Current range condition in southern Ethiopia in relation to traditional management strategies: The perceptions of Borana pastoralists

AYANA ANGASSA AND FEKADU BEYENE
Department of Animal Production and Rangeland Management, Awassa College of Agriculture, Debub University, Awassa, Ethiopia

Abstract
A survey was conducted in Dubluk, Medecho, Did-Hara, Did-Yabello, Web and Melbana grazing areas of Borana to analyse the pastoralists’ traditional practices and strategies for sustainable resource use. A total of 36 sites were selected and data were collected by formal and informal interview using a questionnaire and group discussion, respectively. Among the 288 (17 female and 271 male) pastoralists interviewed, 144 (50%) reported that traditional grazing practices, although effective for sustainable resource use, are becoming highly marginalised due to ranching, allocation of communal grazing areas to private investors, cultivation and privately reserved pasture areas (Kalo). Recent increases in human and livestock populations, and decreases in grazing lands, have eroded the effectiveness of traditional management to mitigate risks of livestock losses during drought, and resilience of the rangelands, with a severe impact on the livelihood of the pastoralists. A decline in total biomass production and animal performance in the study areas was observed during recent years. Participatory planning and development intervention strategies based on traditional knowledge and values were suggested for sustainable resource use and development.

Introduction
The Borana pastoral system of southern Ethiopia, traditionally based on cattle husbandry for survival and income generation, has been effective over generations in producing animal products while maintaining rangeland resources (Pratt and Gwynne 1977; Helland 1997). Borana pastoralists maintained genetically diverse stock and varied the composition of their herds to match local environmental characteristics (Coppock 1994). Herders moved livestock between the wara and fora herd-management systems depending upon the condition of the grazing lands and family milk needs. Large numbers of animals were sent to the fora herd during the dry season when forage resources became scarce in the wara herd’s grazing lands.

Recent increases in human and livestock populations and decreases in the availability of grazing lands are putting the rangeland resource under increased pressure (Coppock 1994; Helland 1997). In the last few decades, the development of water ponds has added further to grazing pressure on the rangelands. In the mid-1980s, about 19% of the area was affected by erosion, and about 40% of the grazing lands were covered by bush encroachment (Assefa et al. 1986). Significant areas of the communal grazing lands have been converted to cultivation with even larger areas allocated to ranching. This has both restricted area available for communal grazing and increased grazing pressure on these areas.

In undertaking these developments, little consideration has been given to the indigenous knowledge and practices of Borana pastoralists. Recognition of these skills and knowledge should be beneficial in crafting sustainable systems of resource use and developing suitable rangeland conservation programs.

We conducted this study to document the current traditional knowledge amongst the Borana pastoralists in an endeavour to determine what its role might be in developing future systems of resource use.
Materials and methods

The study area

The Borana plateau occupies approximately 95 000 km², is slightly undulating and ranges in elevation from 1000–1500 m with peaks up to 2000 m above sea level (Coppock 1994). The study area is located in the central part of the Borana rangeland about 650 km south of Addis Ababa. The area has a bimodal rainfall regimen, with mean annual rainfall ranging from 400 mm in the south-east to 600 mm in the north. Droughts occur once every 5–10 years (Coppock 1994). The human population of about 410 000 (CSA 1996) engages in livestock production, primarily cattle (Borana breed) along with goats, sheep and equines (Helland 1997). The total livestock population is 4.35 million (Helland 1997). The Borana rangeland is a water-limited environment with the major source of water for both humans and livestock being wells and ponds. The clans’ high priest (Kallu), and the gada system are the mainstays of a highly organised and durable social structure of the Borana (Legesse 1973; Hogg 1996; Helland 1997). The Borana generally split their herds into two groups commonly called the fora and wara herds. The fora herd is basically the dry cows, bulls, oxen and heifers while the wara herd constitutes the milking cows and calves. For most of the year, wara herds graze close to the Olla (encampments) and fora herds graze farther away where resources are more plentiful. The soil type of the region comprises 53% sand, 30% clay and 17% silt (Coppock 1994). Soil develops over time from interactions of parent material, weathering and accumulation of organic matter. Overall soils of East Africa are regarded as having low fertility, principally attributed to the very old parent materials (Pratt and Gwynne 1977). Range soils may vary substantially in fertility. In general, soils with more clay that are derived from lava or other materials low in quartz are more fertile than lighter sandier soils derived from granites and sandstones higher in quartz. In most cases, the soil is well drained red sandy loam soil. In valley bottoms cracking black clay soils and volcanic light coloured silty clays predominate, while on the flat lands and hills well drained red sandy soils predominate. Four major vegetation types have been described (AGRO-TEC 1974): (1) Evergreen and semi-evergreen bushland and thickets; (2) Rangeland dominated by Acacia and Commiphora trees; (3) Rangeland dominated by shrubby Acacia, Commiphora and allied genera; and (4) Dwarf shrub grassland or shrub grassland. The dominant herbaceous plants are perennial rather than annual grasses such as Aristida, Bothriochloa, Cenchrus, Cynodon, Heteropogon, Leptothrium, Panicum, Pennisetum and Themeda. The average stocking rate in the study area was approximately 15.6 TLU/km² (Cossins 1985) (1 TLU = 250 kg animal).

The survey was conducted in Dubluk, Medecho, Did-Hara, Did-Yabello, Web and Melbana traditional grazing areas in 3 districts of Borana rangeland. Dubluk, Medecho and Melbana are located 60, 80 and 140 km south of Yabello town, respectively. Did-Hara, Did-Yabello and Web are located 30, 15 and 140 km east, north-east and south-east of Yabello town, respectively.

Sampling of sites and selection of pastoralists

Borana pastoralists residing in 6 communal grazing areas within 3 districts (Yabello, Dirre and Arerro) were included in the survey. In each grazing area, 3 zones were distinguished and in each zone 2 sites were randomly sampled. Pastoralists’ perceptions of desirable practices in range management for sustainable production with minimal degradation of the range resources were documented. Thirty-six sites (8, 18 and 10 sites from Yabello, Dirre and Arerro, respectively) were sampled to assess traditional resource management practices and range condition rating systems. Groups of experienced pastoralists aged between 30–60 years defined best management practices, range condition and strategies to achieve sustainable resource use in Borana. A total of 288 pastoralists (17 females and 271 males; 8 pastoralists per group per site) were interviewed using a semi-structured questionnaire. A general discussion was held with the groups and a group opinion for each question was summarised.

Herder recall was used to document information on traditional grazing practices, range condition and environmental variables. Impacts of drought, ranching, lack of fire, permanent ponds, cultivation and population pressure on traditional management knowledge and magnitude of range deterioration were assessed. The interviews were conducted during February–March 1998.
**Statistical analysis**

Descriptive statistics were used for all data gathered.

**Results**

**Traditional grazing management and system stability**

Borana pastoralists perceived that their pastoral production system was facing serious problems. Fifty percent of the respondents indicated that their traditional means of resource utilisation and life support system were in a downward trend (Table 1), due to external intervention. Pastoralists indicated that bush encroachment became rampant more than 40 years ago, with most of the herbaceous vegetation composed of unpalatable species and valuable grasses are in a downward trend. The Borana pastoralists believed that, if this change continued unabated, the impact on sustainable resource use would be critical. A downward shift in traditional grazing management practices has been observed, as only 216 (75%) of the respondents follow the traditional strategies in resource utilisation, splitting their stock into *fora* and *warra* herds, while 72 (25%) no longer follow communal land use practices (Table 2). All respondents indicated that range condition and milk production from their animals have been decreasing over the years. Pastoralists are becoming more dependent on grain, with a significant increase in sedenterisation.

Borana pastoralists valued range resources, and an extensive base of indigenous knowledge has been developed concerning the characteristics and use of these materials. More than half (53%) of the respondents indicated that the main value of traditional knowledge was in terms of survival while only 20% saw its primary use was for stability/sustainability (Table 3). In traditional grazing management, the grazing lands were partitioned into wet and dry season grazing, particularly in Medecho, Web, Melbana and part of Dubluk. The division of grazing lands into wet and dry season areas was based on different management factors as shown in Table 2. The wet season rangelands lack permanent water supplies and can be utilised only when rainwater is available. Generally, these areas are utilised for only a short period (mostly 3–4 months), leaving them in favourable condition. In areas where cultivation is dominant and permanent water ponds are common (Did-Hara and Did-Yabello), the wet season grazing lands are no longer available resulting in changes in the traditional management.

The major ecological divisions of the dry season rangelands are the presence of permanent water supplies from traditional deep wells. The traditional strategies in resource utilisation were commonly practised in Medecho, Web, Melbana and some parts of Dubluk. However, water pond development changed the pattern of movement between wet and dry season rangelands and created permanent settlements.

Table 1 shows the criteria, which pastoralists consider are important in defining an area as a wet season or dry season grazing reserve. Lack of wet season rangelands in Did-Yabello and Did-Hara was attributed to the expansion of cultivation, ranching and permanent ponds. About 4000 ha of the communal grazing lands were under cultivation, whereas 6000 ha of land has been allocated to ranching. Moreover, 2 permanent ponds were found in these communal grazing lands facilitating sedenterisation and resource deterioration. According to the pastoralists’ perceptions, a

<table>
<thead>
<tr>
<th>Trend in range condition</th>
<th>Yabello</th>
<th>Dirre</th>
<th>Arerro</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional management is in a downward trend</td>
<td>51</td>
<td>41</td>
<td>52</td>
<td>144 (50)%</td>
</tr>
<tr>
<td>Milk production per animal is declining</td>
<td>64</td>
<td>144</td>
<td>80</td>
<td>288 (100)%</td>
</tr>
<tr>
<td>Borana traditional management was more sustainable</td>
<td>40</td>
<td>144</td>
<td>80</td>
<td>264 (92)%</td>
</tr>
<tr>
<td>Borana traditional management was less productive</td>
<td>8</td>
<td>8</td>
<td>16</td>
<td>32 (11)%</td>
</tr>
<tr>
<td>Borana traditional management was more productive</td>
<td>48</td>
<td>144</td>
<td>64</td>
<td>256 (89)%</td>
</tr>
<tr>
<td>Borana traditional management was not sustainable</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>24 (8)%</td>
</tr>
<tr>
<td>Bush encroachment is now increasing</td>
<td>64</td>
<td>144</td>
<td>80</td>
<td>288 (100)%</td>
</tr>
<tr>
<td>Grass cover is declining</td>
<td>64</td>
<td>144</td>
<td>80</td>
<td>288 (100)%</td>
</tr>
<tr>
<td>Participatory planning of development endeavour is lacking</td>
<td>64</td>
<td>144</td>
<td>80</td>
<td>288 (100)%</td>
</tr>
<tr>
<td>Land degradation is a serious problem</td>
<td>64</td>
<td>144</td>
<td>80</td>
<td>288 (100)%</td>
</tr>
<tr>
<td>Livelihood is deteriorating</td>
<td>48</td>
<td>144</td>
<td>80</td>
<td>272 (94)%</td>
</tr>
</tbody>
</table>

1 Figures in parenthesis indicate percentages.
significant proportion of the communal grazing lands in these areas has been converted to cultivation, ranching, year-round grazing and settlement. As a result, 75% of the communal grazing lands were lost which reduced the estimated annual biomass production to 25%.

<table>
<thead>
<tr>
<th>Management factors</th>
<th>Number of sites</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division of herds</td>
<td>27</td>
<td>75</td>
</tr>
<tr>
<td>Reserved grazing area</td>
<td>9</td>
<td>25</td>
</tr>
<tr>
<td>Animal mobility</td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>Migration of Ollas</td>
<td>24</td>
<td>67</td>
</tr>
<tr>
<td>Demarcation of settlement and grazing areas</td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>Cultivation</td>
<td>18</td>
<td>50</td>
</tr>
</tbody>
</table>

1 Total number of sites where management factor is practised.  
2 Represents splitting of herds into mobile (dry cows and bulls) and non-mobile (lactating cows and their calves) groups.  
3 Represents grazing land preserved for calves to use during dry season.  
4 Movement of livestock from place to place in search of pasture and water.  
5 Pastoral encampments.  
6 Movement of the whole family following their animals in search of grazing resource and water.  
7 Indicates the boundary between pastoral encampment and grazing areas.  
8 Indicates the expansion of cultivation in the rangelands.

The traditional practices of Borana pastoralists make a significant contribution to the resilience of rangelands. Among the total respondents (n = 288), 216 (75%) reported that they had been using seasonal movements of herds between wet and dry season grazing lands and within seasons moved animals frequently to prevent overuse of resources and to reduce risks of livestock losses during drought periods. Such knowledge among pastoralists helps them adapt to their environment in ways that advance sustainable resource use. Decisions about the use of grazing lands to be reserved for grazing in abnormally dry seasons have been made by the Dheda council. Herd diversification (cattle, camels, sheep and goats) ensures the presence of both browsers and grazers and reduces the probability that a single drought will wipe out an entire herd. Modern Borana pastoralists were poorly diversified in terms of resource use, risk mitigation and environmental protection. On these areas, bush encroachment was rampant and a few plant species were becoming dominant. In general, the trend is that the traditional management system is
Range condition in southern Ethiopia

becoming unstable and pastoral livelihood is becoming more insecure.

Range condition and animal performance

Table 5 shows different factors for rating range condition classes and qualitative indicators based on the perceptions of Borana pastoralists. Most Borana pastoralists indicated that the current condition of the range is very poor in comparison with 30–40 years ago. All pastoralists interviewed indicated that their rangelands were currently degraded and animal production was declining. Their rangelands were in excellent to good condition with good plant growth and composition, 30–40 years ago. This was confirmed by the absence of bush encroachment and overgrazing and the good body condition and milk production (3–4 L/d) of animals. Intercalving interval ranged from 13–14 months while initial calving occurred at 48–54 months. Mortalities were about 20% annually. Off-take was 14% and the annual cash income per household ranged from 1600–3000 Eth. Birr. The pastoralists listed drought, lack of prescribed burning, population pressure, ranching, cultivation, mismanagement and permanent ponds as the main reasons for the decline in range condition (Table 6).

Currently, range condition has deteriorated with increasing bush encroachment by species such as *Acacia drepanolobium* and *A. brevispica* associated with unpalatable grass, mostly *Pennisetum mezzianum* and *P. stramineum*. Consequently, the effectiveness of traditional patterns of land use was eroded leaving way for the non-traditional options. Loss of indigenous practices has affected the traditional way of survival that had been apparently functioning well for generations to mitigate risk inherent in arid and semi-arid areas.

Table 6. Factors responsible for the variation of range condition history, past and present based on the perception of pastoralists.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Number of respondents</th>
<th>Number of sites</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drought</td>
<td>288</td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>Lack of fire</td>
<td>288</td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>Population pressure</td>
<td>168</td>
<td>21</td>
<td>58</td>
</tr>
<tr>
<td>Ranching</td>
<td>144</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>Cultivation</td>
<td>144</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>Mismanagement</td>
<td>120</td>
<td>15</td>
<td>42</td>
</tr>
<tr>
<td>Permanent ponds</td>
<td>120</td>
<td>15</td>
<td>42</td>
</tr>
</tbody>
</table>

1 Indicates the absence of rain beyond the normal season.
2 Refers to the official ban on fire.
3 Refers to the number of grazing animals above the carrying capacity of the land.
4 Indicates communal grazing land taken by ranchers.
5 Indicates land under cultivation and its impact.
6 Indicates improper use of grazing resources.
7 Refers to man-made ponds giving service throughout the whole year.

Discussion

The observations on traditional practices made in this study support earlier reports (Alemayehu 1998; Ayana 1999), indicating that the process of consulting with pastoralists was useful in identi-
Ayana Angassa and Fekadu Beyene

fying major pastoral problems. Traditional means of resource use and life support systems were declining despite the fact that most pastoralists showed interest in following traditional practices in range management.

The mounting evidence of land degradation in Borana pastoral areas suggested that some current grazing management systems were unsustainable. Coppock (1994) described how drought and uncontrolled grazing pressure have caused serious damage in Borana rangeland. The views expressed by pastoralists in our survey that drought, population pressure and mismanagement are key factors in rangeland degradation support this conclusion.

Over generations, Borana pastoralists have accumulated knowledge and skills in adapting to seasonal variations in biomass production by manipulating grazing management. The use of different grazing areas in the dry and wet seasons, together with a set of rules and practices allowing access to key resources depending upon the season of the year, constituted an effective but non-destructive use of the resources present in their environment (Coppock 1994). According to Alemayehu (1998), Borana pastoralists conduct seasonal assessments of range condition and trends, including vegetation, condition of plant growth, current grazing pressure and accessibility to water. Pastoralists perceived that the condition of plant growth and composition were inferred from the body condition of their animals.

Our findings support the view that cultivation and non-participatory water pond development have played a significant role in the downward trend in range condition. By creating settlements, they increase the concentration of livestock especially around the permanent water points. This contrasts with the system of traditional wells where livestock numbers were controlled by amounts of water and human labour.

The universal view by participants in our survey that land degradation is a serious problem, grass cover is declining and bush encroachment is increasing indicates the seriousness of the problem. Assefa et al. (1986) indicated, based on aerial photo interpretation, that 19% of the Borana rangeland was affected by erosion, 4% severely and 15% moderately. Both severely and moderately eroded areas were included in the areas selected for the present study. Severe erosion was related to both cultivation and non-participatory water pond development. Bush encroachment was a major problem in most areas. Anecdotal evidence suggests that bush encroachment was minimal 40 years ago but began to increase after the gada of Jeldesa Liban (1952–1960) and escalated following a ban on the use of fire. In a study by Alemayehu (1998), Borana elders ranked bush encroachment third, next to drought and overgrazing, as a cause of range deterioration. Several species of Acacia, particularly *A. drepanolobium* and *A. brevispica*, are notorious invaders (Tamene 1990). In our study, pastoralists ranked lack of fire and drought as the major factors responsible for deterioration of the rangeland. In the traditional system, fire was an effective tool in controlling bush encroachment. However, under the modern systems with the added complication of droughts, sufficient fuel and firebreaks for an effective fire are rarely available.

The current situation has severe implications for the survival of the Borana pastoral system. In 1990, the total numbers of cattle and camels per household were 43 and 2, respectively, and in 1994, after the 1991–92 drought, corresponding numbers were 14 and 2 (Alemayehu 1998). The Borana pastoral system has been subsistence-oriented, based on milk production, not only to form the mainstay of human nutrition, but also to rear the calves, which would ensure the long-term continuity of the system. With the current deteriorated condition of the rangeland, this system is under serious threat. By involving Borana pastoralists with their wealth of knowledge in the decision-making process for developments, the outcomes should allow a more sustainable use of the natural resource and a better future for pastoralists. Marketing of animals and animal products must receive due consideration in any deliberations on developments.

Acknowledgements

The authors acknowledge the Borana Lowland Pastoral Development Program/GTZ for financing the project; the Southern Rangeland Development Project for their logistical assistance; and Mr. Borbor Bule, a Borana elder, who assisted us as a key informant during data collection.
References


(Received for publication October 24, 2000; accepted June 20, 2002)