Sustainable Pastoralism on the Borana Plateau: An Innovation Systems Approach

Preliminary Results from Participatory Rural Appraisals (PRAs) and Follow-Up Investigations at Four Pastoral Associations on the North-central Borana Plateau, Ethiopia

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The results depicted in this report are preliminary. They summarize largely qualitative information collected from the four Pastoral Associations from April 2013 through February 2014. The results are intended to guide further research and outreach associated with the project entitled *Sustainable Pastoralism on the Borana Plateau: An Innovation Systems Approach.* It is therefore requested that this report not be cited without permission of Dr. D. Layne Coppock. Contact him at Layne.Coppock@usu.edu

Executive Summary

The goal of the project entitled, *"Sustainable Pastoralism on the Borana Plateau…"* is to identify the best-bet technical and social interventions that can improve the sustainable productivity of the land and livestock supporting the Borana Pastoral System. This considers the high pressure on natural resources from growing populations as well as effects of a changing climate. The interventions we identify must be relevant and adoptable by the Boran people within a short period of time. This report describes preliminary work conducted on the Borana Plateau during 2013. A Participatory Rural Appraisal (PRA) approach was conducted at each of four Pastoral Associations (PAs) in the north-central region. These PAs are Dikale, Harweyu, Medecho, and Denbala Bedana. Each PRA took about four days to complete. A full PRA protocol was conducted in each case. The intent behind using the PRA approach was to describe priority problems and better understand the production system. The use of PRA also incorporates the views of pastoralists and other project stakeholders and thus is an efficient means to build the trust and teamwork necessary to affect meaningful change. The PRAs were later supplemented by focus group activities that added details with respect to water resources and grazing management practices.

Each PA is home to several thousand pastoralists and their livestock. Each PA differs with respect to local environment, forage, water, livestock, and human resources. It is clear from the analysis and associated field observations that the pastoral production systems have been degraded. Soil erosion is pervasive, especially in Dikale. Bush encroachment is widespread, especially in Harweyu. Ponds and other water sources are in a precarious condition. The people typically have little optimism with respect to the future of pastoralism here. They note the high numbers of people and livestock that undermine the system. There are a few very wealthy households (about 10% of the population) that control the majority of livestock, while a large majority of poorer households (66% of the population) have few animals and often receive food aid as part of safety-net programs. Not everything is tending downwards, however. Pastoralists note improved access to formal education, markets, health care, and communications, although in most cases the gap between need and availability in these aspects remains high.

The PRAs revealed a series of ranked problems for the four PAs. The clear priority problem is access to sufficient drinking water for people and animals. No other problem comes close to this. The other problems include a scarcity of feed resources, pervasive poverty, and inadequate social services. Sketch maps, historical timelines (since 1960), and community action plans add considerable detail to this picture. Institutional analyses reveal that from 6 to 10 GO or NGO development agencies have served each of the PAs in recent years. They typically are involved in natural resource management and the distribution of food aid. However, in terms of current activities, the PAs are served by only 1 to 2 development agencies each, and effects do not appear to be widespread. The PRA and focus group results will guide our second year of work. In line with the community priorities, we will primarily focus our research on water resources and associated aspects of landscape management.

Introduction and Objectives

The project entitled *"Sustainable Pastoralism on the Borana Plateau…"* is a three-year partnership between Oromia Agricultural Research Institute (OARI), Utah State University (USU), and the private firm Management of Risk for Improved Livelihoods (MARIL) PLC in Addis Ababa. The purpose of the project is to help pastoral communities in the north-central region of the Borana Plateau identify innovative, adoptable interventions to improve the productive sustainability of the Borana pastoral system. The project is funded for the period 2012 to 2015 under the auspices of the *Feed the Future Innovation Lab: Adapting Livestock Systems to Climate Change.* This program is administered by Colorado State University on behalf of the Global Bureau of the United States Agency for International Development (USAID).

In 2013 the project identified study sites that corresponded to four Pastoral Associations (PAs) within a 100 km radius of the major administrative center of Yabelo. The primary criterion for selection was that a PA be readily accessible to local researchers given transportation and budget constraints. The secondary criteria included considerations that the PA residents were able and willing to collaborate with us, and that there was evidence a PA was already engaged in innovative problem-solving with respect to natural resource management. Roughly eight PAs were initially visited in a rapid-rural-assessment screening process that took several weeks. Relevant GO and NGO actors as well as local key informants were also consulted. Four PAs were eventually selected. Dikale and Harweyu PAs were initially chosen in Yabelo District, while Denbala Bedana and Medecho PAs were subsequently chosen in Dire District.

The initial assessment for each PA was conducted using a Participatory Rural Appraisal (PRA) protocol (Lelo et al., 2001; Narayanasamy, 2009). Each PRA was followed up with focus groups on specific topics. Other data on the size of current human and livestock populations were collected from local PA administrative offices.

The PRA approach provides qualitative information at the community level about basic indicators of natural resource utilization, organizational landscapes, information networks, and

priority problems. The net result of each PRA is a Community Action Plan or CAP. A CAP summarizes priority needs, interventions, and stakeholder responsibilities. The process emphasizes bottom-up perspectives by eliciting the perceptions and knowledge of local people.

The four PAs selected are situated south and east of Yabelo, usually known as the "heartland of the Borana rangelands." It is overwhelmingly a pastoral production system with a semi-arid climate dominated by cattle production, followed by small ruminant and camel production. The main economic activity is therefore livestock production. While Dikale PA has a significant area devoted to rain-fed cultivation, in all cases cultivation contributes a minor portion of human food production. The area is dominated by livestock-related activities, and people reside across the landscape in clusters of settlements. The land is communally accessed and managed.

Background: Descriptions of Pastoral Associations (PAs)

Dikale (Yabelo District)

Dikale is located 30 km to the east of Yabelo town on the main dirt road from Yabelo to Arero. The local landscape has large valley-bottom and depression areas where moisture can accumulate; this allows more farming here than is typical. Crops are cultivated using animal draft power and human labor; croplands are surrounded by bush fencing in many cases. Crops are dominated by maize and beans. Produce is used for household consumption and sale. Farmed soils exhibit some gully erosion, but there are no efforts at soil conservation on any part of the landscape. There is no irrigated farming. Ponds and underground cement cisterns are the main sources of water for humans and livestock. There are modest facilities for public schooling that include formal (primary) and non-formal education. There is also a boarding school established by an NGO. There are a few health posts for people as well as a veterinary clinic. There is a small market held every Wednesday at a central location in Dikale.

Harweyu (Yabelo District)

Harweyu lies 40 km in a more southerly direction from Yabelo town. It is over 10 km from the main tarmac road that runs north to south and connects Yabelo with Moyale. The dirt track to

Dilo (which starts at the tarmac road and then heads due west) passes through Harweyu. Cultivation is much less common in Harweyu compared to Dikale; this is attributable to a drier climate and a flatter landscape that is less favorable for the concentrated collection of precipitation. Harweyu is dominated by woody *Acacia* species; bush encroachment has gradually overtaken savanna. Although farming is rare, the same crops prevail here as in Dikale. Cultivation is recent in Harweyu; permission to cultivate was granted by community leaders during the leadership of *abagada* Liben Jaldesa Gada during 2000-2008. This permission over-turned long-term bans on the practice. Trees from the hinterland are cut and burned to produce charcoal, which is sold illegally. Recent observations, however, suggest that commercial, regulated charcoal production has just begun at Harweyu as initiated by a private firm. Predators seek cover in the extensive bushland that blankets Harweyu, and hence livestock predation has been a major challenge here. In particular, hyenas are noted to kill many camels.

Denbala Bedana (Dire District)

This PA lies 70 km from Yabelo town on the main tarmac road leading to Moyale. This area is a bit drier and warmer than that of the previous PAs. As a result, cultivation is only very rarely attempted. The largest livestock market in the Borana zone is held here every Friday. The main village occurs near a large cluster of deep *(tula)* wells, which are crucial for the whole Borana community in the warm dry seasons.

Medecho (Dire District)

This PA lies 85 km south of Yabelo town near the main tarmac road leading to Moyale. The environment is much like that for Denbala Bedana, namely warmer and drier when compared to the PAs in Yabelo District. Cultivation is thus only very rarely attempted at Medecho. The presence of Medecho crater, with its shallow wells, makes this area unique and beautiful. The water here is highly mineralized, containing high concentrations of sodium carbonate and related compounds. The number of camels here is lower compared to the other PAs, but

camels appear to thrive with highly mineralized water content. Other livestock species appear to tolerate the water here.

Summary Statistics for the Four PAs

Table 1 below summarizes basic features across the four PAs in 2013. These figures were obtained from the administrative offices for each PA. Overall, the size of the PAs varies from 76,712 ha (Denbala Bedana) to 31,485 ha (Dikale). The human populations vary from 3,067 (Harweyu) to over 4,400 (Dikale). Cattle numbers vary from over 6,240 head (Denbala Bedana) to over 25,400 head (Dikale). Sheep numbers range more narrowly between 5,200 head (Harweyu) and just over 7,800 head (Medecho). Goats vary from 6,200 head (Harweyu) to 17,500 head (Denbala Bedana). Camels are the least numerous of the large, food-producing livestock, with numbers ranging from about 600 head (Medecho) to 900 head (Harweyu). Equines vary from about 250 head (Harweyu) to 1,400 head (Medecho). Water resources and *kalo* (sites where forage is protected for deferred use in the system) were also enumerated. Ponds varied from 37 to 43 per site, while cisterns ranged from 14 to 21. Denbala Bedana and Medecho had the vast majority of the deep, *tula* wells for dry-season use. There were between 9 and 13 *kalo* in each PA (see Table 1).

Methodology

PRA Activities

The PRA tools used for this assessment include community-resource sketch mapping, historical timeline, wealth ranking, pair-wise matrices, and development of community action plans. We added interviews and focus group discussions as appropriate. The PRA team consisted of professionals who contributed varied inter-disciplinary perspectives. The Ethiopian compilers of the report were the PRA team members.

Some details of the component methods are as follows. The four PRAs were conducted over two months, April and August of 2013. For each PRA, 50 community members were invited to participate. They were selected in a way that resulted in a good mix of people representing men

Table 1. Features of four Pastoral Associations in the north-central region of the Borana Plateau during 2013.

Pastoral Association Name	Size (km^2)	Households (No.)	Human Population			Livestock Population					Ponds (No.)		Cisterns (no.)	Other Water Points	*Kalo*[1] (no.)
			Total	Male	Female	Cattle	Sheep	Goats	Camels	Equines	Large	Small			
Dikale	315	1,769	4,409	2,306	2,103	25,420	6,998	15,462	671	390[2]	10	31	18	NA[3]	10
Harweyu	567	639	3,067	1,508	1,559	8,700	5,200	6,200	900	256[4]	10	31	14	1 water pump 1 *tula* well	10
Denbala Bedana	392	963	4,229	2,087	2,147	6,245	6,238	17,506	671	409[5,6]	37		18	Many *tula* wells	9
Medecho	767	763	3,763	1,865	1,898	12,484	7,820	8,664	594	1,415[7,8]	26	17	21[9]	12 *tula* wells	13

[1] *Kalo* are areas where local forage use is controlled, either by bush fencing or decree. They vary in size from a few to hundreds of hectares.

[2] For Dikale, equines are broken out as donkeys (255), horses (5), and mules (130).

[3] Not applicable. There are only ponds in Dikale.

[4] For Harweyu, equines are broken out as donkeys (240) and mules (16).

[5] For Denbala Bedana, equines are broken out as donkeys (365), horses (27), and mules (17).

[6] Also, 1,518 chickens reported for Denbala Bedana.

[7] For Medecho, equines were broken out as donkeys (1,057), horses (276), and mules (82). Large numbers of equines attributable to salt mining.

[8] Also, 552 chickens reported for Medecho.

[9] The 21 cisterns are broken out as 11 (communal use) and 10 (private use).

and women, different wealth classes, age groups, and residence locations within the PA. Annex A describes the process of conducting a PRA. Each PRA took four days to complete.

Community Sketch Map

After introducing the PRA process and familiarizing the participants with the team members, the exercise began with between six to 12 randomly selected participants from among the 50 volunteers who had been assembled at each location. This group then drew a resource map on the ground with sticks and noted landmarks with stones and other materials. The mappers constantly received comments from observers. This exercise was an "ice breaker" for the participants. The map included villages (e.g., *olla*), roads, water points, open rangeland, enclosures *(kalo)*, farmland, watersheds, mountains, social-service delivery points, and no-man's lands subject to ethnic conflict. Grazing areas were also identified as to season of use and ecological condition, the latter being things like the extent of denudation, soil erosion, or bush encroachment. The drawings were transcribed on to large sheets of paper and presented for further comments and corrections. The mapping exercise was useful to stimulate discussion.

Wealth Ranking

Participatory wealth ranking was conducted at each PA. The wealth categories were initially defined and quantified by two to three randomly selected participants, and then the approach was evaluated and corrected by the others. Wealth variation was primarily related to variation in livestock holdings at the household level. A stone-scoring method was used to identify the proportion of households in each wealth category. To do this, participants used 100 stones to distribute across all of the wealth categories to estimate the proportion that each wealth class contributes to the overall population.

Historical Timeline and Perceived Changes over Time

Documenting important historical events and noting perceived changes over time was conducted for each PA independently. In both studies an overall time frame of 53 years was

used. The 53 years were broken out into 8-year segments corresponding to the leadership periods of seven *Aba Gada;* namely, starting with Jaldesa Liben (1960-1968) to *Guyo Goba* (2008 to the present). History was described by having the participants note key events and corresponding impacts for each 8-year segment. Key events included anything important to the society in general, and items related to ecology, economy, and politics were commonly mentioned.

Perceived changes were illustrated by showing how 12 ecological, agricultural, demographic, and development variables varied in intensity over 53 years. The 100-stone method (referenced above) was again used to depict trends over time. For example, if human population in the PA was the variable of interest, then 100 stones were distributed by participants across the seven *Gada* time periods to reflect temporal change in the number of people. A preponderance of stones in the last two *Gada* periods would indicate that the human population is perceived to be on the increase since 2000.

Institutional Analysis

Governmental (GO) and non-governmental (NGO) development institutions—covering a range of local, regional, national, and international support—were listed by participants for each PA. The NGOs are listed by name in the analysis that follows. The GOs are simply referred to as "Ethiopian government agencies," but specifically they included: (1) the Ethiopian Pastoral Development Commission; (2) the Oromia Ministry of Health; (3) the Oromia Ministry of Education; and (4) the local zonal (*woreda*) administration.

Each development agent was described with respect to the local services they provide. The NGOs were mostly involved in natural resource management activities. These included: (1) Bush clearing; (2) enclosure (*kalo)* management; (3) soil conservation; (4) water development; and (5) food security. Food security, in turn, can include activities such as establishing savings and credit groups, re-stocking, and food-for-work. They were then ranked against each other using a head-to-head comparison in a matrix format. This resulted in a rank order of institutions that gauged their local effectiveness. Such information helps assess which organizations the

community may prefer to assist them in implementing a development strategy, and why. It also helps identify key stakeholders that may participate in our innovation-system approach. In addition, PRA participants were asked to identify services that: (1) Occurred locally that were also readily accessible; (2) occurred locally that were not readily accessible; or (3) did not occur locally but that are needed. This was irrespective of who provided the service.

Problem Analysis

Current priority problems are listed by the PRA participants in each PA. The problems are then compared with each other on a head-to-head basis in a matrix approach (as above). Problems are assessed not only on how important they are, but also in terms of the feasibility of finding local, sustainable solutions for each. An important problem that is also highly feasible to solve will thus be highly ranked. The problem that wins the most head-to-head comparisons is the priority to tackle, and so on.

Community Action Plan (CAP)

The CAP is a summary of the top priority problems (above) along with the resources needed to properly address them. In this report we illustrate a CAP for each PA in a concise, tabular format.

Follow-Up Studies

Water Resources

As will be shown, the need for water development was the most important finding from the four PRAs. In light of this, we conducted a series of focus groups at each PA during December 2013 to clarify a way forward. A short report by Bedasa et al. (2013) summarizes the results. Here we will only mention some key points. Each focus group involved 9-10 participants at each location. These people were recruited. They included the administrative or political leaders of each PA as well as the leaders of local water-resource committees *(Aba Heriga)*. Elders, women, and youth representatives also participated. Standard techniques were used to manage the

focus group process (Short, 2006). Specifically, the objectives of each focus group discussion (FGD) were as follows:

(1) To acquire an understanding of major factors influencing the use and management of water and to identify community-based, practical and effective interventions;

(2) To discover opportunities to strengthen the capacity of customary institutions, GO, and NGO partners in community-based water development; and

(3) To set the stage to conduct action research on targeted water-development activities.

In addition, about 6 interviews were conducted with representatives of two NGOs in the area that deal with water development; these were AFD (Action for Development) and SOS-Sahel. The objective of these interviews was to clarify how NGOs regard community-based water development in terms of process. The development agents are active in a "water development consortium." They try to avoid duplication of efforts. They share experiences in water development activities and create norms for payment as well as common methods for soliciting community involvement and matching for projects. The water-development agents try to work in different territories on the plateau. Each has their own priorities. Each has budget limitations.

Envisioning the Past, Present, and Future

When consolidating the initial results from the PRAs and other data sources, questions were raised concerning the extent that the pastoral system is changing. As will be shown, we noted the high degree of wealth stratification in terms of livestock holdings, with a particular concern on the large proportions of poor households in each PA. If a few wealthy herd owners managed most of the livestock, would interventions that boost forage production or improve access to water mostly benefit the wealthy? Would this further marginalize the poor? We therefore wanted to improve our understanding as to how the local society is changing and hence be more aware of the consequences of production improvements.

To this end we conducted another round of focus group discussions (FGDs) at each PA during early February 2014. Each FGD involved the recruitment of 8 individuals representing four encampments *(olla)* at each PA. These people represented the following categories of the population: elders, traders, women, and the major wealth classes based on livestock holdings (i.e., wealthy, middle class, and poor). The discussants, however, tended to be dominated by members of the wealthy and middle classes because we were seeking input from "opinion leaders" in this exercise. Our objective was to assess important ways that the pastoral system was changing; a better understanding of change allows us to adapt our work so that it becomes as relevant as possible. In each FGD, participants were asked to characterize the past, present, and future in terms of dominant features of the society, environment, agriculture, and culture. Details are provided in a short report by Derege et al. (2014).

Results and Discussion

PRA Activities

The detailed PRA results are organized for each PA in the Annexes. Annex B is for Dikale, Annex C is for Harweyu, Annex D is for Denbala Bedana, and Annex E is for Medecho. Follow-up findings for Water Resources and Natural Resource Management are shown across all four PAs in Annex F and Annex G, respectively. The text below summarizes major findings overall.

Community Sketch Maps

Photographs of the four community sketch maps are shown as Figure 1 in each of the four annexes (Annex B, Figure 1 for Dikale; Annex C, Figure 1 for Harweyu, etc.). These are general examples of what was created. For more details on sketch maps, interested readers should contact the compilers/editors of this report.

Wealth Ranking

The wealth-ranking exercises identified four levels of household wealth. We labeled these groups as the wealthy, middle-class, poor, and very poor. Averaged across all four PAs, the wealthy class comprised 10% of all households (range: 5 to 18%), the middle class comprised

25% of all households (range: 20 to 30%), the poor comprised 37% (range: 28 to 42%), and the very poor comprised 29% (range: 18 to 42%). In other words, on average, the poor plus very poor households added to 66% of the overall population of households. Details can be found in Table 1 in each Annex B to E. The four wealth categories are briefly described below:

Wealthy. These households have the most livestock holdings. Across all four PAs, for example, the livestock numbers for wealthy households are: >100 cattle, >70 sheep and goats, >10 camels, and >6 equines (i.e., donkeys, mules, horses). Wealthy households may also have cultivated plots for growing maize and other crops. The wealthy households use a mix of family labor and hired labor for livestock management (i.e., herding, milking, etc.) and farming. They tend to educate some of their children by sending them to local schools. Wealthy herd-owners have influential positions in the PA and they have connections with district officials. They typically have enough resources to help relatives and clan members, if necessary. In addition to livestock holdings, they usually have private houses in local towns as well as bank accounts. They are often involved in livestock trading and other business enterprises. Despite their wealth, these herd-owners perceive that they can fall into a lower wealth category quickly if they lose a large number of animals in a drought.

Middle Class. These households have a moderate to high number of livestock. Across all four PAs, for example, the livestock numbers for middle-class households are: 30 to 100 cattle, 30 to 120 sheep and goats, 3 to 10 camels, and zero to 7 equines. They may also invest in educating their children. They may have bank accounts and houses in nearby towns, and they can be involved in business opportunities. They typically have enough wealth to satisfy their own needs but would lack sufficient resources to help relatives or clan members. These herd-owners also perceive that they may drop into a lower wealth category quickly if they lose many animals in a drought.

Poor. These households represent a marked drop-off in livestock holdings compared to the wealthy or middle class households. Across all four PAs, for example, the livestock

numbers for poor households are: 5 to 20 cattle, 4 to 30 sheep and goats, zero to 5 camels, and zero to 4 equines. The poor households are food insecure for most of the year. The family members may be in poor health. Sometimes they may supplement the pastoral life with income from daily labor. They also try to educate their children. Most of the poor do not have savings or access to a house in town.

Very Poor. The very poor are at the bottom of the wealth ranking. These households have few livestock. Across all four PAs, for example, the livestock numbers for very poor households are: 1 to 7 cattle and zero to 13 sheep and goats. The family members in the very poor households are food insecure all year, poorly nourished, and in ill health. Their children are unable to go to school. Their main sources of income are derived from service as farm laborers and from selling firewood and charcoal to town dwellers. They obtain food from safety-net programs.

Historical Timelines and Changes in the Pastoral System

The historical timelines revealed dozens of major events since 1960. Detailed results are shown in Table 2 for Annexes B to E. Key events that have been sporadic throughout the past 53 years included drought, ethnic conflict, and disease epidemics. The 1960s—in contrast to more recent decades—were often regarded by participants as "a time of plenty." Key events that have subsequently had transformative effects on the system include: (1) Pond development, fire bans, and bush expansion starting in the 1970s; (2) initial gullying and cultivation starting in the 1980s—especially for Dikale; (3) improved access to education and spread of camels in the 1990s; (4) improved livestock markets after 2000; and (5) accelerated gullying, bush encroachment, spread of cell phones, and importation of drought emergency feed by wealthier herd-owners, largely since 2008.

Trends over time are readily apparent from Table 3 in Annexes B to E. In general, across all four PAs, the features showing a decline over time include grassland area and higher-value forested area. The feature exhibiting relative stability (e.g., no clear overall trend) over time is the cattle

population. The features showing an increase over time include the bushland area, cropland area, and area covered by bare or denuded land—especially for Dikale and Harweyu. Numbers of settlements, sheep, goats, camels, and poultry are perceived to have increased markedly in recent decades. Development institutions (GOs and NGOs) are far more prevalent today in each PA than they used to be.

Institutional Analysis

Overall, the institutional analysis revealed the presence in recent years of about 13 NGOs and several GOs across all four of our PAs. The NGOs, in particular, do not appear very specialized. They seem to all have a focus on food security (e.g., food distribution) and "natural resource management." The latter may include attention to water resources and rangeland management, but focal areas remain unclear.

The rankings are shown in Table 4 for Annexes B to E. The rankings reflect many variables and do not necessarily imply variation in the quantity or quality of services provided. Institutions vary in terms of their "reach" across the north-central plateau and with respect to the duration and breadth of service provision in any given location. Our analysis reveals that 8 institutions have served Dikale, 10 have served Harweyu, 8 have served Denbala Bedana, and 6 have served Medecho. The number of institutions, however, does not reflect current levels of activity. For example, there is only one NGO currently active in both Denbala Bedana and Medecho. In contrast, none were currently active at Dikale and Harweyu. In other words, development activities tend to be sporadic rather than continuous.

In each PA the PRA participants noted services that are available, available but inaccessible, and unavailable. Needs are dominated by various types of water points that require repair, clinics devoid of manpower and drugs, and primary schools that should be upgraded. The quality of relationships is also an important factor to consider here. Overall, despite that over a dozen institutions operate in the immediate area, the local sphere of impact appears marginal.

Problem Analysis

Priority problems varied among the four PAs. The detailed rankings are shown in Table 5 for Annexes B to E. Table 2 summarizes the top six problems in each PA. Overall, water shortages were the most common problem identified. Poverty, lack of access to education, and challenges of poor human and livestock health were also commonly noted.

Community Action Plans

Plans to address priority problems are briefly summarized in Table 6 for Annexes B to E. These plans were general in terms of resources needed, timing, and stakeholder participants. For example, resources were often listed as "equipment, labor, and capital." Participants were given as "community members, GOs, and NGOs."

Table 2. The top six priority problems as noted from PRA exercises in four Pastoral Associations. Problems listed more than three times are color-coded.

Rank:	Dikale	Harweyu	Denbala Bedana	Medecho
1	Water Shortage	Bush Encroachment	Water Shortage	Water Shortage
2	Poverty	Water Shortage	Human Health	Road Infrastructure
3	Human Health	Feed Shortage	Education	Education
4	Feed Shortage	Poverty	Bush Encroachment	Cooperative Function
5	Education	Human Health	Livestock Health	Natural Resource Management
6	Livestock Health	Livestock Predators	Poverty	Livestock Health

Things became more specific with respect to what should be done to address priority problems. For example, water supply problems were often attributed to high rates of pond siltation as well as cisterns, pumps, and other infrastructure for traditional deep wells falling into disrepair. Education needs focused on new facilities and supplies. Improving health for both people and animals focused on upgrading existing clinics that are devoid of technical staff and medicines. Bush clearing and other forms of natural resource management to bolster grazing resources were commonly mentioned.

Follow-Up Studies

Water Resources

Results from the FGDs are extensive and are briefly summarized here as a series of short statements. For details interested readers should consult Bedasa et al. (2013).

(1) Water shortage is an extremely serious problem here for people and animals. Water quantity problems are more important than water quality problems;

(2) Most small ponds and traditional wells are constructed and maintained by the local communities. The large ponds were constructed during past large-scale development projects. Communities and NGOs have tried to de-silt the large ponds using human labor but the scope exceeds local capabilities, especially given high rates of siltation. Siltation is related to heavy grazing and cultivation that denudes the ground in the vicinity of water points. Spillways for ponds are often poorly designed, and overflow further damages pond structure;

(3) The traditional deep wells are strictly managed and controlled by clans. Problems of maintaining troughs, entrance ramps, and shafts are ever present;

(4) Customary laws regarding water use are widely known and endorsed by the government. Violations of customary law are on the increase in recent times, and this is broadly due to the population adhering less to cultural traditions;

(5) The clan traffic inspired by the deep wells in Medecho and Denbala Bedana—and to a lesser extent Harweyu—vastly complicates natural resource management in these locations. In contrast, Dikale is not affected by the deep well system as animals in Dikale rely on large, perennial ponds;

(6) Flooding is on the increase in all four PAs. In general, pressure on natural resources because of high human and livestock numbers is a cause. Flooding causes massive damage to ponds and wells. Ponds in Dikale have been rendered unusable; and

(7) Compared to men, women advocate more for the development of cisterns given a local water source also lowers their labor requirements for hauling water in dry periods. Cisterns become decrepit due to cracking of cement walls and damage to lids. Cracking causes leakage and is mainly a problem of poor construction.

The interviews with representatives of NGOs revealed the following concerning best practices for implementing water development activities:

(1) Community involvement in such activities must be complete—from design to implementation and management. This includes a 25% cost-share that can be met by labor contributions. Communities must own the activities;

(2) Traditional knowledge of water management is vast, and it must be harnessed;

(3) Involving multiple stakeholders within and outside of targeted communities improves the performance of water-development activities. An NGO consortium

has been established. Sometimes action plans for NGOs and GOs compete, rather than complement, each other; and

(4) A watershed approach is vital. Some NGOs have had success planting *Aloe* spp. to serve as silt traps.

A detailed listing of key water points for each of the four PAs is provided in Annex 5 of Bedasa et al. (2013). This includes past participation by development agents in water development, local needs for hand tools, and notes concerning water quality and quantity. Names of ponds nominated for siltation control are in Annex 6.

Envisioning the Past, Present, and Future

Results from the FGDs are also summarized here in a series of short statements. Details are provided in the report by Derege et al. (2014). In some cases wording has been altered to improve clarity of expression.

The Past is Characterized by: Strong customary institutions; extensive cattle keeping with a high degree of seasonal herd mobility; traditional wells were the only major source of water; prevalence of epidemic diseases for both people and livestock; high livestock productivity; low density of humans and livestock; less frequent drought; and a lack of social services, including low access to formal education.

The Present is Characterized by Positive Factors such as: Improved access to formal education at multiple levels—more local children are being sent to school; increased access to vaccination and health treatments for people and livestock; increased trading, investment in housing, banking, and timely livestock sales—these continue in a wave of government-led strategies today; increased protection and rehabilitation of grazing reserves *(kalo)*, rehabilitation of denuded rangelands, and establishment of paddock grazing systems; purchase of hay and concentrate feeds during droughts, as well as hay making at the household level; watershed development initiated by government; instant accessibility of information via cell phones.

The Present is Characterized by Negative Factors such as: Inconsistent and unreliable markets, excessive influence of middle-men on prices and market transactions; more frequent droughts and a changing climate; deterioration of rangeland due to heavy grazing pressure; rapid expansion of bush; increases in new, unidentified livestock diseases; accelerated conflicts among neighbors—both within Boran society and between the Boran and other ethnic groups—conflicts are more serious than drought; an increase in human and livestock populations decrease per capita livestock holdings; increased food insecurity; weakened customary institutions; encroachment of permanent settlements and the loss of dry-season grazing areas; constrained mobility.

The Foreseeable Future may be Characterized by: In general, the discussants were pessimistic about the future of pastoralism, although some noted that, "the future seems beyond our comprehension." Trends will likely include efforts to: strengthen community-based protection and rehabilitation of grazing reserves *(kalo)*; establish new paddock grazing systems; strengthen community-based protection and rehabilitation of traditional wells and ponds; strengthen community-based protection and rehabilitation of rangelands and patterned settlements; and pursue education for children and expand access to trading as well as investment in housing, banking, etc.

Additional Key Points: Besides tactics already mentioned, others that will be pursued include timely sales of livestock, livestock species diversification, hay making at the household level, and expanding access to information. Common-pool resources are used by all eligible people. Some common-pool resources are degraded as a result of rivalries among users. The wealthy extract more from the common pool because they have the most livestock. The poor take timber from the common pool to sell firewood and charcoal to survive.

Poverty has increased. The poor rely on food aid, sales of firewood and charcoal, and by providing labor on road projects, digging trenches for fiber optic cables, gold mining, cattle trekking, etc. There are more income-generating options for the poor today compared to

before. The poor do not have to migrate from their village to survive. The exit pathway they see is through education.

Cattle redistribution from the wealthy to the poor can no longer address poverty. The needs are greater than the supply. Cattle redistribution is more directed towards clan networks rather than the residents who share local encampments *(olla)*. Even within clans, however, the needs of the poor dwarf the ability of the wealthy to supply enough animals. *Olla*-based safety nets to help the sick and make contributions to weddings and child-naming ceremonies have emerged as new and very important forms of social support.

In previous generations the poor in an *olla* used to help manage the animals of the wealthy—work included herding and cleaning corrals. Payment used to be in the form of milk or young stock. Today, however, the poor go for cash-generating labor opportunities; even if a poor man herds a wealthy man's cattle, the poor man expects cash payment. If a wealthy herd owner has surplus milk, it is sold in the market rather than distributed to the local poor. Thus, today, very few of the wealthy remain connected to the poor as before. A larger number of the wealthy are more greedy and self-interested. The poor and the wealthy participate equally in development activities, regardless of the size of their herd or family. Personality plays a role in willingness to be involved. The wealthy can contribute livestock to sell for community development projects, and this decision can be affected by individual or community-wide deliberations.

The current relationship between the traditional leadership of the Boran and government is "85 to 100% positive." It is important that both players assume joint responsibility to promote cohesiveness, harmony, and cooperation.

Despite more constraints in livestock movement in general, there remains unrestricted access of livestock during dry seasons; they can move freely in pursuit of forage and water. This reciprocity is important and endorsed by the *Gada* assembly. A community tries to balance livestock moving into the PA from different locations by distributing them evenly throughout

the area. The temporary migrants have access to share all common pool resources, but they must follow local bylaws. The challenges of accommodating the temporary migrants are especially acute for the residents of Medecho and Denbala Bedana PAs.

Today the Boran have become cynical when confronted with an increased frequency of conflicts. Sometimes politicians are blamed for igniting conflicts. It is important to follow the traditional methods of conflict resolution. It is also interesting that traders seem immune from conflict all around them. Traders could be active promoters of peace. Solving conflicts is the key to the future.

General Conclusions

The historical trends reveal that conflicts and droughts have been recurrent problems for decades. Environmental degradation, population growth, and poverty incidence, however, are on the increase. Some positive trends occur in terms of access to some social services, markets, and the spread of communication tools like cell phones. There is room to improve, however.

The major problems revealed in the four PAs revolve around access to water. Lack of feed and poor access to health care, primary education, and other basic services were also frequently mentioned challenges. Community interest towards formal education is increasing, in particular. Investment in education must continue as a government priority. The number of NGOs working in the PA locations was found to be relatively small. Findings among the PAs were therefore similar.

The pastoralists exhibit a growing interest in camel production, although this did not appear as a priority in the PRAs. Camels have an advantage over cattle with respect to drought tolerance and their ability to eat browse plants. Camels are also preferred for household food security. Their milk production is high, they are useful as beasts of burden, and they have a high value in the market. Camels in Medecho PA survive on highly concentrated salt water that is a problem for other livestock species.

There are community-based initiatives to protect enclosures, improve grazing management, and better manage watersheds. This is augmented in some cases by village resettlement plans. Such initiatives can be sustained with low levels of external support. The wide scope of ranked problems is beyond what the Utah State project can deal with alone. Partners are needed if the project is to have maximum effectiveness.

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Appendix A. Schedule for PRA Activities

Day	Activity
Day 1—Initial Contact	**Activity 1:** Enter the community and convene meetings with PA leaders. Describe objectives and methodology for the selection of 50 PRA participants. Describe selection criteria carefully that include gender, wealth class, and age class. Make sure that all reras or community clusters are well represented. Set dates for the PRA that best suit the community.
Day 2—PRA Process	**Activity 1:** Community sketch map (emphasizing sites having cultivation, settlements, kalo enclosures, water sources, forest and bush cover, denuded areas, rehabilitated areas, dry- and wet-season grazing sites, seasonal movement patterns, areas they particularly appreciate or value, conflict-prone areas, etc. (time required: 2 hr) **Activity 2:** Wealth-ranking (poverty levels defined, etc.) (time required: 1 hr) **Activity 3:** Historical trend analysis (major events, impacts, etc.) (time required: 1:5 hr)
Day 3–PRA Process	**Activity 1:** Perceived changes in the environment over time. (time required: 2 hr) **Activity 2:** Describing the organizational landscape as well as local communication networks. (time required: 1 hr) **Activity 3:** Identify what services are accessible or inaccessible. (time required: 1 hr)
Day 4—PRA Process	**Activity 1:** Appreciative enquiry. (time required: 1hr) **Activity 2:** Problem analysis and ranking. (time required: 1.5 hr) **Activity 3:** Creating the community action plan. (time required: 2hr) **Activity 4:** Final community meeting to share the main findings. (time required: 1 hr)

Annex B: Dikale PRA Results

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Figure B-1. Photo of the community sketch map for Dikale.

Table B-1. Results from the wealth-ranking exercise for Dikale.

Wealth Category (for households)	Characteristics	Percentage of the PA Population
Wealthy	≥ 100 cattle; ≥ 100 sheep and goats; ≥ 20 camels; ≥ 2 mules or 4 donkeys Other: house in town, bank account, farming plots	18%
Middle	≥ 50 cattle; 40 to 50 sheep or goats; 3 to 5 camels; 1 to 2 donkeys	26%
Poor	5-6 cattle; 4-5 sheep or goats	40%
Poorest	1-2 cattle	18%

Table B-2. Historical timeline for Dikale.

Gada Period	Major Events	Corresponding Impacts
Jaldesa Liban **(1960 - 1968)**	Remembered as a time of splendor and abundance. Trypanosomiasis (*Gendi*), rinderpest *(dadi),* and pasteurolosis *(silisa)* emerged for livestock One short rainy season failed The first vaccination campaigns for livestock began Ethio-Somali war	 Livestock deaths Reduction in livestock mortality and morbidity
Goba Bule **(1968-1976)**	Very severe drought occurred. Relief food was received for the first time	Massive livestock death rate and misery
Jilo Aga **(1976- 1984)**	Drought Ethio-Somali war Diarrhea for children (Gara Kasa) Expansion of ponds Bush encroachment started	Death of livestock. This major drought forced many Boran to migrate to Tulawayu and other areas. Ponds dried up due to severe scarcity of water Boran allied with both sides. Some joined the Somali invaders while others remained with the Ethiopian government. There was bloodshed between brothers. Death of people, cattle rustling, forced migration, and displacement Children were fed by NGOs
Boru Guyo **(1984-1992)**	Severe Drought and repeated ethnic conflict Disease outbreaks: Black fly for livestock *(Tite Gurati),* human/livestock ailment *(Birte)* Gulley formation began Cultivation began	Deaths of livestock and people Livestock death
Boru Mada **(1992-2000)**	Drought Human disease outbreak *(Birte)* Torrential rain Ethnic conflicts	Death of livestock Death of people Increased gullying Human death and misery

	Livestock disease blackleg *(Oyale)*	Livestock death
***Liben Jaldessa*(2000-2008)**	Recurrent and localized droughts Ethnic conflicts Increased degradation of rangelands Imported feed for livestock	Death of livestock Deaths of people, misery, forced migration Bush and unpalatable weeds now inhibit growth of pasture. Gullies start to block human and livestock movements.
***Guyo Goba* (2008 to the present)**	Drought Distribution of imported feed for livestock, purchase of feed from traders. Ethnic conflicts Predator attacks on livestock (leopard) Increased gully erosion	Massive death rates for livestock, forced migration Loss of livestock Human deaths and loss of property Seriously affected movement of livestock and people

Table B-3. Perceived changes (relative scale) at Dikale [changes scored as variation between the *Jaldesa Liben* era (JL, 1960-1968) versus that for the *Guyo Goba* era (GG, 2008 to the present)].

***Gada* Era →** **Feature ↓**	**JL**	**GB**	**JA**	**BG**	**BM**	**LJ**	**GG**
Grassland area	30	22	17	10	8	7	6
Bushland area	0	6	10	15	18	23	28
Cropland area	0	0	7	18	20	25	30
Bareland area	0	0	5	10	15	30	40
Settlements	2	4	8	10	17	24	35
Forested area	34	27	17	10	7	3	2
Cattle (no.)	4	6	10	20	20	25	15
Sheep (no.)	2	4	7	15	19	23	30
Goat (no.)	2	4	7	15	19	23	30
Camel (no.)	0	0	5	10	20	30	35
Poultry (no.)	0	0	0	2	30	32	36
Interventions by GOs/NGOs	0	4	10	16	20	22	27

Table B-4. Institutional landscape for Dikale and notes on local service provision. Pair-wise ranking of eight institutions. Where SOS = *SOS-Sahel*; GOV = *Ethiopian government*; SAVE = *Save the Children*; CISP = *Comitato Internazionale per lo Sviluppo dei Popoli*; HUNDE, GOAL, GAYO, and PANOS are proper organizational names. When an institution is noted in any given cell, it means that the institution was ranked higher than the other in a head-to-head competition; competitors are indicated by row and column headings. The maximum score possible is 7 of 7 while the minimum score is 0 of 7. Ranks reflect many variables and do not necessarily imply variation in quality of service. Most of the institutions are involved in food security and natural resource management.

	SOS	**GOV**	**SAVE**	**CISP**	**HUND**	**GOAL**	**GAYO**	**PANOS**
SOS		SOS	SOS	CISP	SOS	SOS	SOS	SOS
GOV			GOV	CISP	GOV	GOV	GOV	GOV
SAVE				CISP	SAVE	SAVE	SAVE	SAVE
CISP					CISP	CISP	CISP	CISP
HUND						GOAL	GAYO	PANOS
GOAL							GAYO	PANOS
GAYO								GAYO
PANOS								

Summary: CISP = 7/7, SOS = 6/7, GOV = 5/7, SAVE = 4/7, GAYO = 3/7, PANOS = 2/7, and HUNDE = 0/7.

The Services Web

Services that exist and are accessible: Primary school, human health center, cooperative shallow well, road, grain store.

Services that exist but are not accessible (non-functional or dilapidated): Veterinary clinic, deep well, mineral salt store, above-ground cistern, roto water tankers, three underground cisterns.

Services that do not exist but that are needed: Electric supply, small scale irrigation, water network, livestock market, horticulture (vegetables and fruits), transportation access, upgrading of existing school.

Table B-5. Pair-wise ranking of 11 priority problems from the Dikale PRA. The numbers indicating column heads (1, 2, … 11) match the problems with the same numbers for the row heads. The maximum score in head-to-head comparisons is 10/10, while the minimum score is 0/10.

	Problem:	1	2	3	4	5	6	7	8	9	10	11	Score	Rank
1	Water shortage		1	1	1	1	1	1	1	1	1	1	10	1
2	Gullying			2	2	5	2	2	8	9	10	11	4	7
3	Road infrastructure				3	5	3	3	8	9	10	11	3	8
4	Bush encroachment					5	4	4	8	9	10	11	2	9
5	Livestock feed shortage						5	5	5	9	5	11	7	4
6	Flooding							6	8	9	10	11	1	10
7	Predator attack								8	9	10	11	0	11
8	Livestock health									9	10	11	5	6
9	Poverty										9	10	9	2
10	Education											10	7	5
11	Human health												8	3

Summary: Problems in order of priority: Water shortage (10/10), poverty (9/10), human health (8/10), education (7/10), livestock feed shortage (7/10), livestock health (5/10), gullying (4/10), roads (3/10), bush encroachment (2/10), flooding (1/10).

Table B-6. Community action plan for Dikale.

Problem *(prioritized from highest at the top)*	**Actions**	**Resources Needed**	**Best Time to Begin**	**Participants**
Water	Ponds; cisterns; shallow- well construction	Equipment; tools; labor; budget	Chamsa; bufa Watabagi; obera guda	Community; GOs; NGOs
Poverty	Working together in cooperative spirit; cultivation; education	Tools; labor; working capital	Now	Community; GOs; NGOs
Education	Upgrade existing school; establish new schools	Building materials; labor; personnel; budget	Chamsa	Community; GOs; NGOs
Feed shortage	Enclosure management; hay making; establish/ strengthen dry- and wet-season grazing sites; Rationalize settlement arrangement; bush thinning; destocking through livestock sales	Cooperative spirit; enforce bylaws; tools	Bitotesa; obera; dika	Community; GOs; NGOs
Disease Human	Establishment of more health posts; drug supply; pit latrines; periodic/regular vaccination campaigns	Tools; technicians; Labor; budget	Chamsa	Community; GOs; NGOs
Disease Livestock	Establish vet posts; drug supplies; vaccinations	Construction materials; labor; technicians; vaccine budget	Chamsa	Community; GOs; NGOs

Annex C: Harweyu PRA Results

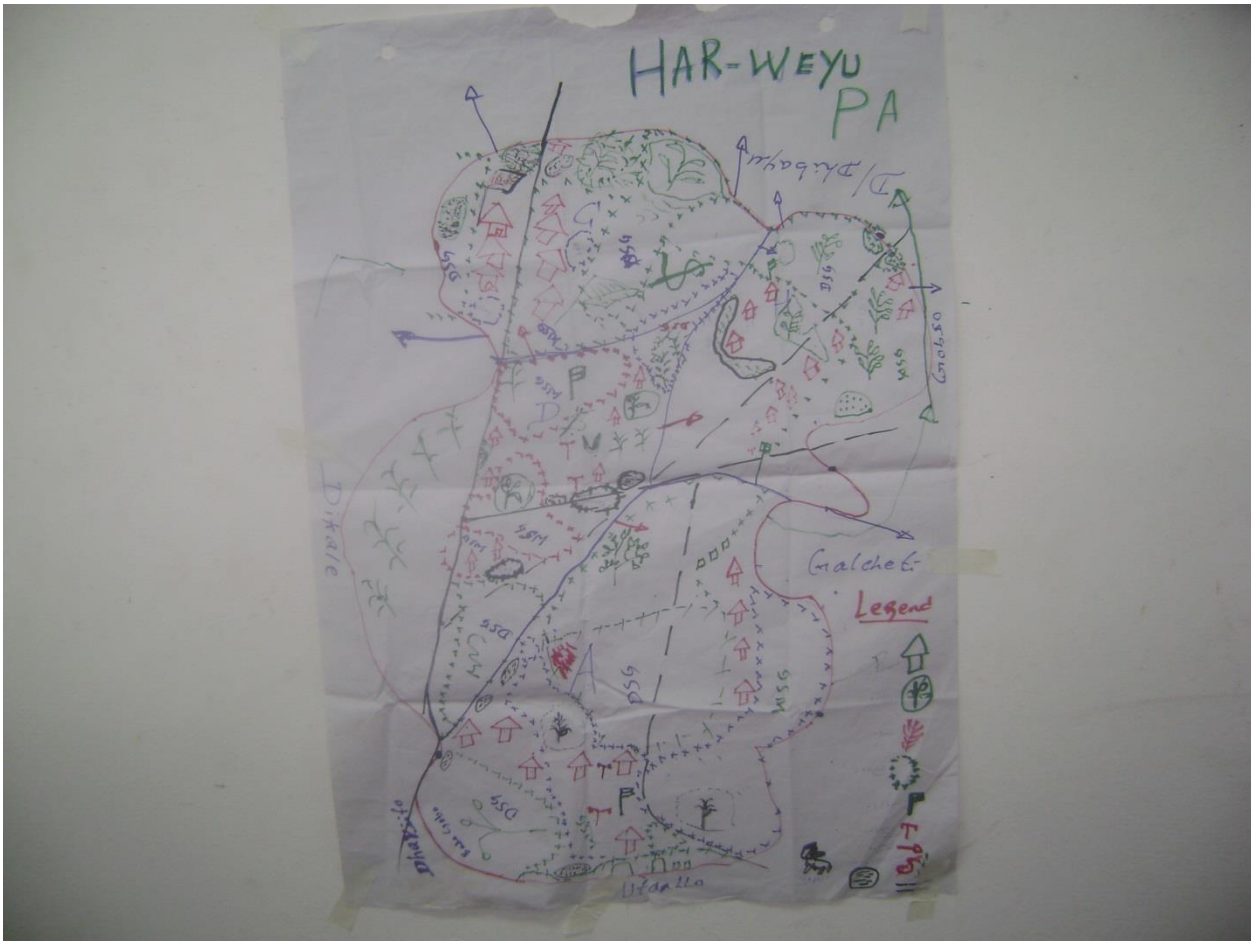

Figure C-1. Photo of the community sketch map for Harweyu.

Table C-1. Results from the wealth-ranking exercise for Harweyu.

Wealth Category (for households)	Characteristics	Percentage of the PA Population
Wealthy	≥ 100 cattle; ≥ 100 sheep and goats; ≥ 20 camels; ≥ 20 equines Other: house in town	10%
Middle	30 to 50 cattle; 40 to 70 sheep or goats; 10 camels; 4 to 7 donkeys	20%
Poor	10 to 20 cattle; 10 to 30 sheep or goats; 3 to 5 camels; 1 to 4 donkeys	28%
Poorest	≤ 5 cattle; 3 to 5 sheep or goats	42%

Table C-2. Historical timeline for Harweyu.

Gada Period	Major Events	Corresponding Impacts
Jaldesa Liban **(1960 - 1968)**	Record heavy rains flooded the area. Horse sickness (unknown) Sheep disease outbreak One short rainy season failed First vaccination campaign for Rinderpest Ethio-Somali war Abundant wildlife, specifically oryx and gazelle Power transfer in the *Gada* was not as smooth as usual. The recumbent *Aba Gada* was unwilling to transfer power to his successor. This brought tension between rival factions.	This time was splendid, with plentiful resources. Death of livestock Death of livestock Death of livestock Death of people. The war ended through government intervention and support
Goba Bule **(1968-1976)**	Very severe drought Vaccination for pastureulosis *(silisa)*, Foot and Mouth disease *(harka)*, and Contagious Bovine Pleuropneumonia *(sombesa)* Food relief started for the first time	Death of livestock
Jilo Aga **(1976- 1984)**	Drought War between Ethiopia and Somalia Bush encroachment started Rangeland burning was banned Wild bees swarmed everywhere SORDU began to provide services for pond construction and veterinary care ILCA studies began *Kalo* enclosures were first established Alcoholic drinks entered the area	Death of livestock and displacement of people Deaths of people; cattle rustling; forced migration Bush encroachment Increased livestock numbers

***Boru Guyo* (1984-1992)**	Severe, recurrent drought Ethnic conflicts Livestock disease outbreak due to *Tite Gurati* (Black flies) Human disease *(Birte, Garakasa)* Extensive deforestation began Initiation of cistern construction, grain storage, and hay making interventions by Care-Borena and ILCA Cultivation started Expansion of *kalo* enclosures	Death of livestock Death of people Death of livestock Death of people
***Boru Mada* (1992-2000)**	Drought Human disease outbreak (yellow fever) Restocking by NGOs started Cultivation expanded Hay making Slaughter of emaciated cattle during drought (for dried meat)	Death of livestock Death of people
***Liben Jaldessa*(2000-2008)**	Localized drought Ethnic conflict Imported feed for livestock	Death of livestock Forced human migration
***Guyo Goba* (2008 to the present)**	Drought Ethnic conflict Bush encroachment; no grass growth even at times of good rainfall Predator attacks on livestock (hyenas devoured large numbers of camels)	Death of livestock Forced migration Increase in unpalatable weeds

Table C-3. Perceived changes (relative scale) at Harweyu [changes scored as variation between the *Jaldesa Liben* era (JL, 1960-1968) versus that for the *Guyo Goba* era (GG, 2008 to the present)].

***Gada* Era →** **Feature ↓**	**JL**	**GB**	**JA**	**BG**	**BM**	**LJ**	**GG**
Grassland area	40	30	12	8	6	3	1
Bushland area	0	2	5	15	24	26	28
Cropland area	0	0	0	0	10	40	50
Bareland area	0	0	5	15	22	25	33
Settlements	3	5	10	15	20	22	25
Forested area	30	25	14	12	10	5	4
Cattle (no.)	5	10	15	20	10	15	25
Sheep (no.)	2	5	10	15	20	22	26
Goats (no.)	5	7	10	15	20	22	26
Camels (no.)	2	3	7	15	20	26	27
Poultry (no.)	0	0	0	0	0	40	60
Interventions by GOs/NGOs	1	8	10	15	20	22	24

Table C-4. Institutional landscape for Harweyu and notes on local service provision. Pair-wise ranking of 10 institutions. Where CISP= Comitato Internazionale per lo Svilippo dei Popoli; GOV = Ethiopian government; SAVE = Save the Children; AFD = Action for Development; and CARE = CARE-Ethiopia; SOS = SOS Sahel; GOAL, GAYO, HUNDE, and PANOS are proper organizational names. When an institution is noted in any given cell, it means that the institution was ranked higher than the paired institution in a head-to-head competition; competitors are indicated by row and column headings. The maximum score possible is 9 of 9 while the minimum score is 0 of 9. Ranks reflect many variables and do not necessarily imply variation in quality of service. Most of the institutions are involved in food security and natural resource management.

	CISP	**GOV**	**SAVE**	**GAYO**	**SOS**	**GOAL**	**PANOS**	**HUND**	**AFD**	**CARE**
CISP		GOV	CISP	GAYO	SOS	CISP	CISP	CISP	AFD	CARE
GOV			GOV	GOV	SOS	GOV	GOV	GOV	AFD	CARE
SAVE				GAYO	SOS	GOAL	SAVE	SAVE	AFD	CARE
GAYO					SOS	GAYO	GAYO	GAYO	AFD	AFD
SOS						SOS	SOS	SOS	AFD	CARE
GOAL							GOAL	GOAL	AFD	CARE
PANOS								HUND	AFD	CARE
HUND									AFD	CARE
AFD										AFD
CARE										

Summary: AFD = 9/9, CARE = 7/9, GOV = 6/9, SOS = 6/9, GAYO = 5/9, CISP = 3/9, GOAL = 3/9, SAVE = 2/9, HUND = 1/9, PANOS = 0/9

The Services Web:

Services that exist and are accessible: Primary school, human health center, veterinary clinic, water tanker, road

Services that exist but are not accessible (non-functional or dilapidated): One school has been built. Health clinic.

Services that do not exist but that are needed: Grain mill, small-scale irrigation, water pump, improved livestock breeds

Table C-5. Pair-wise ranking of 11 priority problems from the Harweyu PRA. The numbers indicating column heads (1, 2, …11) match the problems with the same numbers for the row heads. The maximum score in head-to-head comparisons is 10/10, while the minimum score is 0/10.

	Problem:	1	2	3	4	5	6	7	8	9	10	11	Score	Rank
1	**Bush encroachment**		1	1	1	1	1	1	1	1	1	1	10	1
2	**Grain milling**			3	4	5	6	7	8	9	10	11	0	11
3	**Marketing**				3	5	6	7	8	9	10	3	3	8
4	**Road infrastructure**					5	6	7	8	9	10	4	2	9
5	**Water shortage**						5	5	5	5	5	5	9	2
6	**Poverty**							7	6	6	10	6	6	4
7	**Livestock health**								7	9	10	7	4	7
8	**Predator attack**									9	10	8	6	6
9	**Livestock feed shortage**										10	9	8	3
10	**Human health**											10	6	5
11	**Livestock breed improvement**												1	10

Summary: Problems in order of priority: Bush encroachment (10/10), water shortage (9/10), livestock feed shortage (8/10), poverty (6/10), human health (6/10), predators (6/10), livestock health (4/10), marketing (3/10), roads (2/10), livestock breed improvement (1/10), grain milling (0/10).

Table C-6. Community action plan for Harweyu.

Problem ***(prioritized from highest at the top)***	**Actions**	**Resources Needed**	**Best Time to Begin**	**Participants**
NRM/bush encroachment	Bush thinning; fencing; Fire control	Tools, equipment; labor	Chamsa (May); Bufa (June); Amaji (January)	Community; GOs; NGOs
Water	Water harvesting; ponds; cisterns; hand water pumps	Labor; tools; food	Adolesa; Bufa (June); Watebegi; Camsa	Community; GOs; NGOs
Human health	Drug supply; skilled manpower; establish health posts at other two rera	Labor; equipment; drug supply	Birra; Camsa (May); Hagaya	Community; GOs; NGOs
Poverty	Trading; cultivation; livestock diversification	Capital; capacity building for the Cooperatives; improved seeds; fertilizers (organic/ inorganic); experts/ technicians	Now	Community; GOs; NGOs
Livestock health	---	Vaccinations; establish health posts at each rera	Now	Community; GOs; NGOs

Annex D: Denbala Bedana PRA Results

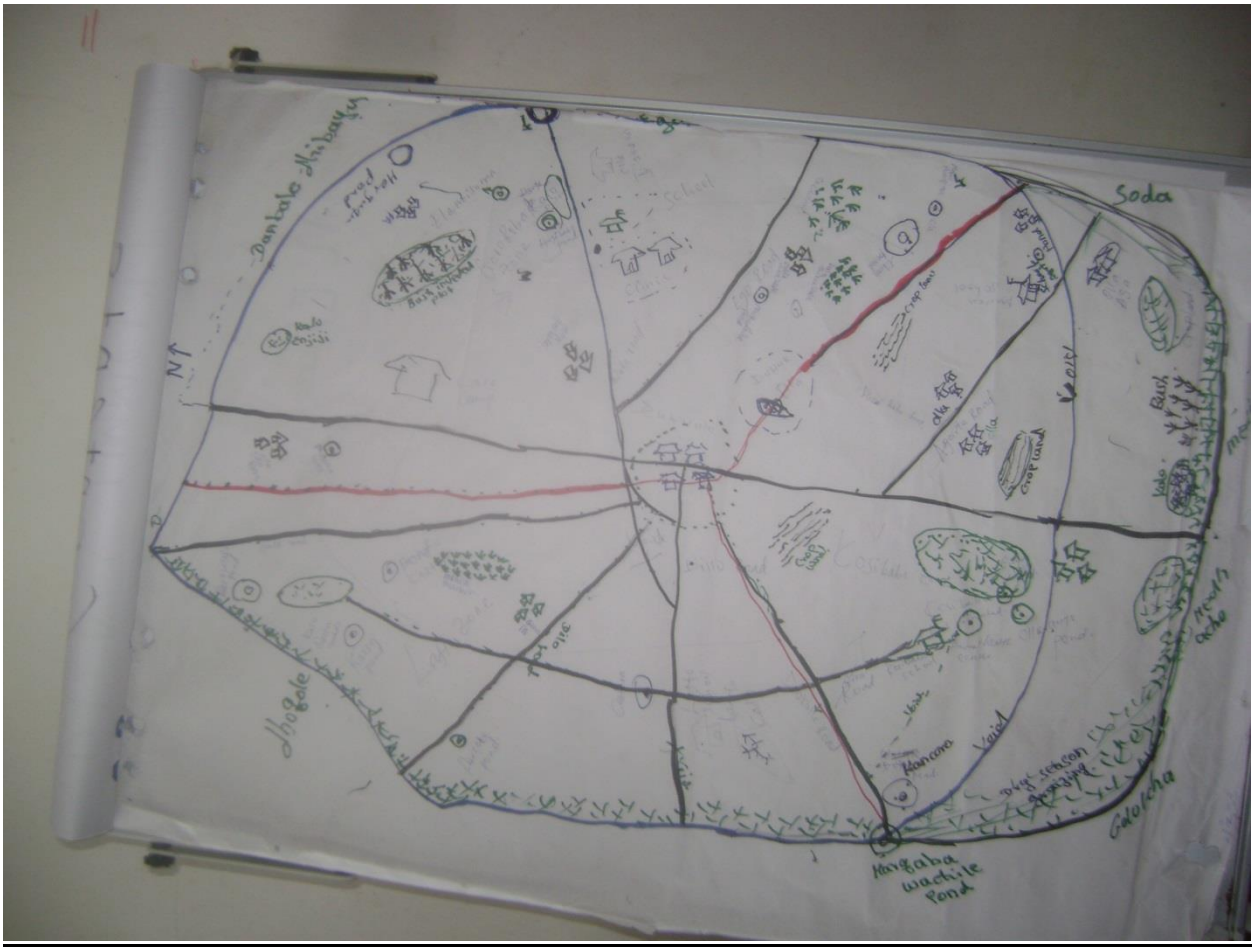

Figure D-1. Photo of the community sketch map for Denbala Bedana.

Table D-1. Results from the wealth-ranking exercise for Denbala Bedana.

Wealth Category (for households)	Characteristics	Percentage of the PA Population
Wealthy	≥ 100 cattle; ≥ 50 goats; ≥ 20 sheep; 10 to 20 camels; 5 donkeys; 1 mule; 1-3 horses Other: house in town (with 1 to 5 rooms); trading business	5%
Middle	50 to 100 cattle; 20 to 50 goats; 10 to 20 sheep; 5 to 10 camels; 1 to 2 donkeys Other: house in town (with 2 to 3 rooms); trading business	22%
Poor	10 cattle; 5 to 10 goats; 3 to 5 sheep	38%
Poorest	1 to 3 cattle; 1 to 5 sheep and goats	35%

Table D-2. Historical timeline for Denbala Bedana.

Gada Period	Major Events	Corresponding Impacts
Jaldesa Liban **(1960 - 1968)**	Ethio-Somali War Livestock and human numbers low High livestock productivity Violation of human rights and killing Burning the rangeland regularly, no hazard from ticks High prevalence of livestock diseases	This was a splendid time with plentiful resources. Death of livestock
Goba Bule **(1968-1976)**	Very severe drought Ethio-Somali war First ponds were constructed Harmful tradition called "RABA" was stopped Livestock vaccination and treatments began Education started Relief food available for the first time	Death of livestock
Jilo Aga **(1976- 1984)**	Drought Ethio-Somali war Bush encroachment started Burning was banned Young men migrated to Kenya to escape military service More schools constructed and education of children increased Tree planting/reforestation started Human and livestock disease outbreaks Trading increased Taxation started	Death of livestock Death of people; cattle rustling; forced migration

***Boru Guyo* (1984-1992)**	Severe, recurrent droughts Ethnic conflicts Livestock disease outbreak—*Tite Gurati* (Black flies) Alcohol entered the area Poor livestock market, weighing scales, and quota system on livestock enforced Thieves entered the area Marked changes in clothing styles Expansion of education Cultivation started Building houses in town started New disease outbreaks for goats Black leg disease for cattle	Death of livestock Death of people Death of livestock Violation of traditions started from alcohol
***Boru Mada* (1992-2000)**	Drought Education increased; encouragement to send female children to school Traditional well digging and well renovation Cistern construction House construction increased Increased need for health services Increased cultivation Bush encroachment increased; Decline in grass growth and land productivity Ethnic conflict increased Livestock market quota system ceased Government and traditional leadership started to work in harmony Livestock price improved	Death of livestock

***Liben Jaldessa*(2000-2008)**	Localized drought Ethnic conflict Increased access to education Improved livestock market; stabilized prices Increased livestock vaccination and treatment Increased road network Increased water availability Chat and local alcohol access increased Charcoal making increased Trading increased HIV/AIDS spread Loss of territory	Death of livestock Forced human migration
***Guyo Goba* (2008 to the present)**	Drought Ethnic conflict Bush encroachment, no grass growth even at times of good rain Chat and local alcohol prohibited to be sold and used. Increase in mobile phones Electricity supply increased *Aba Gada* received vehicle from government New settlement plan started Bush clearing, filling eroded gullies; construction of pit latrines, use of improved kitchens increased	Death of livestock Forced migration

Table D-3. Perceived changes (relative scale) at Denbala Bedana [changes scored as variation between the *Jaldesa Liben* era (JL, 1960-1968) versus that for the *Guyo Goba* era (GG, 2008 to the present)].

***Gada* Era →** **Feature ↓**	**JL**	**GB**	**JA**	**BG**	**BM**	**LJ**	**GG**
Grassland area	30	20	10	8	9	8	15
Bushland area	0	0	10	15	20	25	30
Cropland area	0	0	0	0	10	40	50
Bareland area	0	0	0	0	0	0	0
Settlements	5	8	10	12	15	23	27
Forested area	0	0	0	0	0	0	0
Cattle (no.)	10	13	12	15	20	12	18
Sheep (no.)	5	7	10	15	18	20	25
Goats (no.)	6	8	12	15	18	20	22
Camels (no.)	3	6	11	15	17	20	28
Poultry (no.)	0	0	5	15	20	25	35
Interventions by GOs/NGOs	0	0	5	8	22	25	40

Table D-4. Institutional landscape for Denbala Bedana and notes on local service provision. Pair-wise ranking of eight institutions. Where AFD = Action for Development; CARE = CARE-Ethiopia; OXF = Oxfam; SAVE = Save the Children; SOS = SOS-Sahel; HELP = Health, Education & Literacy Program; UNDP = United Nations Development Program; and GAYO is a proper organizational name. When an institution is noted in any given cell, it means that the institution was ranked higher than the other in a head-to-head competition; competitors are indicated by row and column headings. The maximum score possible is 7 of 7 while the minimum score is 0 of 7. Ranks reflect many variables and do not necessarily imply variation in the quality of service. Most of the institutions are involved in food security and natural resource management.

	GAYO	**AFD**	**CARE**	**OXF**	**SAVE**	**SOS**	**HELP**	**UNDP**
GAYO		GAYO	CARE	GAYO	GAYO	GAYO	GAYO	GAYO
AFD			CARE	AFD	AFD	AFD	AFD	AFD
CARE				CARE	CARE	CARE	CARE	CARE
OXF					OXF	OXF	OXF	OXF
SAVE						SOS	SAVE	UNDP
SOS							SOS	SOS
HELP								UNDP
UNDP								

Summary: CARE = 7/7, GAYO = 6/7, AFD = 5/7, OXF = 4/7, SOS = 3/7, UNDP = 2/7, SAVE = 1/7, HELP = 0/7

Note: Only HELP is currently active at Denbala Bedana.

The Services Web

Services that exist and are accessible: Water cisterns, traditional wells, ponds, school, water pump, cooperative.

Services that exist but are not accessible (non-functional): Underground cisterns, human health clinic, veterinary clinic, traditional wells need renovation.

Services that do not exist but that are needed: Human health, water pump, deep wells

Table D-5. Pair-wise ranking of 9 priority problems from the Denbala Bedana PRA. The numbers indicating column heads (1,2, …9) match the problems with the same numbers for the row heads. The maximum score in head-to-head comparisons is 9/9, while the minimum score is 0/9.

	Problem:	1	2	3	4	5	6	7	8	9	Score	Rank
1	Water shortages		1	1	1	1	1	1	1	1	8	1
2	Livestock health			3	4	5	2	2	2	2	4	5
3	Bush encroachment				4	5	3	3	8	3	5	4
4	Education					5	4	4	4	4	6	3
5	Human health						5	5	5	5	6	2
6	Re-stocking							6	8	6	2	7
7	Livestock feed shortage								8	9	0	9
8	Poverty									4	4	6
9	Marketing										1	8

Summary: Problems in order of priority: Water shortages (8/9), human health (6/9), education (6/9), bush encroachment (5/9), livestock health (4/9), poverty (4/9), re-stocking (2/9), marketing (1/9), livestock feed shortage (0/9)

Table D-6. Community action plan for Denbala Bedana.

Problem ***(prioritized from highest at the top)***	**Actions**	**Resources Needed**	**Best Time to Begin**	**Participants**
Water	Pond construction; cistern construction; traditional well renovation; hand pumps	Tools; equipment; money; Skilled man power Training	Now	Community; GOs; NGOs
Human health	Clinic health post; child and maternal care health extension	Trained manpower; tools; equipment; drugs;	Now	Community; GOs; NGOs
Education	Construction of school at the other cluster	Budget; teaching aids Teachers; water cistern	Now	Community; GOs; NGOs
Bush Clearing	Thinning bush	Tools; equipment; Manpower; budget	Now	Community; GOs; NGOs
Livestock Health	Vaccinations; establish health post at each rera	Budget; skilled manpower; drug supply; labor	Now	Community; GOs; NGOs
Poverty	Cooperatives; strengthen development activities led by the communities	Budget; tools; training	Now	Community; GOs; NGOs

Annex E: Medecho PRA Results

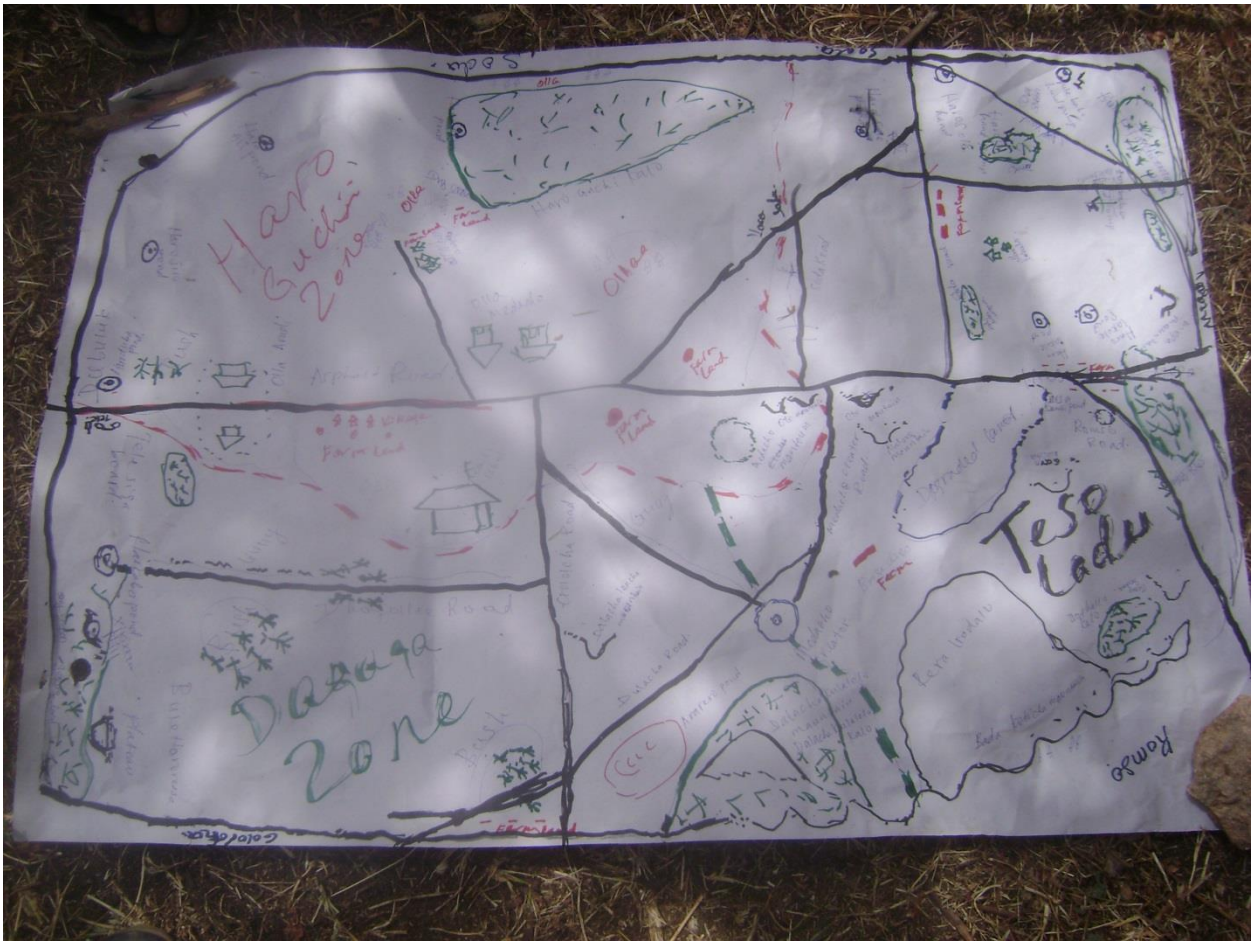

Figure E-1. Photo of the community sketch map for Medecho.

Table E-1. Results from the wealth-ranking exercise for Medecho.

Wealth Category (for households)	Characteristics	Percentage of the PA Population
Wealthy	≥ 100 cattle; ≥ 80 goats; ≥ 100 sheep; ≥ 25 camels; ≥ 2 mules, 4 donkeys; Other: house in town, money, trading business	7%
Middle	45 to 60 cattle; 40 to 50 goats; 50 to 70 sheep; 5 to 10 camels Other: trading business	30%
Poor	5 to 7 cattle; 10 to 18 goats; 1 to 2 camels Other: petty trading	42%
Poorest	1 to 2 cattle; 3 to 5 goats; 5 to 8 sheep	21%

Table E-2. Historical timeline for Medecho.

Gada Period	Major Events	Corresponding Impacts
Jaldesa Liban **(1960 - 1968)**	Ethio-Somali war Livestock and human numbers low High livestock productivity Violations of human rights and killing High prevalence of disease outbreaks including rinderpest, contagious caprine pleuro-pneumonia, and anthrax	Death, displacement, misery They recall this time as splendid, with plentiful resources Abundance of milk Death of people Huge livestock losses
Goba Bule **(1968-1976)**	Very severe drought Ethio-Somali war Good rainy season	Huge livestock losses Death, displacement, misery Time of recovery
Jilo Aga **(1976- 1984)**	Drought Ethio-Somali war Unusual predator attacks on people	Deaths of livestock Deaths of people, cattle rustling, forced migration
Boru Guyo **(1984-1992)**	Severe, recurrent droughts Ethnic conflicts Livestock disease outbreak—*Titi Gurati* (Black flies)	Death of livestock Death of people Deaths of livestock
Boru Mada **(1992-2000)**	Drought Ethnic conflict Camels introduced Huge outbreak of Foot and Mouth disease among livestock	Death of livestock Deaths of people, displacement, loss of property Decline in livestock productivity, livestock deaths
Liben Jaldessa**(2000-2008)**	Localized drought Ethnic conflict loss of territory Huge disease outbreaks for sheep and goats	Death of livestock Forced migration, loss of territory High mortality for sheep and goats
Guyo Goba **(2008 to the present)**	Drought Ethnic conflict Increase in mobile phones, electricity	Death of livestock Forced migration (relatively less than in the past)

Table E-3. Perceived changes (relative scale) at Medecho [changes scored as variation between the *Jaldesa Liben* era (JL, 1960-1968) versus that for the *Guyo Goba* era (GG, 2008 to the present)].

***Gada* Era →** **Feature ↓**	**JL**	**GB**	**JA**	**BG**	**BM**	**LJ**	**GG**
Grassland area	28	12	20	10	12	7	11
Bushland area	0	0	5	15	20	28	32
Cropland area	0	0	0	0	0	45	55
Bareland area	0	0	0	0	0	0	0
Settlements	5	8	10	12	18	20	27
Forested area	32	28	25	10	3	1	1
Cattle (no.)	8	10	14	12	14	14	13
Sheep (no.)	3	5	8	12	14	26	32
Goats (no.)	3	5	8	12	14	26	32
Camels (no.)	2	5	10	15	20	22	26
Poultry (no.)	0	0	0	0	20	30	50
Interventions by GOs/NGOs	2	6	8	15	18	23	26

Table E-4. Institutional landscape for Medecho and notes on local service provision. Pair-wise ranking of six institutions. Where AG = Agriservice; CARE = CARE-Ethiopia; AFD = Action for Development; SOS = SOS-Sahel; UNDP = United Nations Development Program; and GAYO is a proper organizational name. When an institution is noted in any given cell, it means that the institution was ranked higher than the other in a head-to-head competition; competitors are indicated by row and column headings. The maximum score possible is 5 of 5 while the minimum score is 0 of 5. Ranks reflect many variables and do not necessarily imply variation in the quality of service. Most of the institutions are involved in food security and natural resource management.

	AG	**CARE**	**GAYO**	**AFD**	**SOS**	**UNDP**
AG		CARE	AG	AFD	AG	UNDP
CARE			CARE	CARE	CARE	CARE
GAYO				AFD	GAYO	GAYO
AFD					AFD	AFD
SOS						UNDP
UNDP						

Summary: CARE = 5/5, AFD = 4/5, AG = 2/5, GAYO = 2/5, UNDP = 2/5, and SOS = 0/5.

Note: The only NGO currently working in Medecho is Agriservice (AG)

Services Web

Services that exist and that are accessible: Primary school, human health clinic, veterinary clinic, underground cistern, traditional wells, roads, ponds

Services that exist but that are inaccessible (non-functional): Hand pump, underground cistern, traditional wells and ponds require renovation.

Services that do not exist but that are needed: Tap water, upgrading the school, imporved access road to water point at Medecho crater.

Table E-5. Pair-wise ranking of 10 priority problems from the Medecho PRA. The numbers indicating column heads (1, 2, …10) match the problems with the same numbers for the row heads. The maximum score in head-to-head comparisons is 10/10, while the minimum score is 0/10.

	Problem:	1	2	3	4	5	6	7	8	9	10	Score	Rank
1	Water shortage		1	1	1	1	1	1	1	1	1	10	1
2	Road infrastructure			2	2	2	2	2	2	2	2	8	2
3	Bush encroachment				4	5	6	7	8	9	10	0	10
4	Education					4	4	4	4	4	4	7	3
5	Poverty						5	5	8	9	10	2	8
6	Re-stocking							7	8	9	10	1	9
7	Livestock health								8	9	7	3	6
8	Cooperative function									9	8	5	5
9	Natural resource management										9	5	4
10	Marketing											3	7

Summary: Problems in order of priority: Water shortages (10/10), road infrastructure (8/10), education (7/10), natural resource management (5/10), cooperative function (5/10), livestock health (3/10), marketing (3/10), poverty (2/10), re-stocking (1/10), bush encroachment (0/10)

Table E-6. Community action plan for Medecho.

Problem ***(prioritized from highest at the top)***	**Actions**	**Resources Needed**	**Best Time to Begin**	**Participants**
Water	Ponds; cisterns; shallow-well construction	Equipment; tools; labor; budget	Dry season	Community; GOs; NGOs
Infrastructure	Access road to water point maintenance	Equipment; labor; budget; skilled manpower	Next rainy season	Community; GOs; NGOs
Education	Upgrading existing school; establishing non-formal education center; Residence for teachers; Teaching aids, chairs, library	Building materials; labor; skilled personnel; budget	Next rainy season	Community; GOs; NGOs
Natural Resource Management	Soil/water conservation; terraces; tree-planting; enclosure management; bush clearing	Labor; tools; training budget; skilled manpower	Immediately	Community; GOs; NGOs
Cooperatives	Establish cooperatives; seed funds; savings safe box	Training; budget; credit	Immediately	Community; GOs; NGOs
Livestock Health	Establish veterinary post; drug supply; vaccinations and treatments	Budget; equipment; Labor; technicians; vaccines	Immediately	Community; GOs; NGOs