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# Ethiopian rangeland conditions, management and improvement technique reviews

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## Abstract

Rangelands are geographical regions dominated by grass and grass like species with or without scattered woody plants. The rangelands cover 62% of the land in Ethiopia. The rangelands of southern Ethiopia comprise 7.6-12.3% of the area of the country. Borana rangelands comprise about 95,000km$^2$. While In Somali region more than 70% are cover by rangelands. Before four decades, the Borana rangelands were known as the best rangeland in east Africa. But yet by the early 1990s it has been observed that productivity of the Borana was in decline. The aim of this paper is to review the concepts of rangeland condition, range management and improvement techniques based on the studies so far done. To meet the objectives data and literatures were collected from different literatures sources and reviewed. The literature review mainly addresses concepts of rangeland degraded conditions, major causes, management and common improvement techniques. The major rangeland conditions are in best and worst condition. Of all well managed for grazing, land use and protection. Management of rangelands is usually limited to grazing, burning and control of woody species.



**Key words; rangeland, range management and degradation**

## Introduction

Rangelands cover about 65% of total land area of Africa and 62% of Ethiopia(Dalle et al., 2006) . Management of rangelands is usually limited to grazing, burning and control of woody species and combines biological, physical, and social sciences. Past development interventions planned to improve rangelands and living conditions of pastoral communities in Ethiopia failed to identify and apply the appropriate rangeland management options. Because a top-down approach was followed, no attempt was made to deal with pastoralists' problems using a holistic approach, and policy makers failed to understand the pastoral dynamic system(Dalle et al., 2006). Rangelands in Ethiopia are in danger of becoming seriously degrading owing to natural and human-induced factors. This is a matter of priorities and should follow by a detailed assessment of the state of health of the rangelands. Rangelands of Ethiopia consist of mainly native pastures (grass, forbs and woody plant species); they are main feed sources of grazers and brewers. These fodder plants usually are consumed by domestic and wildlife animals(Abate et al., 2012). Therefore, assessing the condition of vegetation utilized by grazing and browsing herbivores are essential for sustainable utilization of rangeland ecosystem. The concept of rangeland condition is encompassing to indicate the state of health of the rangeland in terms of its ecological status, resistance to soil erosion and potential for producing forage for sustained optimum livestock production(Dalle et al., 2006). Pastoralists own different animal types including browsers (33%) and grazers (67%) irrespective of the condition of rangelands(Bedunah & Angerer, 2012). As elsewhere in other dry land of Africa, pastoralists in the area depend heavily on woody plants as livestock feed. Other studies have shown that assessment of a rangeland composed of different vegetation components must incorporate three parameters of assessments (i.e., the herbaceous layer, the soil and the tree-shrub layer). However, previous studies in Ethiopia rangelands have used grass and soil parameters in evaluating the condition of rangelands. Recent studies have indicated that use of species composition alone as an index of rangeland condition rating to be unsatisfactory(Bedunah & Angerer, 2012).

They have suggested that the inclusions of other parameters like woody parameters (e.g. its density, frequency, canopy cover, browsing effect and palatability)(Abate et al., 2012), percentage of bare ground, and biomass yield as deemed necessary. The present study considered the above parameters in indexing of rangeland condition. So far many methods have been developed in assessing rangeland condition. However, the choice of the method or parameters to be used should depend on the local conditions(Abate et al., 2012). Furthermore, other studies suggested that range condition cannot be simply rated based on its usefulness for a single priority of land use and the interpretation of assessments requires a multiplicity of perspectives. Hence, this study was intended to examine the hypothesis that inclusion of woody parameters in rangeland condition rating can be useful in evaluating rangelands(Bedunah & Angerer, 2012).

In the past in the rangelands of Ethiopia some attempts have been made by many scholars to determine rangeland condition(Bedunah & Angerer, 2012). However, compared with the vast rangeland areas of the country, there are only very limited studies; for example, in south Ethiopia in middle Rift valley. Despite of all these studies, there is limited. Information regarding to rangeland condition in South East Ethiopia Furthermore, evaluation of rangeland condition using the three component of assessments, use of benchmark method and use of wheel point methods have not yet explored, only the studies. Therefore, the objectives of this study were to evaluate rangeland condition, percent cover of bare ground, biomass production, and grazing capacity in different elevation belts and along grazing gradient in Rayitu rangelands(Bedunah & Angerer, 2012).

## Objective

To review the Ethiopian rangeland condition, range management and improvement techniques.

## Ethiopian Rangeland conditions

In Ethiopia(Abate et al., 2012), the rangelands are located around the periphery of the country, almost surrounding the central highland mass. Most of these areas are found below 1500 meter above sea level. The rangelands are located in the east, northeast, southeast and southern part of the country where there is virtually no comparative advantage in the sustainable crop-based livelihood transformation(Mengistu, 2005). Although, there are no accurate and reliable data indicating the area coverage, human population and other resources of the Ethiopian rangelands(Abate et al., 2012). It is estimated that the rangelands support pastoral and agro-pastoral communities of over 12 million people belonging t0 29 ethnic groups in 7 regions, and 122 districts on grazing area of about 545,100 $km^2$ that accounts for about 89% of the total land mass of the pastoral areas. The major pastoral groups in Ethiopia, in terms of human population, livestock numbers and area occupied are the afar in the northeast, borana oromo in the south, and the Somali in the east and southeast of the country. In addition, there are smaller groups such as the hamer, arbore, surma, dascenetch , etc. who live in the extreme south of the country(Abate et al., 2012).

### Definition of rangeland condition

Rangeland condition is commonly defined as a 'state of health' of an area and is viewed as analogous to human health(Mengistu, 2005). The health of a rangeland area is assessed by measuring attributes and indicators of its current functional state relative to an expected normal. An indicator is a simple surrogate or index for a difficult to measure attribute.

### Physical characteristic of rangeland conditions

Thorough knowledge for physical characteristic of rangeland is essential for understanding of range management problems(H et al., 2004). The physical characteristics of rangeland are soil, climate and topography that determine the type of vegetation and its productivity in the rangeland. Climate is critical component to rangeland management. Precipitation is one of the important elements among the climate factors vital for determining the type and

productivity of vegetation in area. On the bases of climatic variable and magnitude of the animal use(Mengistu, 2005). Two opposing school of thought namely equilibrium and non-equilibrium theories have emerged and been put into practical use. Advocates of the equilibrium theory, argue that the densities of consumers (livestock) should be maintained at a level matching the carrying capacity of the rangelands. Those on the side of non-equilibrium theory argue that the rangeland condition and trends are primarily dictated by rainfall variability and consider the traditional grazing resources management system to be the right way to go. These concepts have strongly influenced the development paths of rangelands over the years(Zerga & Teketay, 2018).

Rangeland conditions as the state of health expressed in terms of its ecological status, resistance to soil erosion and potential for producing forage sustained optimum livestock production. It is used as guide to ensure sustainable land use(Zerga & Teketay, 2018), determine carrying capacity and adjust stocking rates, and identify potential response to range improvement programs. In any assessment of a rangeland ecosystem composed of different vegetation component, rangeland monitoring must incorporate three tiers example herbaceous, soil and tree-shrub layer. Range trend on the other hand refers to the changes in the status of resources at site detected by monitoring and is usually expressed as improving, detect or stable. It is carried out by periodic re-measurement of rangeland attributes at the same location at different points in time. Before examining the condition and trends of Ethiopian rangelands in different time periods, it is important to examine the paths followed in rangeland development at the global level notable by financing organization like **World Bank** as it has direct/indirect influence on the development paths of rangeland in developing countries. Secondly, efforts in developing the rangelands in Ethiopia

had long history and series of livestock development projects were undertaken with financial support from the United States(Zerga & Teketay, 2018).

### Importance of rangeland

The natural resources in the rangelands provide multiple uses that include food, feed, firewood, charcoal, timber for construction, traditional medicine, shade,

spice, gums resins, dyes, etc. the rangelands are also important for livestock and wildlife production. As source of water, recreational products, minerals and easthetic value. For instance, the rangeland supports 73%, 25%, 20-27% and 100% of the goal(Mengistu, 2005).

### Economic value of rangeland

The economic importance of rangelands worldwide is extremely variable according to the socio-economic system in which they are embedded(Zerga & Teketay, 2018). In Africa and especially east Africa. Rangelands are essential to the subsistence of pastoralists, forage and natural pasture dependent on rain. Such groups are generally the most vulnerable groups in the region, because they depend on variable climate to support a necessarily patchy resource, and because tenurial regimes tend to be more ambiguous in regions often regarded as a common pool resource. The consequence of this is that there is a sort of gradient of composition for access to rangeland. Forage is one of the economical uses of rangeland plants of eastern Africa(Mengistu, 2005). It includes trees, shrubs, grazes, and forbs, which provide fodder for both domesticated and wild animals. In mixed farming livestock systems forage legumes play central role(Mengistu, 2005). They provide high quality feed for livestock and help to improve soil fertility and boost crop yields. Although(Mengistu, 2005) eastern African rangelands are rich in forage species inadequate nutrition is one of the most serious constraints to livestock production.

## Rangeland Degradation

Ecosystems(Abate et al., 2012) that are liable to species richness reduction lose important resources for their function. Suggested that the reference point for rangeland degradation when measured in terms of beef that it can sustain is the potential natural community that provides the highest grazing value for beef cattle production. This indicates(Resource, 2014) that one major aspect of rangeland degradation is reduction in the capacity of the ecosystem to support livestock production and productivity. Change in the pattern and state of vegetation or structure, as defined by patchiness and biodiversity in semi-arid regions, are the main indicators of the state of land degradation and it gives useful information for monitorin(Abate et

al., 2012)g.

## Causes of Rangeland Degradation

Human activities, including timber harvesting(Abate et al., 2012), infrastructure construction, grazing, mining, and water diversion, have decreased the species diversity and changed the function and productivity of ecosystems. These actions have degraded the future integrity, value and reduced the use of different rangeland ecosystems(Resource, 2014). Rangelands are also degraded when they are infested by weed, the soil is eroded, and when their pasture quality deteriorated. Indicated(Resource, 2014) that rainfall, fire, and grazing are the main driving forces of change in vegetation of semi-arid rangelands from perennial, drought-tolerant grasses and shrubs to annual, drought-sensitive plants. Other activities including burning, cropping and management of grazing animals conducted by humans have influences on vegetation cover, structure of vegetation communities, soil characteristics, and on biogeochemical cycles that may lead to the invasion of alien plant species. Also revealed that the biodiversity reduction in the South ethiopia(Mengistu, 2005), savanna communities is due to the colonization of African species, which led to a progressive loss of native species from the communities. The majority of the threats were due to loss of perennial grass cover and increase in annuals, unpalatable forbs and bush cover(Mengistu, 2005).

### *Overgrazing*

Setting stocking at higher density has commonly resulted in a decline in the most palatable perennial species and an increase in less favorable species. Because livestock is the major user of primary production in the semiarid and arid regions, degradation has always been attributed to this sub-sector(Resource, 2014).

### *Sedentralization*

The effects of overpopulation and government policies on agriculture, food availability and increased poverty have contributed to the sedentarization of pastoralists(Resource, 2014). This has lead to concentrations of people, livestock, farming and other type of land use centered on permanent water supplies. These sites become centers of overuse of rangeland resources and subsequently resulted in rangeland degradation and reduced

biodiversity. Causes of environmental changes linked to growing bush cover are presently associated with episodic climatic events as well as recent and historical land and water alienation in developing countries(Resource, 2014).

### *Encroachment of Rain Fed Agriculture in Rangelands*

Population in East Africa has been growing high during the last three decades(Resource, 2014). According to, most of the population increase has taken place in the higher potential agricultural areas of the region. Because of this, migration took place to high potential rangelands; areas formally occupied by habitats of various plants and animal species. Moreover increased populations put pressure on readily available resources and thus have widespread overexploitation of rangeland resources. In developing countries, particularly in Africa and Middle East, traditional pastoral societies have lost their relative influence within the new national states of the dry lands, where political and economic powers tend to be in the urban and agricultural sectors(Resource, 2014). Recent encroachment of rain fed cropping into the better pasture land can be understood as a response to newly created national policies for increased food production and increased emphasis on cash crops as producers of foreign exchange. Thus valuable grazing lands have been lost and important traditional exchange relationships between pastoralists and farmers have broken down(Resource, 2014).

This type of range degradation(Resource, 2014) is widespread in the Near and Middle East and in Africa, particularly in East and South East Africa, where agriculture and pastoralism in the past were in balance with environmental conditions.

### *Frequent Drought*

(Resource, 2014), suggests that a draught can be said to occur when rain falls below half of the long term average or when rain fall in two or more successive years falls 75% below average. The Society for Range Management, also defines drought as prolonged dry weather generally when precipitation is less than three quarters of the average rainfall(Resource, 2014). Agricultural drought is the stress that causes plants to wilt or die and results in lower production. These attributed to not only

amount and distribution of rainfall, but also function of other influential factors such as temperature, soil characteristics and management of the land. The frequent drought in many parts of the world's dry lands and notably in Africa is a prominent factor, which has contributed to range degradation. The crisis in the pastoral production systems of the Sahel in the early 1970s(Resource, 2014) showed the great repercussion of this sequence of dry years on rangeland degradation. When there is drought and overgrazing together, the effect on the productivity of the rangeland is double barreled. Pastoralists suggested that the Booran rangelands are periodically perturbed by episodic events such as droughts that result in mass livestock mortality. Prolonged drought including a shortage and erratic rainfall can cause serious range degradation. Rainfalls during drought is hardly adequate to allow grasses to grow and unable to fill the surface water ponds. Poor rainy seasons or droughts followed by years with above-average rainfall with frequent rainfall events have probably made a substantial contribution to the problem of bush thickening(Resource, 2014). Mobility remains the most important pastoralist adaptation to spatial and temporal variations in rainfall, and in drought years many communities make use of fall-back grazing areas unused in 'normal' dry seasons because of distance, land tenure constraints, animal disease problems or conflict. But encroachment on and individuation of communal grazing lands, and the desire to settle to access human services and food aid, have severely limited pastoral mobility(Resource, 2014).

### *Bush Encroachment*

This type of vegetation degradation occurs where indigenous shrubs and trees encroach onto former grassland areas and changing them to various forms of shrub bed grasslands(Resource, 2014). On the other hand, the density of trees and shrubs may increase into thickets or various wooded types and reduce the relative amount of grass and therefore livestock production. Increase in domestic livestock (grazers) and a decrease in game animal numbers (browsers) results in increased pressure on the grass layer. The competitive advantage of a vigorous perennial cover declines and more favorable environment is created for the woody plant components(Resource, 2014). Invader bushes have started to produce seeds in abundance and so create opportunities for the establishment of new generations of bushes. In some instances

woody encroachment is speculated due to a lack of foraging by livestock and lack of fire. Thus both overuse and underuse have been implicated in affecting vegetation dynamics(Resource, 2014).

### *Climate change*

(Tsegaye et al., 2010)At country's level, Ethiopia is already experiencing signs of climate change. In the last 50 years the annual average minimum and maximum temperatures over the country have been increasing by about 0.25 and 0.1 $c^o$ respectively. Every decade according to rise in temperature and fall in rainfall has been measured in the southern and eastern Ethiopia in the since 1996. With temperature increases has come more dry and windy period and hence increased erosion events. It is projected(Tsegaye et al., 2010) that rangelands will be more negatively affected by climate change, with implications such as change in water resource, change in rangeland productivity, change in land use system and rangeland based livelihood.

## Range Management

The range management approach argues that the current (often traditional) rangeland and the boundary (albeit porous) of that area are the entry point for defining the rangeland management unity (i.e. usually larger than a *kebele*(Awgachew et al., 2015)). It also argues that customary institutions or a committee based on the customary institutions (or clan) is the appropriate governing body. CARE International is taking this approach as part of the PRIME work there – using the customary grazing area as a starting point for PRM implementation. Under guidance from local communities the larger *dheeda* has been divided into sub-*dheeda* or *reera*. (Awgachew et al., 2015)Communities or clans who share resources are regarded as a rangeland system. Where the rangeland area is large, it can be appropriate to divide it into various sub-systems or rangelands sub-units as components of the larger rangeland system, based on who most frequently shares resources.

More systematic community-led land use planning has been recommended for rangelands including, what can be interpreted as, a zoning of land for

agricultural use and other for grazing or browse(Awgachew et al., 2015). The production of a Rangeland Management Plan not only provides strategic direction for those involved but also is a useful process in itself. Experience has shown that the more detailed the Plan, the more transparent and effective it proves to be. Different planning cycles are required. Some may be short – annual or semi-annual; and others will be for longer periods of time. The production of a Rangeland Management Plan is a requirement of the processes described here, and has been made necessary for acquiring a Rangeland Management Agreement(Awgachew et al., 2015). The Rangeland Management Plan is also the starting point for the development of bylaws that control local land/resource access and use, including that of primary and secondary users. More systematic community-led land use planning has been recommended for rangelands including, whatcan be interpreted as, a zoning of land for agricultural use and other for grazing or browse(Awgachew et al., 2015).

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### Managing soil and forage resources

Fertile soil is the foundation of sustainable production(Awgachew et al., 2015). Soil macro-organisms and microorganisms are the external digestive system that processes organic matter, delivering a smorgasbord of minerals, vitamins and other nutrients to the crop at a metered pace. This contrasts the conventional approach of flooding crops with a limited number of soluble fertilizer nutrients, leading to luxury

consumption, imbalanced plant nutrition and a susceptibility to disease and attack by insect pests(Awgachew et al., 2015).

The pasture systems are maintained throught grazing and animal impact on land, which accomplish the following:

- ✓ Nutrient cycling through feces and urine
- ✓ Timely defoliation and removal of plant material that encourages regrowth
- ✓ Root death through leaf removal, resulting in underground organic matter accumulation and nutrient cycling.

## Range management in Borana

Recent studies by the PRIME project show that there remain two categories of rangelands in the community(Awgachew et al., 2015). The open grazing area is managed by customary institutions (*Abba dheedas*) and is commonly accessible to members of the *dheeda* community, and neighboring communities through negotiation. The second category of rangeland is the "*kalo*" (reserved rangeland), which is managed at *reera* (sub-*dheeda*) level. The reserve is often fenced for use during the dry season. This area can be reserved for calves, lactating animals, and weak animals. (Awgachew et al., 2015)Access to the reserve is discussed and decided by *Jarsa reera* (the community elders), and only a few animals are allowed to graze at a time so that the reserve is not depleted. Crop farming is expanding in Borana. The farmland is locally called *obru*.

A community member can request the *kebele* administration for a plot of land for crop production(Awgachew et al., 2015). The *kebele* administration consults the *abba olla (t*raditional village leader) and the *Jarsa reera* to check whether the requested cultivation would affect grazing areas, reserve pasturelands, routes to grazing areas and water points. However, the land can rarely sustain more than one or two seasons of cultivation and then will be abandoned. Others can then request the local administration and traditional leaders to use the land without the permission of the former user of the same plot. This is because the land belongs to the community and the *Abba Olla* has the authority to

reallocate land for another purpose. Water managementtends to be of more importance than grazing area management – the *Abba herrega* (father of the water) is considered to have greater authority than the *Abba dheeda*(Awgachew et al., 2015).

(Awgachew et al., 2015)Traditionally, community elders have been the ones responsible for making decisions about the management of different resources across multiple-use dryland landscapes including rangelands. Governance of these resources tends to occur at different levels from a rangeland through to seasonal grazing areas, through to a tenure 'niche' such as a well or a tree – all of which tend to be communally used, accessed and governed. In addition, and as has been seen more recently(Awgachew et al., 2015), there may have been the introduction of more individualized uses of land such as agricultural plots or private water points. Today, these private property resources also need to be incorporated into dry land governance structures and systems. Traditionally, customary institutions are the ones responsible for making decisions about NRM. However under new challenges and constraints it may be that customary institutions alone are no longer capable or appropriate for these roles and responsibilities(Awgachew et al., 2015).

## Improvement of range management

Ecological improvement is becoming an increasingly important tool in humanity's attempt to manage, conserve and repair the world's ecosystems(Resource, 2014). Many indicators of "landscape" scale dysfunction are structural, but functional once are critical for ecosystem functioning. Functional problems that require repair include soil erosion, plant-animal interactions, water connectivity, and production at some or all trophic stages. The function, as defined by resource retention of landscapes that are endowed by high cover of perennial plants, is effective in terms of runoff capturing and retention and utilization of nutrients(Abate et al., 2012). Conversely, the function of landscapes with low covers threatens the aforementioned functions because landscapes with large patches of bare soil that are deprived of perennial plants are dysfunctional. As runoff and the

concomitant.

## Rangeland improvement techniques.

First, in order to improve an ecosystem(Abate et al., 2012), we need to understand how it worked before it was modified or degraded, and then use this understanding to reassemble it and reinstate essential processes. Passive restoration, as explained by (Resource, 2014), is restoration of degraded habitats by ceasing anthropogenic perturbations that are causing degradation while active restoration refers to biotic manipulation that is practiced by reintroduction of animal or plant species that have been extirpated from an area. (Resource, 2014)Active restoration action may not be necessary in places where the damage is not too great. This is because natural succession alone may be capable of restoring equilibrium(Resource, 2014). However, factors such as species extinction, exotic predators, and loss of hydrologic function can prevent ecosystems to attain natural dynamic system through passive restoration. In addition, ecosystems that are sufficiently degraded may not be restored to a state that would occur naturally by the implementation of passive restoration only, but need to be intervened by active improvement techniques(Resource, 2014).

### *Grazing management*

The first step in any project is to ensure that grazing is managed well to reduce the risk of further degradation. In the past(Resource, 2014), set stocking has been the most common way to manage grazing. In some instances at very low stock densities this practice has been successful at maintaining but generally not improving rangeland condition. Set stocking at higher stock densities has commonly resulted in a decline in the most palatable perennial species and an increase in less favorable species. The second step is to realize that timely grazing management can have a positive impact on rangeland condition(Resource, 2014).

### Destalking.

The accumulation of animals is a proven livelihood strategy, when the primary feed resource (grazing land) is commonly owned and in the face of periodic disaster which threatens to reduce the herd(Resource, 2014). Income from livestock assets in pastoral Africa is primarily in the form of products produced from the livestock themselves, rather than in cash obtained from the sale of livestock. Economic theory suggests they are likely to be held until their

income generating value falls below their salvage value, which is likely to be well past their market prime. Better physical infrastructure in some market locations, improved road access and better information on more distant markets(Resource, 2014), will not only enhance the access of pastoralists to markets in which to sell their animals, but will also improve their access to consumer goods and increase their integration into the larger market economy. The withdrawal of government regulatory agencies or marketing monopolies that add to the covert costs of trading, stifle competition and depress producer prices may be equally important(Resource, 2014).

### *Introducing Seeds*

(Resource, 2014)Areas suffering from prolonged vegetation decline are likely to have very limited supplies of seeds. In these instances seed needs to be introduced for regeneration projects to be successful in the short-term. Native grasses are well adapted to the harsh environment of semi-arid areas. Many exotic species, with the exception of buffel grass, generally fail to persist due to drought or infertile soils(Resource, 2014). Native grasses not only provide necessary habitat for many native animals, they provide a suitable pasture base for animal production and can perform well as exotic species under harsh conditions(Resource, 2014).

### *Prescribed Fire*

Prescribed fires are planned and conducted at the proper time, and in a safe manner, to meet specific management objectives(Resource, 2014). Typically, desirable plants are dormant, soil moisture is sufficient to support plant growth after the fire, and favorable environmental conditions ensure predictable fire behavior and simplify control. In contrast, wildfires are unplanned and usually due to lightning, human negligence or malice. Wildfires usually happen during extended dry periods when soil moisture levels are low and plants are severely stressed and result in reduced forage yields and other undesirable effects(Resource, 2014). Timing of fires can be used to favor desirable grasses and suppress undesirable grasses plants that reproduce solely by seeds because seeds can be killed by fire if their growing points at the twig tips are exposed to lethal temperatures. In contrast, perennial plants that can reproduce vegetative from subsurface buds are usually only top killed and initiate new shoots after fire. Prescribed

fire can yield many benefits if it is used with other sound management practices(Resource, 2014). This fire can increase grass nutritive quality, palatability and availability because the fire removes dead plant material and improves access to new growth(Awgachew et al., 2015).

The fire is used at a certain time of the year and under specific levels of relative humidity, air temperature and wind speed to help control target weed species(Resource, 2014). Burning when relative humidity is less than 25 percent, air temperature is above 80$^{o}$F, and wind speed is more than 15 mph causes intense, possibly dangerous fire behavior(Resource, 2014). Planning is essential to safe burning and should be done well in advance of the proposed burn date. The plan should cover objectives, what areas to burn, pre-fire management practices needed to meet the objectives, how to conduct the fire and any post-fire management practices(Resource, 2014).

### *Re-vegetation of rangeland*

In the pastoral areas of the country, prolonged heavy grazing pressure combined with the recurrent drought has changed large areas of the rangeland to bare soil. Rangelands in such situations are prone to wind and soil erosion(Tsegaye et al., 2010). Which in turn leads to decline in soil fertility and seed in the soil. In such extremely degraded rangeland where soil seed bank has completely depleted or in situation where the relative proportion desirable species has fallen below critical level(10-15%), (Tsegaye et al., 2010)the land degradation problem can be reversed through reseeding. Seed needs to be introduced for restoration of degraded rangeland projects to be successful in the short term. Reseeding technology has been used successfully as means of rehabilitating degraded rangelands(Tsegaye et al., 2010).

Reseeding involves collecting seeds from existing grasses and then sowing them on bare ground. The reseeding(Tsegaye et al., 2010) approach would involve ground preparation using fertilizers and ongoing nurturing, as well as encouraging pastoralists to collect enough seeds in the growing season to sow the land when needed(Tsegaye et al., 2010).

## Conclusion

Most of the rangelands in our country have lost the productivity mainly due to wrong ways of resources exploitation. Overgrazing due to extensive livestock production is one of critical problems that resulted in deterioration of the rangeland condition in most regions. Fertile Borana rangelands were converted to cropland and pastoralists were pushed to marginal area and this aggravated rangeland degradation. Traditional livestock production and rangeland management system was interrupted with change in land use and government policies. Nomadic way of life which causes little degradation was converted to sedentary life in most areas.

## Recommendation

I would like to recommend that

To enhance the rangeland management through international standard

To increase the awareness and organizing the usage of rangeland properly

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