Management planning for highland communal grazing lands

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December 2020

ILRI thanks all donors and organizations which globally support its work through their contributions to the CGIAR Trust Fund.

Editing, design and layout—ILRI Editorial and Publishing Services, Addis Ababa, Ethiopia.

Cover photo—ILRI/Zerihun Sewunet

Citation: Sircely, J. and Eba, B. 2020. *Management planning for highland communal grazing lands*. Nairobi, Kenya: International Livestock Research Institute (ILRI).

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Introduction

A well prepared and carefully implemented grassland management plan will increase the productivity of livestock and maintain grassland health and alleviate environmental concerns with respect to livestock grazing. Management plans should be practical, flexible and simple to operate by community institutions to enable feasible improvement of grassland condition and livestock production. Grazing management plans are site-specific, follow the interest and motivation of the community and correspond to agro-ecological conditions such as climate, soils and existing grassland forage vegetation composition.

This planning tool provides guidance for government and civil society staff, among others, who are tasked with facilitating communities to improve grazing management in communal grasslands in the highlands of Ethiopia. The planning tool should be used after beginning the process of a government agency or nongovernment organization engaging with a community to improve communal grassland management. The planning tool should be used by these government or nongovernment organization facilitators to understand how a community currently manages a communal grassland already and how to 'fit' new management or restoration options into the existing management system. Improvement of grassland management involves much more than technical improvements such as reseeding of grasses. The largest benefits will come from improving organization of the grazing system, institutional structures and rules for managing grazing livestock and larger social improvements such as certification of communal grasslands.

Grassland management includes two main components: (1) grazing management and (2) intensive restoration. Grazing management includes where and how many grazing animals are located throughout the year and the rules that regulate these grazing animals, usually over large grassland areas. Grazing management has elements of space, time and actions, which makes grazing management complex to implement by a community institution. Much simpler, but less effective, is intensive restoration of grasslands, which is normally applied over small areas that have become degraded, such as reseeding of grasses, control of weeds and invasive species and exclosure enrichment.

A key step in the management planning process is the identification of management goals (see Step 4. below). The management goals for a community grassland can include increasing livestock production and improving grassland sustainability. Grassland sustainability goals include maintaining or improving pasture quality and reducing or reversing degradation (i.e. invasions, erosion, loss of vegetation cover, loss of good grasses, etc.). Before going to the community for management planning, review the livestock-related and grassland-related problems previously identified by the community to help frame the discussion to identify management goals that will effectively address the problems the community faces.

1. Summary of the management planning process

Main methods: Representatives of communities who use the grassland are selected. Between three and six community members from each of the following stakeholder groups should be included: youth, men, women, elders and priests or other religious leaders.

Materials: Flip chart, notebooks

Preparation: Map of grassland, list of top three livestock problems and list of management priorities (priority resources, priority livestock types) for the site.

Objectives: to identify feasible grassland management options for a community, and to create a first draft plan of how these options can be implemented.

The plan should be created so that it has tangible benefits or returns in one to two years.

Steps for participatory management planning in highland communal grazing lands

1. Introduce the purpose of the workshop.
2. Present the list of top three livestock and grassland problems, and the list of management priorities (priority resources, priority livestock types) for the site. Confirm that the problems and priorities are correct. Note any changes needed.
3. Present the map of the grassland site. Confirm that the map is correct. Make any edits on a flip chart. Draw a new map if needed.
4. Identify one or two key management priorities (linked to livestock and grassland problems) for management planning to focus on. Use these management priorities to create one or two clear and concise management goals.
5. Summarize for the community grazing management options (Section 3) related to the selected management goals.
6. Select one or more grazing management options for planning. If no option is seen as feasible, skip to Step 10.
7. Plan actions needed to implement the selected grazing management options.
8. Define rules governing resource use and access and enforcement mechanisms for the selected grazing management options.

9. Define roles and responsibilities of users and decision-makers, the timeline for implementation of actions and rules and resources required for the selected grazing management options.
10. Conduct survey for the community intensive restoration options (Section 4) related to the selected management goals. These options must be complementary to the grazing management options previously selected.
11. If applicable, select any preferred intensive restoration options for planning.
12. Plan actions needed to implement the selected intensive restoration options.
13. If necessary, define rules governing resource use and access, and enforcement mechanisms for the selected intensive restoration options. If not necessary, skip to Step 14.
14. Define roles and responsibilities of users and decision-makers, the timeline for implementation of actions (and rules if applicable), and resources required for the selected intensive restoration options.
15. Create a sensitization plan for comment by the wider community and refinement to produce a robust and transparent grassland management plan.

2. Grazing management options

Facilitate the community representatives to select one or more of the following 'grazing management options' for planning in their grassland.

Use these criteria to help the community select grazing management options. Any option selected by a community must:

- directly help in achieving one or more management goals;
- be effective toward these goals; and
- be feasible to implement within a period of 1–2 years.

Steps for selecting grazing management options

1. Start with basic seasonal grazing. Use this section to understand the different seasons of the year and areas inside the grassland, and to create a grazing plan (where possible).
2. If the community sees basic seasonal grazing as feasible, continue to describe the other options (short-resting and rotational resting) and see if the community is willing to incorporate some of these other ideas into their basic seasonal grazing plan. You may also explore rotational grazing if time allows (rotational grazing takes time to plan and will rarely be immediately feasible but introduce the idea to build awareness). Be sure to mention exclosure last.
3. If the community sees basic seasonal grazing as not feasible, proceed to short-resting and rotational resting. These are simple options that can be used almost anywhere. Be sure to mention exclosure last.
4. After completing (2) above or (3) above, continue to Section 4, 'intensive restoration options', below.

3. Basic seasonal grazing

Basic seasonal grazing is a simple and effective approach to grassland management. Seasonal grazing involves dividing the grassland into 'grazing areas' for grazing use in different seasons of the year under a basic seasonal grazing plan.

The central goal of basic seasonal grazing is to ensure that all areas of the grassland receive at least some rest from grazing at some time during each and every year. Resting must be conducted during the rainy season to be effective.

The process of planning basic seasonal grazing involves dividing the grassland into 'grazing areas' for grazing use in different seasons under a basic seasonal grazing plan. However, this is a general goal and will look different in each location. Each grazing area can be grazed more than once per year in different seasons according to the management plan. Often grazing one area more than once per year is desirable for both the livestock and the grassland. Each 'grazing area' can be grazed more or less heavily in different seasons—but there should be some time in every year when each 'grazing area' is rested. For example, there is no need to rest a '*belg* season grazing area' for the rest of the entire year (the entire *kiremt* season and dry season). Rather, the '*belg* season grazing area' might be used heavily during the *belg* rains, with lower grazing during the rest of the year.

How to divide a communal grassland into pasture areas for use at different times of year

1. General guidelines

    - Follow any existing local practice by the community that creates any seasonal differences or changes in grazing intensity between different areas of the grassland. This includes livestock preferences for certain areas and during certain seasons.
    - Where there is no significant seasonal variation in grazing, the objective is to identify the maximum feasible number of grazing areas that can enable the use of basic zoning of grazing areas for use at different times. Feasibility concerns will likely result in a small number of grazing areas—from perhaps three to ten—but even dividing a grassland into two large grazing areas provides a minimum basis for seasonal or opportunistic resting. A smaller number of grazing areas will be advantageous where many grazing areas are too difficult to implement, and where community buy-in may be initially weak (but, to increase awareness, always mention having more grazing areas is most productive and is the best long-term goal. A greater number of grazing areas gives more resting time for each grazing area, and grazing is heavier for shorter periods of time, enabling control of weeds and unpalatable forage species).
    - Often it is best to graze the poorest pasture areas earliest in the rainy season to concentrate grazing pressure on the poorest pastures and to rest the best pastures earlier and for longer.
    - Often it is best to save the most productive pasture areas for grazing in the dry season or later in the rainy season to maximize biomass in these rich areas and to protect such important resources

from degradation (often these are swamps, which cannot be grazed during the rains due to inundation and likely degradation).

- Usually, areas to be grazed earlier should be larger to minimize grazing intensity during the early growing season when grasses are regenerating from seeds and roots.
- Usually, areas to be grazed later should be smaller because they have accumulated more biomass during the rainy season.
- Often, areas near the boundary of the grassland should be grazed earlier, and areas in the center of the grassland grazed later.
- In areas of the grassland where grazing is difficult to control, for example where there are local conflicts over grazing, grazing should generally begin as early as possible in the rainy season to decrease the temptation for neighbours or rule-breakers to invade areas being rested.
- In many cases, high grazing pressure will force each grazing area to be grazed repeatedly. It is usually best for all grazing areas to be grazed for more than one period per year, although not continuously. The most productive pasture areas, if rested even briefly, might often be grazed again in the same season (if it is raining or in moist micro-sites).

2. Setting the seasons

- Here, the grazing year should be considered to start with the beginning of the rainy season (or seasons).
- Divide the year into two or more seasons that will be used to plan grazing areas in the grassland.
- In the case of bimodal *belg/kiremt* rainfall seasons, may be set for the *belg* rains, *kiremt* rains and the dry season.
- In the case of uni-modal rainfall in one season only, seasons may be set according to the rainy season versus the dry season.
- In all cases, any season can be divided into early and late periods as useful.
- In all cases, ask the community if they would like to separate seasons to highlight periods of forage scarcity, especially the late dry season and the middle of the rainy season.
- Enter the final resulting seasons into the following table of seasons.

Season	Months	Number of grazing days	Good areas for grazing during the season	Bad areas for grazing during the season	Forage scarcity or other problems during the season

3. Method 1: Participatory local knowledge

- Ask the community representatives what the best way is to divide up the grassland. Even if they are only able to divide their grassland into two large grazing areas, this will greatly increase their management options.
- Several simple approaches exist even with only two grazing areas: (1) a grassland divided into one area for dry season grazing, and one area for wet season; (2) a grassland divided into less productive pasture, and one area with more productive pasture.
- Record as accurately as possible the locations of the grazing areas suggested by the community.
- Ask the community representatives why they have chosen these grazing areas. Record the reasons given. Ask any follow up questions until you have a clear understanding of their reasons.
- If this has succeeded rapidly, more detailed methods can be applied to assess the viability of the seasonal grazing plan, such as estimating animal forage needs and forage supply.

4. Method 2: Animal needs and forage supply

- Normally, the production of biomass will not be the same everywhere within the grassland with some areas producing more biomass and other areas producing less. The amount of biomass will also differ among seasons.
- Estimate animal days per hectare (ADH) of forage available in different general pasture areas or pasture types to better understand variation in productivity inside the grassland. 1 ADH means that a hectare can provide forage for one animal unit for one day in a specific season. The easiest ways to estimate ADH are to ask for a specific pasture area in a specific season: (1) 'what is the maximum number of animals that can be grazed on one hectare for one day, eating all of the available biomass in this area?'; or (2) 'what is the maximum number of days that one animal can graze, eating all of the available biomass in this area?'. Animal units can be in cows, sheep, goats, tropical livestock units (TLUs), etc. per hectare. Choose the animal unit according to the highest priority livestock type in the view of the community.
- In each general pasture area or type discussed, estimate the forage available in animal days per hectare (ADH) in each pasture area or type during each major season of the year, and compile these values in the following table.

General pasture area or type	Season 1 name and ADH	Season 2 name and ADH	Season 3 name and ADH

- Next, estimate the percentage of the grassland's total area covered by each pasture area or type inside the grassland and enter in the table below. Divide these percentages by 100, then multiply by the entire area of the grassland to estimate the size of each in hectares and enter in the table below. Then multiply the size of each in hectares by the ADH available (from the table above) to estimate total animal days (AD) of grazing for each and enter in the table below.

General pasture area or type	% of total grassland area	Size of pasture area or type (ha)	Total of forage available (in animal days, AD)

- These general pasture areas or types now become the grazing areas to be used in different seasons. In the table below, enter the name of each grazing area, the main or best season for grazing that area, the number of days in the season and the total animal days (AD) of forage available in each grazing area.
- Estimate the herd size during each season of the year. The herd size is the total number of animal units that graze in the grassland on a normal day-to-day basis. Enter the same herd size for all grazing areas and seasons (for now, assume that only one grazing area is used in each season. This can be changed later as necessary.).
- Correct the herd size for what proportion of livestock feed comes from the grassland (this information comes from grassland management characterization. See the characterization manual, *Manual for characterization of highland communal grassland management systems*).
- Herd-C = (Herd size) × (% feed from this grassland)/100
- Multiply the corrected herd size, Herd-C, by the number of days in the season to calculate total forage needed (in animal days (AD)), and enter in the table below.
- Subtract the total forage available (in AD) from the total forage needed (in AD) to calculate the surplus or deficit amount of forage (also in AD) and enter in the table below.
- Note the forage surplus or deficit and compare the herd size with ADH available in the grassland. Often the ADH will not be sufficient to meet the demand of the herd size.

Grazing area	Main or best grazing season	Days in the season	Total forage available (AD)	Herd size (AU)	Herd-C (AU)	Total forage needed (AD)	Surplus/deficit forage (AD)

- Use these values as the starting point for creating feasible grazing areas within the grassland to best meet forage demand during particular seasons.
- Adjust the size of grazing areas and the length of seasons to best enable the grassland to meet the forage needs of the herd. However, if the discussion shows that grazing areas and seasons may have major problems, you will need to make new versions of the previous two tables.

1. Note: alternatively, the reverse process can be followed. Rather than starting with seasons and locating areas, you can begin with pasture areas recognized by the community and ask what seasons they should be grazed in, for how long, followed by how much resting if any, and subsequently, how long they should be grazed again (in the same season or in other seasons).
2. Document the basic seasonal grazing plan. Draw a map indicating the grazing areas inside the grassland as agreed by the community representatives. Record the reasons given by the community to form these grazing areas and ask any clarifications on the reasons.
3. Plan simple seasonal grazing rules to enable the community to implement the basic seasonal grazing plan. The following should be clear:
   - Which rules apply to each grazing area?
   - Which rules apply to which seasons for each grazing area?
   - During each season, is resting to be complete or partial? If resting is not 100% complete, a proportion of animals that can be allowed to graze inside the area is specified and additional rules required to denote which animals are allowed in various seasons.
   - Mechanisms for transparency, accountability and enforcement of the rules. Make sure the rules are realistic by pressing the community to identify problems that may arise and make changes as needed.
4. Finally, ask the community if they are ready and able to implement the basic seasonal grazing plan in full. If they are ready, help them to create a plan for the initial steps, e.g. for the first six months to one year, including responsibilities, materials and timeline needed for the community to implement the plan successfully.
5. If they are not ready to implement the full plan, ask the community to identify portions of the grazing plan and rules to create a management option they can test now without further delay. Even if they only test a portion of the plan in a specific area in a specific year, the evidence may prove highly useful to the

community for learning, discussion and cultivation of wider buy-in from the community in support of improving grazing management.

Short-resting

Short-resting is when any portion of a grassland is rested from grazing for a short or long period of time. It is the simplest and most flexible option available. Longer resting times are often best for recovery of grass but can result in weed infestation. Shorter resting times are generally less effective for grass recovery but are more feasible.

The central goal of short-resting is to ensure that specific, targeted areas of the grassland receive some rest from grazing in some years. Resting must be conducted during the rainy season to be effective.

Describe common types of short-resting, including:

- spelling: specific areas are targeted for resting early in the rainy season to enable regeneration of grasses from seeds and roots (effective reseeding or oversowing of grasses normally requires spelling at minimum).
- deferred grazing: specific areas are targeted for longer-term resting from grazing to enable grasses to re-seed themselves.
- resting of specific pasture areas to reverse or slow down ongoing degradation.

If none of these options is acceptable to the community, they may need a more low-cost approach due to feasibility concerns.

Work with the community to identify a minimum feasible resting period for at least one area of the grassland. Ask them one or more of the following questions:

- What is the maximum area and minimum time possible to rest any portion of the grassland during any time of year when feasible and useful? What benefits would this provide, and do they link directly to management goals?
- What is the minimum area and maximum time possible to rest any portion of the grassland during any time of year when feasible? What benefits would this provide, and do they link directly to management goals?
- What is the minimum area and minimum time possible to rest any portion of the grassland during any time of year when feasible? What benefits would this provide, and do they link directly to management goals?

If any feasible plan for resting emerges from the discussion, take note of resting areas, resting times, and the goal of resting in the eyes of the community as related to their management goals.

Then, discuss and agree on rules, responsibilities, materials and timeline needed to conduct resting successfully.

Finally, clarify with the community how often resting will need to be repeated to maintain good pasture production. Is resting necessary for a portion of every year? Is every other year, every third year, every fifth year necessary? If the community appears willing to prepare a longer-term plan for resting throughout the grassland, continue rotational resting in the next section.

Rotational resting

Rotational resting is an approach in which degraded grasslands are rested for short or long periods of time in large or small portions of the grassland in a shifting pattern over time that encourages ecological regeneration of priority rangeland resources. Resting areas are shifted to new areas each year in rotations extending over multiple years to rest the entire grassland. Since the grassland ecosystem does most of the ‘work’, resting can assist

ecological regeneration at a low cost, and some resting is a necessary prerequisite for reseeding of grasses (at least the minimum time needed on a per-species and per-site basis). Rotational resting is less costly and easier to implement than rotational grazing. Where basic seasonal grazing will not work because it is not possible to rest all areas in the same year, rotational resting is an appropriate option.

The central goal of rotational resting is to ensure that all areas of the grassland receive at least some rest from grazing in some years. Resting must be conducted during the rainy season to be effective.

Resting rotations can follow any number of management goals with improving grass biomass production and species composition being among the most common. To minimize costs of lost grazing due to long rest by using short-resting (see above), multiple priority areas of the grassland could be rested for short time periods at the beginning of the rains, improving grass production and regeneration at a low cost. In other cases, long-term resting may be possible to restore severely degraded areas. A rotational resting plan can include both short-resting and long-term resting to accomplish different management goals in different parts of the grassland.

Start with the table of seasons (from the basic seasonal grazing section), including which months they cover and how many days and add them to the table below.

Ask the community representatives in which season resting is feasible, which potential locations of the grassland can be rested and the objective of resting (toward the management goals) and add them to the table below.

Ask the community representatives how large each resting location should be, how long it should be rested and the resting return interval (how many years can pass until the same location will be rested again).

Season	Months	Days	Potential location(s)	Objective of resting	Size of resting area (ha or timad)	Length of resting period(s) (months)	Resting return interval (years)

The information in the table above is sufficient to create an essential plan for rotational resting. Once the table is complete, work with the community to prioritize areas of the grassland for resting. Note which resting areas in the table above are of the highest priority for resting in the eyes of the community.

Note: an alternative approach is to start with grazing areas rather than seasons. In this case, ask which grazing areas (or any small portions of the grazing areas) that can be rested feasibly for a significant benefit. Then, ask the season for resting, objective of resting, size of resting areas, length of resting period and resting return interval. Otherwise, the process is the same.

Use a discussion of constraints to help the community identify what resting will be feasible and what will not be. Constraints may include loss of grazing, rule-breaking by the community or by neighbouring communities, low grassland productivity, invasive or unpalatable species, etc.

Once the community has a clear and realistic understanding of what feasible resting looks like in their area, create a rotational resting plan using the table below. Separate each location or area to be rested on a different line of the table. Start with the areas given highest priority for resting by the community.

Year (for rest)	Resting location (grazing areas, or which portions of grazing areas)	Season(s) for resting	Month(s) for resting	Objective of resting	Size of resting area (ha or timad)	Length of resting period(s) (months)	Next resting period (year)

Finally, discuss and agree on rules, responsibilities, materials and timeline needed to successfully implement the rotational resting plan.

Simplified rotational grazing

Using resting periods and grazing periods on top of a basic seasonal grazing plan is a relatively simple means of introducing rotational grazing. A basic seasonal grazing plan is required for the following steps and must be prepared first. For the sake of simplicity, we will assume that each 'grazing area' used in a specific season is only grazed during the appropriate season (meaning it is rested in the other seasons). More complicated plans can be created although it will require a more complicated planning framework.

To use the resting period/grazing period approach, a single seasonal grazing area is divided into two or more divisions. Livestock are then moved among these divisions in a rotation, enabling resting of areas when they are not being grazed. This approach has several benefits in highland communal grazing lands: (1) every portion of the grassland is rested at some time; (2) grazing livestock are concentrated into smaller areas, forcing animals to eat moderately palatable forages to allow highly palatable preferred forages to increase their dominance, controlling weeds and invading shrubs by trampling, and smoothing the soil surface to prevent rill and gully formation and in dry areas to break the soil crust; and (3) grazing happens for shorter periods of time, enabling grasses to recover faster when grazing stops and protecting highly palatable preferred forages from overgrazing and death.

The resting period/grazing period approach can be conducted in two main ways. First, the maximum resting period is estimated, enabling calculation of the maximum grazing period. Second, the minimum resting period is estimated, enabling calculation of the minimum grazing period. Here, the best approach is to estimate the maximum resting period for calculation of the maximum grazing periods. In most highland communal grazing lands, starting with the maximum resting period has two main advantages: (1) it gives the longest resting times possible, giving the grassland more time for recovery; and (2) it gives the longest grazing periods possible, meaning that livestock can graze for longer in each area, which simplifies the grazing system and minimizes the burden of community oversight and enforcement.

Start by filling in the following table, beginning with information obtained during basic seasonal grazing planning, notably the grazing areas and the seasons of use for each grazing area. Then add the months for each season and the number of days in each season to the table below.

For each grazing area, facilitate the community to decide how many divisions are feasible in each grazing area. A good goal is to have three or more divisions inside each grazing area, but even two divisions is helpful (it is acceptable if some grazing areas are not divided into divisions and are grazed as a single unit). Once they have decided the number of divisions for each grazing area, add the number of divisions to the table below.

For each grazing area, ask the community to estimate the maximum resting time (RP-max)—the longest feasible period of time to rest one division inside one grazing area of the grassland. Estimate RP-max for each grazing area and add RP-max to the table below.

Grazing area/ season of use	Months of grazing	Days of grazing	Number of divisions	RP-max	GP-max	Rotations
_____ season grazing area	____ - ____	___				
_____ season grazing area	____ - ____	___				
_____ season grazing area	____ - ____	___				

Calculate GP-max for each grazing area using the equation,
GP-max = RP-max ÷ (Number of divisions – 1)
Calculate the number of rotations for each grazing area (1 rotation = animals graze all 3 divisions in one grazing area), as
Rotations = Days ÷ GP-max ÷ Number of divisions

The community can now reflect on the resting times, grazing times and number of rotations required to identify what is and is not feasible at the present time. Once the community has identified an acceptable option, push them to identify constraints and develop strategies for achieving success in the face of the difficulties they expect. Often, the first try may not be acceptable to the community. Center in and identify from the community which elements of the grazing plan present a constraint or problem.

To improve the plan and avoid constraints or problems identified by the community, start by changing the resting periods to re-calculate the grazing periods and number of rotations. To see the full variety of options available, play around with all the different ways of organizing rotations—change the number of divisions, the seasons and the resting periods (RP-max) to see what other possibilities exist. Note that decreasing the resting period (RP-max) will necessarily reduce the length of grazing periods (GP-max) for each division. This means that animals are moved among divisions more quickly, increasing the burden on the community institution in terms

of sensitization, rule-making and enforcement. A large number of divisions with rapid movements of animals is good grazing management, but a small number of divisions with fewer animal movements will be easier for the community to manage. The ideal goal is to have an optimal number of divisions with the resting and grazing periods most suitable for the number of divisions the community has selected.

Finally, discuss and agree on rules, responsibilities, materials and timeline needed to successfully implement the rotational grazing plan.

Simplified rotational grazing example: grassland with three grazing areas, with three divisions each.

In this example:

- A community has used basic seasonal grazing planning to separate their grassland into three 'grazing areas' that are used in different seasons: (1) a small, wet, swampy area with good pasture production (dry season grazing area); (2) a large upland area with poor pasture production (belg season grazing area); and (3) moderately productive areas elsewhere (*kiremt* season grazing area).
- The community has identified the following: (1) each grazing area is divided into three divisions (nine total divisions or paddocks); and (2) the maximum feasible resting time is 60 days in all three grazing areas (*belg*, *kiremt* and dry season grazing areas).

For each of the three grazing areas, we fill out the table below.

Grazing area/season of use	Months of grazing	Days of grazing	Number of divisions	RP-max	GP-max	Rotations
Belg season grazing area	April–June	90	3	60		
Kiremt season grazing area	July–December	180	3	60		
Dry season grazing area	January–March	90	3	60		

Calculate GP-max for each grazing area, as
GP-max = RP-max ÷ (Number of divisions – 1)|
Belg: GP-max = 60 ÷ (3 – 1) = **30**
Kiremt: GP-max = 60 ÷ (3 – 1) = **30**
Dry: GP-max = 60 ÷ (3 – 1) = **30**

Grazing area/season of use	Months of grazing	Days of grazing	Number of divisions	RP-max	GP-max	Rotations
Belg season grazing area	April–June	90	3	60	30	
Kiremt season grazing area	July–December	180	3	60	30	
Dry season grazing area	January–March	90	3	60	30	

Calculate the number of rotations for each grazing area (1 rotation = animals graze all 3 divisions in one grazing area), as

Rotations = Days ÷ GP-max ÷ Number of divisions
Belg: Rotations = 90 ÷ 30 ÷ 3 = **1**
Kiremt: Rotations = 180 ÷ 30 ÷ 3 = **2**
Dry: Rotations = 90 ÷ 30 ÷ 3 = **1**

Grazing area/season of use	Months of grazing	Days of grazing	Number of divisions	RP-max	GP-max	Rotations
Belg season grazing area	April–June	90	3	60	30	1
Kiremt season grazing area	July–December	180	3	60	30	2
Dry season grazing area	January–March	90	3	60	30	1

The resting and grazing periods, and rotations are the key information for community analysis and discussion. The *belg* and dry season grazing areas will require only one rotation according to this plan, meaning each division is grazed only once per season (per year in this example). The *kiremt* season grazing area requires two rotations, meaning each division will be grazed twice per season (per year). This is still a low number of rotations, which is advantageous as a high number of rotations will quickly run into feasibility constraints in highland communal grazing lands. Technical effectiveness and realistic feasibility should guide selection of any rotational grazing plan.

Simple exclosure

Although exclosure is not grazing—in fact, exclosure is the exact opposite of grazing—we include it under 'grazing management options' because, like most grazing management options presented here, it is a simple option with a low investment cost (most costs come from lost grazing, labor and transport) that can be directly implemented by the community.

Here, we consider only 'simple exclosure'—all grazing animals are excluded to enable cut-and-carry fodder harvest of native grasses only (for enriched exclosure, see Section 4, 'Intensive restoration options'). This means the area is not plowed or planted with improved forages.

Because simple exclosures are not planted with improved forages, their productivity depends on the site selection. Areas selected by the community for simple exclosure should be a productive location—good soil fertility, hydrology and grass species composition. If there is no such area in the grassland, they will need another option, such as grazing management options (Section 3 above) or enriched exclosure (Section 4 below). Normally, the most effective exclosures with good community management are located in low, wet areas near rivers or swamps, where grass production is higher and cut-and-carry harvest is easier. Closing these areas to grazing helps to prevent loss of land to gully formation, maintain stream flow for a longer portion of the year and improve water quality downstream.

Exclosures can provide a useful complement to grazing planning. Even if the grazing plan is effective, the community may benefit from creating a small exclosure area in a productive area of their grasslands. In supplementing grazing management, simple exclosure has several advantages:

- Exclosure is relatively easy to implement.
- Exclosure carries little investment cost.
- A cut-and-carry fodder source is available at times of severe forage scarcity, which may help the community to feed their animals in difficult times, and reduce grazing intensity and grassland degradation.

However, exclosures have their disadvantages:

- Creating an exclosure means there is no grazing in that area. Livestock must graze elsewhere, sometimes causing high grazing pressure on other areas of the grassland and resulting in grassland degradation.
- Exclosures have 'hidden' costs. Labor to cut the fodder and transport of fodder can prevent some community members from benefitting from the exclosure, while lost grazing can create resentment.

- The loss of fertilization from manure and urine deposited by grazing animals will lead to a long-term decline in soil fertility, requiring periodic fertilization to maintain the current level of productivity.
- When areas are closed to grazing, the lack of trampling by livestock often allows weedy forbs and shrubs and trees to invade and degrade the grassland.
- If the exclosure is located in an area with low pasture productivity, it is likely that the community will receive little benefit, placing the exclosure at risk.

Once you have discussed these advantages and disadvantages with the community, assist them to identify where exclosure can be feasibly created and how large it will be.

Finally, discuss and agree on rules, responsibilities, materials and timeline needed to successfully implement simple exclosure.

4. Intensive restoration options

Intensive restoration of grasslands is often useful and sometimes necessary in the case of severe degradation. However, intensive efforts are often expensive and costly in terms of labor and will not be successful in most grazing lands unless 'fitted into' a grazing management plan. In other words, usually the restoration of small portions of a grassland will have no long-term benefit unless these small-scale improvements are linked to a large-scale improvement in control over where livestock are grazed and when.

Therefore, do not use this section until after the community has selected one or more grazing management options from Section 3, 'Grazing management options.'

Start from the grazing management option(s) selected by the community, and the management goals for the grassland. The grazing management plan and management goals of the community for the grassland are the structure into which intensive restoration options will be fitted as appropriate.

Go through each of the intensive restoration options summarized below. Begin with the option you think is most relevant to the grassland and the community. If some options are not relevant, ignore those options.

Ask the community representatives to compare the costs implied by each option, with the benefits from each option in a general and qualitative manner. Ask them to clarify the details of the costs and benefits they mention and record these details. Ask them to clarify how the benefits mentioned address the management goals for the grassland.

Other general factors to consider and include in discussion:

- Is there a realistic benefit?
- What areas are key to seasonal grazing?
- What areas are key to provide grazing or fodder during times of forage scarcity?
- What areas do you want to preserve for future generations?

Reseeding (and over-sowing)

Where good grasses have been lost, replacing them by seed is often possible.

- These 'good' grasses are typically perennial, highly palatable and highly productive under active livestock grazing.
- However, most of these 'good' grasses are rhizomatous (densely rooting) or stoloniferous (with runners) grasses that do not spread easily by seed (e.g. *Cynodon dactylon*)
- Species selection is very important. The species selected must be able to germinate, survive and grow in the

location where reseeding is conducted.

- The species selected must also be available in the market or for harvest locally.

Reseeding is only feasible if the grass seedlings survive. Grazing after reseeding will normally result in failure. To conduct reseeding:

- The community must select a resting option that gives the germinating grass seedlings rest from grazing for as long as possible (three months to one year).
- The resting period must also be during the early rainy season.
- Before the community selects an area for reseeding, ensure that the area has some kind of resting planned during the early rainy season (e.g. during the *belg* rains).

Control of weeds and invasive species

Controlling weeds and invasive species that infest and can degrade grasslands may seem simple—they are cut or cleared manually, etc. However, the problem is deceptively complex.

- Weeds and invasive species can produce millions of seeds that continue to grow year after year, or simply re-sprout following cutting.
- If simple cutting or other manual clearing is not effective for more than a few months, it is unlikely to be sustainable and a broader strategy is needed.
- For weeds and invasives that are difficult to control, strategic use of herbicide for a temporary period may be recommended. However, before wide-scale application, herbicides should be selected to ensure appropriateness for the main target species, and then tested to ensure effectiveness.
- Usually, combining more than one technique will most effectively control weeds and invasive species.

The best way to control weeds and invasive species is to have a healthy, thick grassy layer.

- If there is no bare soil and no light at the soil surface for weeds to grow, there will be no weeds (or few).
- Beyond maintaining a healthy grassland, a good grazing plan can also help control weeds and invasions.
- Concentrating a large number of animals into a small area infested with weeds or invasive species uses the power of livestock trampling to control unwanted species. However, this heavy grazing should only be for a short period of time, long enough to crush weeds and woody species though not long enough to create new bare soil or affect grasses and other preferred forages negatively.

Enriched exclosure

Improved forages are an excellent option for creating productive exclosures that conserve environmental resources while providing large quantities of high-quality livestock fodder.

- Usually, establishing improved forage species involves plowing the grassland (only once), planting the improved forage with manure as fertilizer (NPK and other chemical fertilizers are not recommended unless use is to be repeated every year), requiring weeding until the improved forage has filled in and covered most of the soil. Fencing is recommended but not required.
- Grass species selection is very important. The species selected must be able to survive and grow in the location where reseeding is conducted.

- The species selected must also be available in the market or for harvest locally.
- Species propagated by cuttings usually establish better than those propagated by seed. For example, Desho grass is best propagated by transplanting cuttings of live roots (or sod), while elephant/napier grass is planted by stem cuttings, and Rhodes grass is planted by seed.

Some grass species have multiple advantages that make them particularly useful for cut-and-carry exclosure.

- Species like Desho grass and elephant/napier grass grow easily from cuttings, making establishment faster and more effective.
- Desho and elephant/napier also have a large stature, growing tall and producing large quantities of biomass that is easier to cut and transport.
- When they grow taller and older, the forage quality of these species is often lower than other improved forages (e.g. Rhodes, Brachiaria). To maintain high forage quality, these species normally require repeated cutting to create new growth of high quality.

Usually it is best to plant multiple plots of more than one grass species.

- Each grass species has different traits such as life history, forage quality and optimal cutting frequency and other management needed.
- Species with different traits normally can be used in different seasons or cut at different times, and can be used for different purposes (e.g. for feeding different livestock species or types).

Since exclosures are protected from grazing, they have the additional advantage of enabling the planting of fruit or fodder trees.

- Encourage the community to select one or more tree species for planting in the enriched exclosure to enrich it further.
- Fruit trees should be selected based on climate, soil and market prices.
- Fodder trees should be selected based on climate, soil and community interest in their use as fodder.
- In addition to fodder, trees such as tree lucerne or sesbania provide nitrogen that enhances the forage quality of the grasses beneath.

Gully management

In areas with little vegetation cover, rainwater can flow too quickly and heavily to infiltrate into the soil. Any water that does not infiltrate comes off as runoff, which when flowing quickly creates erosion and gully formation.

Key points on gully management:

- The federal SLMP guidelines provide a thorough set of recommendations for the rehabilitation of gullies, and they should be followed carefully.
- In communal grazing lands, gullies are a widespread and serious issue.
- The cost and machinery for gully re-shaping and other methods is often beyond the ability of community institutions, requiring government support to be feasible.
- Most gully management should be preventative rather than reactive.

Livestock grazing has both negative and positive effects on gully formation:

- Areas vulnerable to gully formation should never be grazed when it is raining or the soil is wet since trampling of especially heavy livestock such as oxen will simply enlarge any existing gullies.
- Livestock grazing can also be a solution for gullies. Concentrating a large number of animals into a small area where gullies are to be healed uses the power of livestock trampling to smooth the edges of gullies. However,, this heavy grazing should be only for a short period of time so that grasses and other species can begin to grow in the gully and hold the soil in place.

Better than rehabilitating gullies is to prevent them from forming in the first place.

- The best way to avoid the massive labor investment in gully rehabilitation is to maintain a healthy grass layer (ideally with some trees as well).
- A healthy grass layer will slow the speed of water flow downhill, allow rainwater to infiltrate into the soil rather than run off the surface, and thereby reduce erosion and the formation of gullies.
- Therefore, the best way to prevent the need for gully rehabilitation is to have a good grazing plan that maintains a healthy grassland.
- A second preventative measure is the use of exclosure in vulnerable areas. It is usually best to create exclosures in areas close to valley bottoms, swamps and streams. These areas are productive for exclosure, an effective approach to prevent the loss of productive land as gullies expand.

Soil and water conservation (SWC) measures

Trenches and other soil and water conservation (SWC) structures help to improve infiltration of water into soil, allowing the water to flow into superficial areas available for plant uptake and growth of vegetation, or to flow into groundwater storage. Any water that does not infiltrate comes off as runoff, which when flowing quickly creates erosion and gully formation.

Key points on SWC structures:

- The federal SLMP guidelines provide a thorough set of recommendations for the size, design and spacing of SWC structures, and they should be followed carefully.
- In communal grazing lands, the most relevant and effective SWC structures are normally trenches.

The success of trenches and other SWC structures in communal grazing lands varies widely.

- SWC success varies with soil type and erosion prevalence since highly erosible soils will often fill in trenches or break terraces within a few months, eliminating any benefits and requiring re-application from step one.
- SWC structures are costly in terms of labor and any SWC structures that do not remain are unlikely to have any lasting benefit.
- The presence of grazing livestock, especially oxen and other heavy livestock types, can furthermore result in destruction of trenches and other SWC structures. SWC structures should be designed to withstand livestock grazing, or otherwise should not be attempted.
- The best way to ensure that physical SWC structures remain for a longer period of time is to use biological measures in combination with temporary resting from grazing. Grasses or other species are planted soon after the SWC structures are created and the area is rested from grazing to allow these species to establish and sink down roots to hold the SWC structures in place.

Better than creating SWC structures is to prevent their need.

- The best way to avoid the massive labor investment and frequent failures of SWC structures is to maintain a healthy grass layer (ideally with some trees as well).
- A healthy grass layer will slow the speed of water flow downhill, allow rainwater to infiltrate into the soil rather than run off the surface, and thereby reduce erosion and the formation of gullies.
- Therefore, the best way to prevent the need for SWC is to have a good grazing plan that maintains a healthy grassland.

5. Create the first draft grassland management plan

Start from the grazing management option(s) selected by the community.

Make a new map of the grassland that shows all areas where grazing management options will be implemented in the grassland.

- Grazing areas and seasons of use (basic seasonal grazing)
- Any areas where short-resting will be conducted
- Any areas where rotational resting will be conducted
- Any divisions of grazing areas for rotational grazing
- Any areas to be set aside for simple exclosure

For each area on the map, document on separate paper for each grazing management option.

- The rules created by the community to implement grazing management options
- The responsibilities, materials and timeline needed to successfully implement grazing management options

Add to the map of the grassland any and all areas where intensive restoration options will be implemented in the grassland.

- Any areas to be reseeded
- Any areas where weeds or invasive species are to be controlled
- Any areas where enriched exclosure will be created
- Any gullies to be targeted for rehabilitation or prevention of expansion
- Any areas where soil and water conservation (SWC) measures are to be created

For each area added to the map, document on separate paper for each intensive restoration option.

- The rules created by the community to implement intensive restoration options
- The responsibilities, materials and timeline needed to successfully implement intensive restoration options

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