of other bomas within 200m:
(if bomas are arranged in daisies, count no. of daisies)
- ◯ 0
- ◯ 1
- ◯ 2
- ◯ More than 2

Signs of erosion:

	None	Few	Some	Many
Gullies………………	◯	◯	◯	◯
Rills/channels…………	◯	◯	◯	◯
Litter Dams……………	◯	◯	◯	◯
Pedestals……………..	◯	◯	◯	◯
Water flow patterns….	◯	◯	◯	◯

Boma Monitoring Data Sheet

Location

    Property name: _____   GPS easting: _____

    Area within property:_____   GPS northing:_____

    Boma name / ID: _____   GPS datum: _____

Notes:

Time Since Abandonment: _____   Date: _____   Observer name:_____   Photo of site? _____

INSIDE the abandoned boma site:

Plant base cover:	Perennial grass and forb cover:	Star grass (*Cynodon*) cover:	Shrub cover:	Tree cover:	Undesirable plant cover:	Bare ground:	Ground with large gaps (>1m) between plant bases:	Number of large trees (>2m):	Grasses with seed heads:
					_____%				○ None
					Species of concern:				○ Few
									○ Some
_____%	_____%	_____%	_____%	_____%	_____	_____%	_____%	_____	○ Many

Grass colour:
- ○ NO green leaves
- ○ FEW green leaves
- ○ SOME green leaves
- ○ MANY green leaves

Livestock use over the past year (or since abandonment):
- ○ Not at all
- ○ A little bit
- ○ Moderately
- ○ A lot

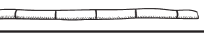**Wildlife use over the past year (or since abandonment):**
- ○ Not at all
- ○ A little bit
- ○ Moderately
- ○ A lot

Signs of erosion (tick if present immediately around site):   **uphill**   **downhill**

	uphill	downhill
Gullies……………………..	○	○
Rills/channels…………….	○	○
Litter Dams……………….	○	○
Pedestals………………….	○	○
Water flow patterns………	○	○

Other notes and observations (Termite activity? Wildlife species? Plant species?):

Plant and Ground Cover (%)

Plant		Good 🚜	Bad 🚫	Total
🍄	Tree			
☁	Shrub			
🌑	*Cynodon* (Star Grass)			
🌿	Grass and Forb			
▭				
●	Plant Base			
▱	Rock			
⩔	Lichen			

North

Start ✛ Here

West

East

South

Boma name / ID: _____ Date: _____

Observer name(s): _____

Data collected ____INSIDE or ____OUTSIDE
of the boma site? (tick one)

Gaps > 1m Between Plant Bases

Number in Gaps		% in Gaps
	x 5 =	

Number of times the stick fell entirely within a basal gap (no plant bases anywhere along the stick).

Plant and Ground Cover Totals

Total Plant Cover	

Number of points with any kind of plant cover. Count each point only once.

Total Undesirable Plant Cover	

Number of points marked with an 'x' above the stick."

Bare Ground	

Number of points with nothing circled or marked on or above the stick.

Notes on collecting plant and ground cover data:

1. It is only necessary to count perennial grass and forb species (grasses/forbs that live for more than one season or year), not annuals (those that die quickly after one season/year).

2. You can indicate Cynodon (or another desirable species) presence by drawing a filled-in circle over the grass/forb icon.

3. Be sure to record which species you are considering 'desirable' and 'undesirable.'

4. When distinguishing between shrubs and trees, consider potential growth rather than current size. For example, if you see an Acacia that is now young and small like a shrub, but will one day grow into a larger tree, record it as a tree.
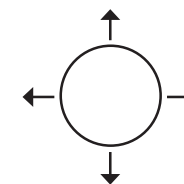
Inside of the Boma
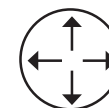
When collecting data INSIDE the boma site:

1. Begin at the centre of the boma.

2. Walk transects in all four compass directions (North, South, East, West).

3. Place the stick down on the ground and record data every 2-3 m, depending on the size of your boma.

4. For each transect, put the first stick down 2-3 m from the centre; do not collect data at the very centre of the boma.

Outside of the Boma

When collecting data OUTSIDE of the boma site:

1. Begin just outside of the edge of the boma site.

2. Walk transects away from the edge of the boma site in all four compass directions.

3. Place the stick down on the ground and record data every 20 m.

For a quick and easy way to measure percent slope, print out Page F of this guide (slope lines) onto a transparency, or copy the slope lines accurately onto a transparency. These lines will help you to estimate slope using either of the below methods. If you think the slope falls between two of the lines, make your best estimate of what the slope might actually be. For example, if the slope falls between 2% and 4%, you might estimate that the actual slope is 3%.
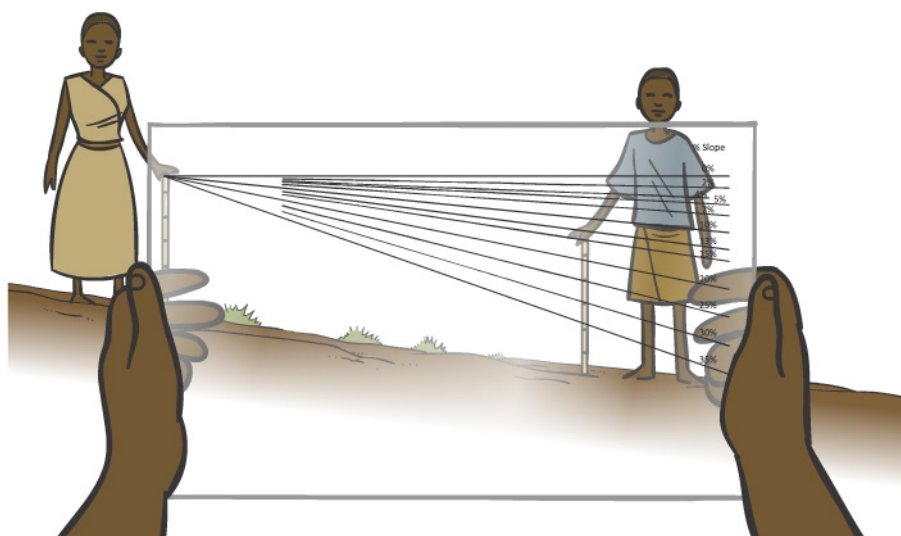
If you can see the shape of the slope clearly:

- Keep the upper edge of the transparency level (use the horizon as a reference, or if possible hold a hand-held spirit level along the top).
- Align the upper left edge of the transparency with the top of the slope that you want to measure.
- Determine which slope percentage is the closest to the slope being measured.

If you cannot see the shape or edge of the slope clearly (for example if the vegetation is very thick and you cannot see the slope):

- Hold two sticks of equal length (for example, 1 m) upright at different points along the slope.
- Align the top left edge of the transparency with the top of the upper stick.
- Determine within which slope percentage the top of the lower stick falls.

% Slope

0%

2%

4%
5%

7%

10%

13%

15%

20%

25%

30%

35%