WATER IN BORANA ETHIOPIA:

A study of the development, use and maintenance of water sources in the rural areas of Borana Zone

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Finally, the author apologises if the findings do not accurately or fully reflect the detail and quality of the information that was so freely and willingly provided.

Acronyms

AAH	Action Against Hunger
EU	European Union
ETB	Ethiopian Birr
FGD	Focus group discussion
GTP	Growth and Transformation Plan of the Government of Ethiopia
IWD	Innovations in Water Development project
Km	Kilometres
m	Metres
m^3	Cubic metres
mm	Millimetres
MJ	Mega-joules
NGO	Non-governmental organisation
OSHO	Oromo Self-Help Organisation
PRA	Participatory rural appraisal
RESET II	RESilience building and creation of economic opportunities in ETHiopia (RESET II) Project
Sq km	Square kilometres
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
US$	United States Dollar
WMC	Water Management Committee

Executive Summary

The main purpose of the RESET II project is to increase the resilience capacity of vulnerable communities, including through improved access to basic services, and in this way address the root causes of displacement and irregular migration. This study in Borana is funded under Expected Result 4: Enhanced research and knowledge management systems established, and its purpose is to: review the development, use and maintenance of traditional and modern water sources in rural areas and make gender-specific recommendations for improvements. The study is therefore expected to contribute to a better understanding of how water development, a basic service, can play a role in building resilience.

The study took place between November 7 and December 3, 2018 and included: a literature review; participatory fieldwork; and a validation process. The fieldwork included eight purposively sampled rural locations – 4 agro-pastoral and 4 pastoral communities – where focus group discussions were held, followed by meetings with key informants at community, *kebele, woreda* and zonal levels. In total, the team met 419 people: 170 women and 249 men.

The literature recognises Borana as part of Ethiopia's pastoral lowlands located in central southern Ethiopia, on the border with Kenya. Rainfall is erratic and variable and reflected in vegetation type. Unable to depend on annual cropping, the Borana have developed an efficient extensive livestock production system that includes mixed herds of cattle, camels, sheep and goats, and equines. The result of changes in the modern times, the rangelands that support the livestock are increasingly degraded and perhaps half of the grasslands have been lost to woody and less productive scrub and bush. This has impacted on livestock productivity that in turn has undermined the resilience of the Borana community.

Borana social systems are complex and men and women are members of a number of different customary institutions, some of which can be traced back more than 500 years. In more contemporary times, customary institutions have been overlooked and deliberately marginalised by Government. In a recent development, the Borana elders have reasserted their influence through the rejection of a *kebele*-based land administrative system, in favour of a customary-based system that they hope will enable them to address issues of poor land management and return the rangelands to their once pristine condition.

Inhabiting the semi-arid lowlands, the Borana recognise that 'water is life' and over their 400-year association with the Borana rangelands they have developed complex water management systems. These systems ensure equitable access for the livestock of all Borana households. Water sources can be divided into surface and groundwater, with people and livestock typically transitioning from seasonal surface water sources in the wet season, to permanent groundwater sources in the long dry season.

Surface water sources include seasonal runoff that is harvested in shallow depressions and water courses, small and large ponds and rainwater harvesting systems. While widely used in season, surface water from ground catchments carries risks of faecal contamination and associated illnesses. Such risks are much reduced when households switch to accessing water from groundwater sources in the dry season, including traditional shallow and deep wells, handpumps and shallow boreholes and motorized and deep boreholes.

Management of different water sources varies with the most complex systems associated with traditional wells, in particular the nine *ela tula* or deep well complexes found on the central plains. The management of these well complexes is well documented in the literature. Each well is owned and managed by a clan representative responsible for day-to-day management including use, routine cleaning, maintenance and coordinating labour for more major repairs. While women collect water on a daily basis, cattle are watered on a strict three-day rotation, in order that all are watered equitably. This requires high levels of cooperation and organisation that researchers suggest provides the foundation for the Borana's complex social systems.

The importance of water in Ethiopia's pastoral areas is widely appreciated by Government and international development actors, and the Borana have attracted considerable investment in the water

sector over more than 50 years. Much of this investment has been positive and resulted in improved health and wellbeing outcomes, notably improved safety, the result of improved access to deep wells and considerable time-savings for women. Studies however confirm a range of problems associated with poor installation, maintenance and repair and an estimated 20 per cent of water schemes in Borana are non-functional at any one time. Furthermore, the failure of Government and international development actors to consult and collaborate with customary livestock management institutions has resulted in disruption to centuries old grazing patterns that has led to over-grazing, rangeland degradation and declining livestock productivity. The literature suggests this disruption has at times been deliberate as local Government extension staff promote cropping and agriculture over mobile livestock production systems.

The water sector in rural Ethiopia is heavily dependent on investment from the regions, *woredas* and international development actors as the federal Government commits just 9 per cent of its total budget to the sector. International development actors provide more than 30 per cent of the overall investment and it is this funding that is driving technical innovation, documentation and wider learning around outcomes. International actors within the wider Horn of Africa region have produced a series of evidence-based good practice guidelines. Unfortunately, there is little evidence to suggest that these guidelines are routinely used by all stakeholders in Borana with the result that investment continues to be piecemeal and poorly coordinated. This problem is exacerbated by the limited resources available to the zonal Water Office.

During the field work, the study team used participatory rural appraisal methods and techniques to ensure inclusivity. These included: resource mapping supported by transect walks; historical water timelines to provide information on the development of different water sources over time; and profiles of individual water sources to understand use by people and livestock, and community contributions for development and major repairs. The field work confirmed that communities continue to mobilise significant local resources of up to US$ 7,000/ month for the development of new and repair of old *ela adadi* or shallow wells. Such findings dispel notions of pastoral dependency syndromes.

The study team organised focus group discussions in a purposive sample of four agro-pastoral and four pastoral communities. In each, separate discussions were held with women and men, with water for domestic purposes as a primary focus for the women's groups and water for livestock as the primary focus for the men's groups. Summary findings are presented here.

Summary findings from the women's groups:

- Over the last 30 years, the majority of communities have benefited from investment that has improved access to water, including from a combination of different surface and groundwater sources. The respective importance of different water sources varies according to levels of breakdowns. The result of this investment is that local Government is unable to maintain all water points at all times and this is unlikely to change.
- Water availability is ranked as important, but surprisingly perhaps, water quality was ranked as the most important outcome from investment in water resource development. This is attributed to the improved health outcomes and reduced levels of illness associated with investment in groundwater sources.
- As a result of the investment, time-savings for women in the dry season were estimated to average 2.45 and 4.25hrs/ day for agro-pastoral and pastoral women respectively.
- The women prioritised further investment in the rehabilitation and improvement of traditional wells, more motorized pumps, and improved routine maintenance of pumps to reduce the number of breakdowns. In addition, recommended managerial improvements included the appointment of customary water managers to oversee all schemes and a return to traditional management practices including penalties for misuse.

Summary findings from the men's groups:

- Livestock are less dependent on water from traditional water sources than they were 30 years ago as they can also be watered at large ponds and at motorized pumps. It was however noted that the silting of ponds is a perennial problem and that over time, ponds become less viable.

- Such is the number and complexity of water provision, it is no longer possible for local government to routinely maintain and repair all water points with the result that breakdowns and failures are inevitable. With the current level of funding, it is unlikely that this problem will be addressed in the near or medium-term.
- As a result of the problems associated with motorized pumps, the men's groups ranked traditional *ela adadi* and *ela tula* as the most important water sources for livestock in Borana.
- The importance of the provision of clean water for livestock is widely recognised and elders value the provision of clean water for improved livestock growth rates and fattening.
- While recognising multiple benefits from water resource development, pastoral elders recognise that the installation of large volume motorized pumps has had a detrimental impact on seasonal grazing, land management, and rangeland and livestock productivity.
- Men in the different agro-pastoral and pastoral groups identified different technical and managerial problems for improved water outcomes. The agro-pastoral men's groups prioritised investment in motorized pumps while the pastoral men prioritised traditional wells for additional investment: holding tanks, livestock troughs and access points to improve safety for people involved in water lifting. There was complete agreement however that customary water managers should be appointed to all water sources and that traditional governance systems be reintroduced to ensure appropriate use.
- Finally, both agro-pastoral and pastoral men's groups confirmed that their capacity to address both technical and managerial challenges associated with the provision of water for livestock was compromised by increasing engagement of local Government in technical and managerial decisions and that this has helped to undermine customary systems .

Informed by these findings, the report offers detailed conclusions and recommendations. Here however, only the recommendations are presented and are structured by surface water sources, groundwater sources and more general water recommendations, sub-divided into different technologies. The main report also contains a small number of generic recommendations that promote resilience in the wider context.

Surface water sources: Ponds

1. It is recommended that international development actors de-prioritise investment in large ponds and instead restrict investment to small ponds in remote, wet season grazing areas where they may help extend seasonal grazing by one or two months. In this way, they may ease livestock concentrations and associated rangeland degradation in other areas.

   It is however recommended any such investment should only be considered where: *dheeda* (landscape level rangeland management institutions) are functional and consulted and *dheeda* elders are able to ensure appropriate use, management and maintenance; and communities agree to fence ponds to prevent cattle from accessing and contaminating the water and ensure that they are watered in simple clay watering troughs at one side of the pond, as was the traditional practice.

   It is recommended that consideration be given to decommissioning livestock ponds that are associated with disruption of sustainable livestock systems. To do this, it is recommended that international development actors commission collaborative studies with *jarsa dheeda* (*dheeda* elders) to identify which ponds are appropriately and which inappropriately sited. Such studies may also identify that improvements can be made to settlement patterns and land-use.

2. It is recommended that the zonal Water Office and international development actors collaborate to produce guidance on the use of pond water, including recommended water treatment guidance to improve health outcomes.

3. It is recommended that international development actors fund a pilot to test the appropriateness and acceptance of ox-drawn earth scoops for desilting ponds, as an alternative to mobilising community labour.

Surface Water Sources: Rainwater harvesting systems

4. It is recommended that every opportunity is taken to invest in the development of rainwater harvesting systems at schools and health posts, provided it can be ensured the harvested water is routinely shared with children/ patients in particular women and girls, and not simply 'captured' by male teachers and medical staff. In the event such guarantees are not possible, it is recommended that such investment be deprioritised.

5. It is recommended that in remote locations where access to groundwater is limited, ground catchments and cisterns are prioritized only for water for human consumption. Where possible they may be constructed near ponds which can then be used for livestock drinking purposes only. All such investments however should be subject to discussions with *dheeda* institutions. Priority should be given to those areas where women are routinely required to walk more than two hours a day to collect water.

6. It is recommended that where such investment is considered, agreement with the community is reached ahead of construction that open defecation is prohibited in the catchment.

7. It is recommended that harvested water in cisterns is routinely treated according to good practice guidelines to improve health outcomes.

Groundwater sources: Wells – *ela adadi* and *ela tula*

8. It is recommended that international development actors collaborate with the zonal Water Office to update and annotate the 1970s map of *ela adadi* and *ela tula*, including clan ownership. It is also recommended that development actors ensure that appropriate documentation and video footage is made available to local, regional and national pastoral learning platforms, archives and museums.

9. It is recommended that international development actors continue to support Borana clans to rehabilitate and improve *ela*, specifically: platforms that *totuu* or water lifters can safely stand on while working; reinforced concrete holding tanks and livestock troughs; and widening and deepening the access pathways to improve access and reduce the number of *totuu* required to lift water. Such investment should be done on a strict rotational basis with each clan receiving assistance in turn.

   It is also recommended that discussions with clans should ensure that they have the right to determine investment priorities: which *ela* in which location will be improved and requiring what type and level of assistance. In contrast, it is recommended that development actors do not support clans to undertake routine maintenance and repairs, as they have the capacity to do this themselves.

10. It is recommended that international development actors establish a monitoring system to record accidents, in a sample of *ela adadi* and *ela tula*, over one or two years, with a view to better understand levels of risk. Such information may help inform discussions with clans around investment priorities. Such a monitoring system might be done with the support of a university and an MSc student.

Groundwater Sources: Hand pumps

11. It is recommended that international development actors cooperate with the zonal Water Office to establish a monitoring system that routinely collects and analyses information on the functionality of hand pumps. Information could be submitted by community representatives using mobile phones. This information collected over 12 months would help inform investment choices: makes; installation; maintenance; repairs; the provision of spare parts – possibly including an expanded role of the private sector; training and equipping of technicians; and roles and responsibilities of community members.

It is also recommended that consideration be given to equipping one or more local NGOs to establish a specialist capacity in hand pump maintenance and repair in order to improve functionality.

12. It is recommended that 50 per cent of all community operators and technicians who are trained in future are women and that they are selected by *marro* (women's) institutions in the locality. In this way, women will be empowered to maintain and repair community hand pumps and play a more active and central role in improving functionality.

13. It is recommended that international development actors and the zonal Water Office undertake a pilot to explore alternatives to Water Management Committees, through participatory discussions with *jarsa olla* (village elders) and *marro*. For example, it might be possible to test the use of a locally appointed *Abba Heregae* or indeed a woman *Heregae* to be responsible for use, maintenance and repair of individual hand pumps. As part of the pilot, it might be possible to install a hand pump for an individual clan and in this way test their capacity to improve the management of hand pumps.

Groundwater Sources: Motorized pumps

14. It is recommended that international development actors, perhaps supported by CARE and its RESET II partners, identify two or three pilot *dheeda* in which motorized pumps have been installed and undertake detailed benefit-cost assessments in order to understand better the medium and longer-term implications of this choice of technology.

    It is recommended that working with the *jarsa dheeda* and *marro* institutions efforts are made to address cost-related issues, including, as appropriate decommissioning, re-locating – although it is recognised that this will involve considerable additional costs – or regulating the use of motorized pumps in order that sustainable livestock grazing systems can be re-established, and rangeland degradation is arrested and reversed.

15. On a similar pilot basis, it is recommended that responsibility for day-to-day management of one or two motorized pumps is temporarily passed to the *jarsa dheeda* and *marro* representatives in order to be brought within the jurisdiction of customary institutions and management systems. As appropriate, the *jarsa dheeda* and *marro* representatives might be supported to appoint an *Abba Heregae* to manage the livestock watering rota with local herders for a trial period. Such pilots should be closely monitored and appropriately and fully documented and reported on. Based on the findings, decisions could be be made regarding the scaling-up of promising approaches.

16. It is recommended that no new motorized pumps are installed without *dheeda-level* discussions and approval by elders and senior *marro* representatives. It is also recommended that ahead of any such investment *dheeda* representatives are required to produce detailed use, management and maintenance plans and grazing management plans that detail exactly how huge influxes of livestock from the surrounding area will be prevented. These plans could be developed by the *dheeda* representatives with the support of NGO monitoring and evaluation staff.

17. It is recommended that new motorized pumps are solar-powered and that over time diesel-powered pumps are replaced with solar pumps through innovative cost recovery schemes, rather than distributed free. As it can be expected that such upgrades will result in significant savings in future operation and maintenance costs, it should be possible for benefiting *dheeda* or communities to invest revenue from the pumps in improved site management, more timely maintenance and eventual replacement.

General Water Recommendations

18. It is recommended that international development actors pilot the phased reintroduction of customary water management systems including the appointment of *Abba Heregae* across a range of water sources. Recognising that customary institutions themselves are not static but continue to evolve and develop over time, it may be possible to appoint a woman *Heregae* at pilot sites where

women collecting water for domestic use are the primary users. Based on the documented outcomes of these pilots, it may be that international development agencies could support the emergence of more appropriate and sustainable water management systems that strengthen as opposed to undermining customary institutions and leadership.

19. It is recommended that international development actors take a more collaborative approach to water resource development in Borana, with a shift in emphasis from donor requirements to local needs and priorities in the context of improved resilience and better natural resource management. As part of future such collaboration it is recommended that all development actors come together to agree a minimum community contribution. This could be set for example between 35 – 50 per cent of all costs and in this way, communities become partners in development as opposed to recipients of development.

20. It is recommended that Borana zone establish a Water Task Force that among other things sets realistic targets on the proximity of water points. While recognizing the Task Force must be allowed to set its own targets, it is suggested that the initial target for women from sedentary households be no more than 2 hours a day or 8kms to and from the primary water source. Setting targets however for pastoral women is more challenging as these households routinely move between different seasonal grazing areas and hence the distance to and from water varies seasonally.

21. It is recommended the Water Task Force supports wider studies related to water, including a water and sustainable grazing systems study in partnership with one or more *dheeda.* The primary purpose of such a study would be to: map trends in rangeland productivity, identify good and innovative practices that can be taken to scale, and identify appropriate institutions and approaches to arrest and reverse rangeland degradation. Among other issues, the Task Force will need to address: the proliferation of water points and settlements; loss of livestock mobility; spread of dryland farming into prime grazing areas; and deterioration of rangeland and forest resources. The findings of such a study would support the water sector to re-align current ways of working, for improved resilience outcomes.

1 Introduction

This water resources management study was commissioned by CARE Ethiopia as part of the European Union (EU) funded RESilience building and creation of economic opportunities in ETHiopia (RESET II) project implemented by CARE Ethiopia in partnership with Action Against Hunger (AAH) and Oromo Self-Help Organisation (OSHO). The RESET II project's Overall Objective is: 'to address the root causes of displacement and irregular migration in Borana Zone, Oromia Region through the creation of economic opportunities and increased resilience capacity of vulnerable communities'. The Specific Objectives are: 'to increase access to basic services, promote resilient livelihoods and diversify economic opportunities for women, youth and communities who are vulnerable to human-induced and natural disaster in drought prone and food insecure woredas in Borana Zone'. The RESET II project was launched in October 2016 and will continue to March 2020.[1]

The need for this study was identified by the CARE RESET II team in response to changes in management of key water resources due to increasing human and livestock populations and shifting use and maintenance responsibilities. The purpose of the study is: *to review the development, use and maintenance of traditional and modern water sources in rural and urban contexts and make gender-specific recommendations for improvements.*[2]

The study's specific objectives are to*:*

- Map existing and planned water sources: surface water, ponds, shallow and deep wells including those fitted with hand and motorized pumps and rainwater harvesting systems;
- Explore water demand and supply issues for rural and urban areas, including strengths and weaknesses of government and non-government water resource investments;
- Review the roles and responsibilities of men and boys, women and girls in water development, management and use in rural and urban areas;
- Recommend improvements to water system management in rural and urban contexts.

The study is funded under Expected Result 4: Enhanced research and knowledge management systems established by targeted Government and non-governmental organisation (NGO) partners in Borana Zone by mid-2020.[3] The terms of reference are presented in Annex 1 and a detailed itinerary presented in Annex 2.

The study was carried out at a time of unprecedented change in Ethiopia. While political processes can be expected to continue to evolve and change in the coming months and perhaps even years, it does appear there are genuine opportunities for discourse that were previously not possible. In addition, it seems there are also new openings for women in senior positions - for example, the President and the Head of the Electoral Commission are now women, and for the first time the Council of Ministers is gender-balanced. This openness to new forms of political discourse does not yet appear to have reached the pastoral areas of Ethiopia but it may be that it could, in particular if international development actors engage with the new leadership.

[1] CARE Nederland. (2016). Completed grant application: RESilience building and creation of economic opportunities in Ethiopia (RESET II). Funded by the European Union Emergency Trust Fund for Africa. Reference: T05 – EUTF – HoA – ET – 01 (CfP)
[2] RESET II Terms of Reference for Contract to Conduct an Investigative Research Study
[3] Ibid

2 Methodology

The water resources management study took place from November 7 to December 3, 2018 and was based on a literature review, fieldwork and a validation process. The fieldwork was carried out in Borana zone from November 12 to November 26, 2018 at eight purposively sampled locations – four agro-pastoral and four pastoral communities[4] – and meetings with key informants at zonal, *woreda*, *kebele* and community level. In total, the team met 419 people: 170 women and 249 men.[5]The validation process involved a presentation to CARE staff in Addis Ababa followed by feedback and discussion. The detailed methodology is presented in Annex 3.

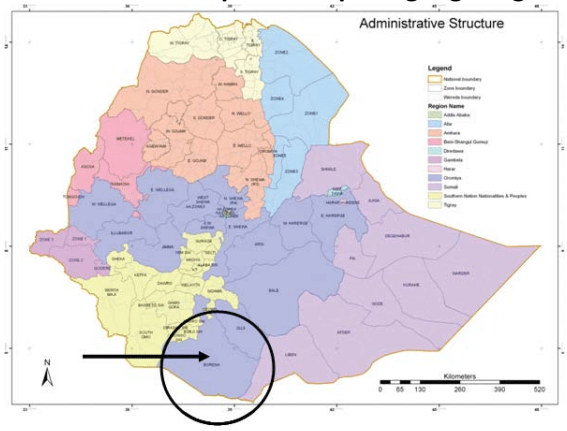
3 Literature Review

This section of the report presents the findings of a review of the available literature on water resources management in Borana zone.

3.1 Borana administrative zone

Borana is one of 19 administrative zones in Oromia region[6] and located 550kms south of Addis Ababa on the border with Kenya and sub-divided into 13 administrative units or *woredas.* The zone is named after the majority ethnic group that has occupied the area since the mid 16th century[7] and today numbers more than 770,000.[8] [9] With a population growth rate of 2.5-3.0 per cent per annum[10], it is estimated that the zonal population will double by 2045.

Figure 1: Administrative map of Ethiopia highlighting Borana zone



3.2 Borana ecology and pastoralism

Borana zone is part of the Ethiopia's pastoral lowlands that occupy 60 per cent of the nation's landmass.[11] Rainfall reflects altitude – 700mm in the more mountainous north-west and 500mm in

[4] The study used the standard definition of livelihood zones (see USAID 2018). However, as a result of conflict in Moyale at the time of the study, focus groups were organised in only two of the five livelihood zones: a) southern agro-pastoral and market-isolated cattle and shoats; and b) Borana-Guji cattle pastoral.

[5] Mobilization was the same for men and women, but women focus groups were less well attended. The women said this was the result of household duties including the collection of water .

[6] Oromia region also includes three special zones which are large urban areas: Adama, Jimma and Dire Dawa

[7] Homann, 2005.

[8] Central Statistics Agency, 2016. The zonal population fell from more than a million, following the creation of West Guji that included a number of highland *woredas* formerly part of Borana zone.

[9] Other ethnic groups resident in Borana zone include the Amhara, Burji, Gabbra and Somali.

[10] Homann, 2005.

[11] FAO, undated.

lowland border area[12] – and is bi-modal: the spring *ganna* rains account for 60 per cent, while the shorter and more erratic autumn *haggaya* rains account for the balance. Rainfall is variable and erratic and drought not uncommon[13] and this is reflected in the vegetation which is a rich mixture of open grasslands, perennial herbaceous and woody vegetation.[14] To utilize this spatially and temporally variable vegetation effectively requires the management of mixed herds – cattle and sheep for the grasslands and goats and camels for the woody species[15] – that are mobile and moved between wet and dry season grazing areas and drought reserves when the rain fails.[16]

In recent years, there have been profound changes in livestock management systems as a result of a range of factors. These include changes in settlement patterns, land alienation, rangeland fragmentation and enclosure[17] [18], and the ban on grassland burning.[19] Many of these changes, initiated or supported by Government, have resulted in the concentration of livestock in smaller grazing areas[20], leading to the out-competing of grass species by aggressive woody species: *Acacia drepanolobium, Albiza amare, Acacia horrida* and *Acacia mellifera*. By the mid-1990s, an estimated 40 per cent of grazing lands were degraded.[21] This trend has continued, and in some areas more than 50 per cent of the grazing is degraded today.[22] In response, the Government and development actors have routinely supported rangeland rehabilitation and resilience interventions.[23]

Historically, the Borana were cattle pastoralists and were categorized by household cattle numbers: *dega* or poor with fewer than five cattle; *offi-danda'a* or just sufficient with five to ten cattle; and *duressa* or rich with ten cattle or more.[24] Cattle were managed in two herds: the *warra* or milking animals herded close to the homestead and the *foora* or breeding animals herded more remotely and able to access higher quality forage.[25] The Borana were among the most successful producers in East Africa with higher levels of profitability[26] and 60 per cent more edible energy/ ha/ year than commercial Kenyan ranches under the same ecological conditions.[27] Boran bulls have been exported for breeding to Australia, Kenya, Mexico and the USA.[28] [29]

The result of rangeland degradation, population growth, drought, conflict and other socio-economic factors, cattle are increasingly owned by the rich. Richer households have also diversified their herds to include camels and goats that feed on more drought tolerant shrubs and trees.[30] [31] [32] The

[12] Ibid.
[13] Op. cit.
[14] Pratt et. al., 1977.
[15] Oral history suggests that the Borana acquired camels from their Somali neighbours in the *Gedaa* Abay Baba Hure (more than 550 years ago), while numbers remained small until relatively recently. Camels have however been used for transport only since 2000.
[16] Wasonga, 2016.
[17] Napier, et. al., 2011
[18] Elias, 2015
[19] Controlled burning was a routine rangeland management practice that was integrated into herd movements and used to 'accelerate the regeneration of most valuable forage grasses and to clear the area of parasites and woody species, in order to provide high quality pastures for rapid recovery after the dry season'. Homann et al., 2004.
[20] Virtanen, et. al., 2011.
[21] Coppock, 1994.
[22] Homann et al., 2004.
[23] Napier, et. al., 2011.
[24] Anbacha et. al., 2018.
[25] Lind et.al., 2016.
[26] Including the sale of male cattle for draught oxen to Ethiopian smallholder farmers in the highlands and, in more recent times, for live animal export to the Middle East.
[27] Cossins et. al., 1985.
[28] Homann, 2005.
[29] Improved Ethiopian Boran cattle reach body weights of 850kg. Rege, 1999.
[30] Coppock, 1994.
[31] Simachew et. al., 2010.

remainder, perhaps as many as 80 per cent of all households, are poorer today than they were two or three decades ago.[33] Many have no livestock at all and they are forced to engage in other activities: dryland cereal production, poultry production, livestock and petty trading and the collection and sale of forest products.[34] [35] [36] [37] Many of the subsistence activities of poorer households are ecologically unsustainable[38] and increasing numbers of young people migrate to neighbouring countries.[39]

3.3 Customary social systems

The *Abba gedaa* or 'three fathers' is the apex customary institution in Borana and is appointed on an eight-year rotation, to be responsible for the well-being of the Borana community.[40] [41] Oral tradition can trace the *gedaa* to the mid-15th century.[42] Borana social structures are complex and men are members of: a *luuba* or generation-grade; *sabo* or *gona* moieties; *hariya* or age-sets that define ritual roles and responsibilities;[43] and a *goosa* or clan.[44] The Borana are also organised spatially: several *warra* or households form an *ola* or village, while clusters of *ola* form *ardaa* or a neighbourhood[45]. Grazing units are similarly organised, with *re-era* or smaller grazing units of the *ardaa* clustered into nine landscape level units known as *dheedaa*. Grazing in the area immediately around permanent water points is known as *madaa.*[46] At each level, units are governed by rules and regulations that ensure effective co-ordination and use.[47]

Women are members of *marro* or literally a 'go around' institution, that ensures they are supported in times of need. Networks are both local and more distant, in order that women receive day-to-day support and from further afield, when village-level resources are thinly stretched. Although all participate, it appears poorer women are most active, sharing: milk, butter, yogurt, meat, tobacco, tealeaves, sugar, salt, grain, firewood, water, cash and labour.[48]

Text Box 1. Marro

The value of *Marro* is well illustrated as follows: should a woman receive a visitor when she has no food, she will send a messenger to or visit her *marro* friend to request tealeaves, sugar and other foodstuff. In this way, the host will maintain her good image.

Marro women also share domestic tasks: cooking, fetching water, collecting firewood, cleaning, hut-making, going to market and taking care of children and the sick, in particular in times of drought when women's workload increases yet further.

In modern times, customary social systems have been progressively marginalised by local government, which it appears seeks to reduce its influence and authority. In addition, some local administrators and extension staff have gone further and have actively disrupted customary

[32] Boru et. al., 2014.
[33] Desta et. al., 2004
[34] Abebe, 2016.
[35] Hertkorn et al., 2015.
[36] Tache et al., 2008.
[37] Anbacha et al., 2018.
[38] Coppock, 1994.
[39] Focus group discussion in Yabello, August 2018.
[40] Helland, 1997.
[41] *Gedaa* systems are found amongst other Oromo communities in southern Ethiopia. They are however not identical to the *Gedaa* in Borana.
[42] Huqqaa, 1999.
[43] Coppock, 1994.
[44] The social and ritual life of clans is guided by *quallu* or priests, together with *hayyu* or clan leaders, *jellaba* or messengers and *abba quaee* or organisers of meetings. All are responsible to the *Gedaa* for maintaining the well-being of the Borana.[44]
[44] Helland, 1997.
[45] Hogg, 1997.
[46] Ibid.
[47] Tache, 2000.
[48] Anbacha, et. al., 2018.

rangeland management systems through the promotion of sedentary farming and more commercial/ ranching systems over mobile livestock systems.[49] Interventions, which included the development of large ponds, have not only disrupted livestock production, but also accelerated rangeland degradation.[50] [51] [52] In an attempt to reassert themselves, Borana elders recently rejected government-backed *kebele*-based land certification in favour of customary *dheedaa*-based land certification.[53] With support, this elders' initiative may help reactivate customary knowledge and rangeland management skills, arrest and reverse rangeland degradation[54] and harmonise competing land-uses.[55]

3.4 Borana water systems

The strategic importance of water for human and livestock populations is underlined in the following Borana saying: *'Bishaan lubu: nami bishaan balese namu lubu balese'* or 'water is life and he who mismanages water, mismanages life.'[56] Water management issues are therefore discussed at the *Gedaa gumi* or general assembly, that meets every eight years.[57] [58] The strategic importance of water is well understood by local government and development partners, that have invested significant resources in water resource development. Despite impressive levels of investment over more than 40 years, local government and NGO representatives confirmed water resource development remains the first development priority for many rural communities.[59] This is not surprising as women in many rural communities spend hours daily collecting water for household purposes: drinking, cooking, washing of clothes and personal hygiene.

In this section of the report information is presented on traditional and contemporary water sources and technologies used for human and livestock and from surface and groundwater sources. Women collect water from both sources for household purposes although more typically from groundwater sources as the dry season progresses. The pattern is similar for livestock, with herds and flocks typically watered from surface water sources in the wet season and transitioning to groundwater in the dry season as surface water sources become exhausted.[60] [61]

3.4.1 Surface water sources

Surface water and seasonal streamflow

At times during the seasonal rains, rainfall intensity exceeds infiltration capacity and raindrops coalesce on the surface and to run across the ground surface in a sheet of water. Sheet run-off becomes concentrated in rills and small drainage channels and eventually finds its way to small and eventually larger seasonal streams and rivers. In the northern part of the zone, seasonal streams

[49] Over the last 40 years the majority of international development organisations actors have collaborated with Government and its extension services to 'modernise' livestock production systems, with little or no reference to customary institutions and local informal leadership.
[50] Desta, 2006.
[51] Homann, 2005.
[52] Helland, 1982.
[53] USAID, 2018b.
[54] Customary knowledge is described as: a cumulative body of knowledge, know-how, practices and representations that is maintained and developed by peoples with extended histories of interaction with the natural environment. These sophisticated sets of understandings, interpretations and meanings are part and parcel of a cultural complex that encompasses language, naming and classification systems, resource use practices, spirituality and world-view. ICSU, 2002.
[55] Homann, 2005.
[56] Save the Children, USA, 2009.
[57] Behailu, et. al., 2016.
[58] The evolution of Borana social and administrative systems has been attributed to the complexity of managing deep wells in for cattle production. Helland, 1982.
[59] Zamari et. al., 2018.
[60] With the exception of very large ponds.
[61] Tiki, 2010.

feed into the Dawa and Genale rivers that flow year-round into neighbouring Somali Region and eventually to Somalia and the Indian Ocean. Elsewhere, seasonal streams end in natural depressions and swampy areas that become important water sources for neighbouring communities and their livestock in particular in the late wet and early dry season.[62] While after heavy rainstorms, surface water is immediately and widely available, as it flows across unprotected catchments it is typically also heavily contaminated with faecal material.

Ponds - Hara

The Borana have a long history of excavating and using *hara* or ponds. In the early days, it is likely that natural depressions that harvested seasonal, surface water were progressively expanded to increase the storage capacity. Over time, larger and ambitious excavations followed. Excavations were traditionally initiated by an elder or *Konfi* – literally a 'sharpened stick' – who would mark the area to be excavated and support the excavators with food while they worked.

Traditionally, the pond was managed by the *Konfi* and *jarsa olla* or village elders. Typically, small ponds were fenced with thorns and cattle were watered at low clay troughs. This prevented the cattle from entering and contaminating the pond water. Herders were also responsible for the removal of cattle dung from the area immediately around the troughs and silt that was deposited in the pond during the seasonal rains.[63] [64] Excavated silt was used to strengthen the earth-retaining walls and reduce the threat of flood damage.

Text box 2. Haro Bake

The pond at Bake was first developed in the early 1960s by SORDU and has served as a major, year-round water source since. It did however dry in 1984 in Borana's most serious drought in living memory.

Over the years the pond became increasingly silted and was rehabilitated recently by the USAID-funded Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) project. The rehabilitation cost ETB 12 million (US$ 450,000) for the hire of large earth moving machinery and heavily engineered outlets and overflows.

Despite this investment, year-round grazing, the spread of cropping and the growth of a large settlement in the catchment are again causing siltation. Thus, Hara Bake will again require substantial investment for desilting or, as suggested by a senior representative of the Pastoral Development Office, 'other large ponds could be developed elsewhere to relieve the pressure on Haro Bake pond'.

Note: Information provided by CARE staff in Yabello.

In modern times, hundreds of ponds have been excavated both by the communities themselves and with support from government and development agencies.[65] Capacity varies according to the type of assistance: small community initiatives of 10,000 – 20,000m^3 that provide water for three - five months that are excavated with manual labour[66]; intermediate ponds of 50,000 – 100,000m^3 that provide water for both humans and livestock; and very large ponds holding more than a million cubic metres that provide year-round water for thousands of people and tens of thousands of livestock, excavated using heavy earth-moving machinery. The largest structure in the zone is at Bake and was constructed by the Southern Rangelands Development Unit funded by the World Bank, see Text box 2, while the pond at Hallona was constructed with the support of IGAD.

[62] No-one has specific rights to *lola* or surface water, although it may be understood that water found nearer to homesteads will be used primarily by human as opposed to livestock populations. Helland, 1980.
[63] Helland, 1980.
[64] Ibid.
[65] Including food and cash-for-work and often associated with emergency and resilience projects.
[66] In southern Africa and to a lesser extent in East Africa, draught oxen have been used to desilt ponds using a small scoop that collects silt and deposits it on the earthen retaining walls.

As the number of ponds has increased, it appears that customary pond management systems have been weakened, the result of the increasing use of food and cash-for-work. It may however also be true that the amount of work required to maintain large ponds is simply beyond the capacity of customary institutions, in particular as roles and responsibilities for construction and maintenance of water sources have become increasingly blurred.[67] Whatever the reasons, increasing numbers of ponds are: not fenced, dung is not routinely cleaned away and cattle enter the water to drink.

Rainwater harvesting systems

In the same way as ponds, rainwater harvesting systems collect rainwater run-off during storms from roof, rock and ground catchments, and store the water in tanks or cisterns[68]. Typically, tanks for roof catchments are above ground and range from 2 – 10m^3, while ground catchments feed larger underground cisterns ranging from 20 – 100m^3. Above ground water tanks are fabricated from corrugated metal sheets, fiberglass and plastic, while underground cisterns are typically reinforced concrete. Underground cisterns are often roofed, to reduce evaporation, limit the growth of algae and reduce levels of wind-blown contaminants.

Rainwater harvesting systems were first developed in the area in the 1920s – 1930s including along the border with Kenya by the British colonial administration to support the policing of the international border.[69] More recently however, there has been increasing interest in rainwater harvesting systems as sources of potable water for schools and health centres. In addition, development actors are installing rainwater harvesting systems in remote areas where the development of groundwater is not possible. Interest in rainwater harvesting in Borana is doubtless the result of the significant increase in the number of *birkads* or rainwater harvesting systems in neighbouring Somali region.[70]

3.4.2 Groundwater sources

Wells - Ela

The *ela* or wells of Borana were mapped in the 1970s. The *ela adadi* or shallow wells are scattered across the zone in 35 clusters, while the *ela tula* are restricted to nine clusters in the central plains.[71] Clusters comprise up to 30 individual wells and in the 1990s totalled more than 540 individual wells.[72] Typically, *ela adadi* are dug in alluvial soils, while *ela tula* were excavated through rock to depths of up to 30m.[73] In parenthesis, the Borana continue to dig *ela adadi*, but not *ela tula*, which appears to confirm Borana oral history that the Wardaai – who preceded the Borana in the area and are who resident in Kenya – excavated the deep wells. In some locations *ela adadi* and *ela tula* have played an unbroken 400-year-old tradition in water provision for the Borana and their livestock and in the 1970s provided an estimated 80 per cent of water for livestock.[74] In the 1990s it was estimated that the *ela tula* alone provide water to more than one million cattle and more than 50 per cent of the Borana population in the annual dry seasons.[75]

Ela adadi and *ela tula* are owned by clans and each well is overseen by an individual referred to as *Konfi.* In contrast, individuals involved in the commissioning the excavation of new wells, and their eldest sons who inherit and continue to oversee wells, are referred to as *Chokorsa.*[76] [77] To

[67] CARE, 2018.
[68] Pacey, et. al., 1986.
[69] Cullis, 2008.
[70] Gomez, 2006.
[71] Helland, 1980.
[72] Coppock, 1994.
[73] Ibid.
[74] Helland, 1980.
[75] Coppock, 1994.
[76] Tiki, 2010

commission the excavation of a new well requires considerable resources and organisational capacity as excavations may take up to seven months and involve the removal of 2,000m^3 of soil and rock.[78] During this time excavation teams are provided with food, livestock and in more recent times, daily cash payments by the *Chokorsa* and his clansmen.[79] There are records that teams have consumed more than 275 cattle during a single excavation.[80]

Figure 2. Photograph of an *ela* access pathway leading to livestock watering troughs

The design of shallow and deep wells is similar: a sloping access pathway of 3 - 5m wide and 50 - 150m long leads to drinking troughs sited anywhere from 3 to 6 m below ground-level. As can be seen in Figure 2, access pathways effectively reduce the height water has to be lifted from the groundwater table to the troughs. Water is lifted by *gogessa* or clansmen that are grouped in *totuu* or teams[81] of between three and 20 young men and women, who position themselves on ledges and branches of tree trunks that are inserted into the well shaft.[82] Water is passed up this human chain in plastic containers[83] holding six to ten litres, that are emptied into holding tanks that feed the cattle troughs. Traditionally, the tanks and troughs were made from stone and clay. These traditional structures have increasingly been replaced by reinforced concrete that reduces the number of failures. The work is physically demanding: containers are lifted from below knee-height to above head-height, with individual teams working in shifts of up to 6 hours in a day. As the *totuu* teams work they sing to ensure containers are passed up and down the chain in rhythm and the wells are

[77] The *Chokorsa* is typically not directly involved in the excavation process, but rather has the capacity to organise and finance the excavation, with the support of his clansmen. Once the well is operational, the rights and responsibilities of the *Konfi* are passed to the eldest son and so on.
[78] Haberland, 1963.
[79] Before wells become operational, various ceremonies are performed: the slaughter of an ox, coffee and the milking of a high yielding cow. Save the Children USA, 2009.
[80] Legesse, 1973.
[81] Save the Children USA, 2009.
[82] Where the well is wide and the water yield adequate, two teams of *gogessa* may work in parallel. Helland, 1980.
[83] Traditionally, containers were made of giraffe-hide, but these have been replaced with plastic half jerry-cans, fitted with wooden handles. CARE Ethiopia, 2018.

commonly referred to as the 'singing-wells'.[84] Cattle are watered according to the *limalima* or dry season three-day rota, and *totuu* teams work every third day.

When in residence, the *Chokorsa* or *Konfi* is responsible for the efficient rotation of watering herds. In order to ensure that the access pathways to the wells do not become congested, assistance is provided by one or more *Abba Guyya* or stockmen.[85] When absent from the well, managerial responsibility is delegated from the *Konfi* to the *Abba Heregae*[86] or 'father of the counting'. The *Abba Heregae* is supported by the *Chora ela* or group of six or seven elders that ensure the smooth running of the well and are empowered to mediate and enforce management decisions.[87] Management of the wells is particularly demanding in extended dry seasons and droughts, when falling groundwater increases watering times and cattle become more restless and difficult to manage.[88]

The *Konfi* together with the *Abba Heregae* and *Abba Guyya* are also responsible for routine maintenance: the removal of dung from around the troughs and minor repairs to the troughs and the access pathway.[89] More major repairs are the responsibility of the *Konfi* and clan elders that apportion labour to individual households based on livestock numbers and hence their use of the well. Herders that use wells in the same area cooperate to effect repairs beyond the capacity of an individual well's regular users.[90]

Local and regional government and development actors have supported the rehabilitation and improvement of wells - clearing, widening and deepening access pathways in order that holding tanks and water troughs can be positioned closer to the groundwater table. In this way, the number of people in the human chain that lifts the water can be reduced.

Hand pumps

Hand pumps are relatively inexpensive, cheap to install, easy to maintain and with minimal effort are able to lift groundwater from up to six metres. For these reasons, thousands of hand pumps have been installed in the rural areas of Ethiopia over the last 60 years. While in some areas including in Borana groundwater is brackish and therefore not fit for human consumption, it is typically free from bacterial contamination and hence safer to drink.

In Borana, the first hand pumps were installed in Borana zone in the *Gedaa* Boru Guyo (1984 - 1992) and since this time more than 260 handpumps have been installed on shallow boreholes and wells. They are of different types including AFRIDEV, India Mark II and, more recently, solar pumps with storage tanks. The use of different types of hand pumps requires the purchase and stocking of a wider range of spare parts but this challenge has been addressed and increasingly only AFRIDEV hand pumps and solar pumps are installed.

Motorized pumps

As noted, in the 1970s more than 80 per cent of livestock were watered from traditional wells. Since this time, ten high volume motorized schemes have been installed. These motorized pumps provide high-quality ground water – although in some locations water may be brackish and hence not fit for human consumption; lift groundwater from depths of up to 150m; avail large amounts of water – up

[84] See YouTube: https://www.youtube.com/watch?v=_DSutKMpneM
[85] Helland, 1980.
[86] Ibid.
[87] Op. cit.
[88] Behailu et. al., 2016.
[89] Coppock, 1994.
[90] Helland, 1980.

to 40 litres/ second or 144m^3/ hour; and improve safety as women can collect water at taps, while cattle are watered separately at troughs. Motorized pumps can also help improve animal productivity, as livestock spend less time waiting to be watered and can therefore return earlier to grazing. The motorized pump at Goray for example, provides water in the dry season for 730 households and 32,000 livestock.[91]

While motorized pumps have many advantages, there are some drawbacks. For example, following the droughts of the 1970s and 1980s, motorized pumps were installed in traditional wet season grazing areas, with the probable aim of spreading human and livestock populations more evenly. In practice however, this has resulted in a proliferation of new settlements, reduced mobility in particular of the breeding herds, and encouraged the spread of dryland farming. The end result therefore appears to have undermined rather than strengthened livestock production systems.[92]

3.5 Water sector investment outcomes

As a result of the levels of investment in the provision of water for human and livestock populations in Borana over more than 50 years, the number of permanent water points has increased from the nine *ela tula* or deep well complexes in the 1970s to more than 300 today.[93] This transformative change is not unusual in the region, as evidenced by a study carried out in Wajir District, northern Kenya, that documented the increase in the number of permanent water sources from 4 – 75 from 1940 –1996 and an increase in the number of settlements from 4 – 45.[94]

A recent USAID study of the impact of lowland water projects in Ethiopia identified a number of key outcomes: significantly improved access to safe water, compared to routinely collecting water from remote areas; improved health outcomes; and time-saving that could be invested in other livelihood activities. The study concluded that there is a huge change in living standards for those people who benefit and 'its importance cannot be stressed enough'. The study did however highlight concerns regarding sustainability and the impact of the water-related investment on socio-cultural habits.[95]

Text Box: 3 Hardship in times of drought

Women in Borana walk between 5-10 km and spend on average 3-5 hours per day collecting water. In addition:

- Many non-functional water points have recently been fitted with new submersible pumps, generators and fittings but installation and/or sizing and matching of components was done incorrectly
- The Zonal and Woreda Water Bureaus state they do not have the capacity to support the maintenance and/or repairs of all schemes
- There is no regular maintenance of generators
- There are shortages of spare parts
- Most taps at distribution points are broken and women collect water from cattle troughs

In response, the Government and local development partners are forced to provide mobile tankers to provide emergency water.

Trocaire et. al., 2011.

The study also identified high levels of failure of water schemes and attributed this to: sub-standard construction materials, shortage of trained operators, inadequate recurrent budgets, lack of spare parts, delayed repairs and poor institutional arrangements.[96] Poor institutional arrangements were linked to the lack of capacity of Water Management Committees, which while able to collect fees and manage day-to-day operations including routine maintenance, were 'typically dependent on the *woreda* administration and water office, to effect major repairs'.[97] As a result, key water sources for

[91] CARE Ethiopia, 2018.
[92] Nassef et. al., 2009.
[93] Zonal Water Office, 2018.
[94] Gomes, 2006.
[95] USAID, 2014.
[96] Ibid.
[97] Behailu et. al., 2016.

human and livestock populations may remain non-functional for weeks and months at a time, while local government offices respond to other maintenance and repair requests. Such delays result in hardship, in particular in dry and drought seasons – see Text Box 3 above – when water sources are routinely used more intensively.[98]

Key informant discussions with zonal representatives of the Water, Irrigation and Electricity office suggest the office has limited funds and hence they are unable to provide the quality service that they would like. One representative suggested that at any one time, 17 – 20 per cent of water points are either broken or only working partially. It was also noted that Zonal offices are dependent on their regional counterparts and development actors for funding through short-term projects, in order to be able to expand existing schemes, rehabilitate old and non-functional schemes, mobilise communities for maintenance, and train Water Management Committees.[99] Significantly too, faced with inadequate resources, they are unable to provide leadership and coordination, with the result that operational standards across the different actors are mixed.[100]

3.6 Water sector policies and targets

The government's Growth and Transformation Plan (GTPII) 2015-2020 sets out a vision for Ethiopia to become a middle-income country by 2025. The GTPII recognises water is 'critical for the achievement of rapid and sustainable socio-economic development' and includes targets for: water supply, irrigation and drainage development, hydro-power study and design, watershed management, and water infrastructure development activities. The target for rural water supply is to improve access to 25 litres/ per person/ day from 59 to 85 per cent of the population.[101]

The GTPII targets are underpinned by the Water Resources Management Policy (1998), Strategy (2000) and the Water Sector Development Programme (2002).[102] These policy documents and programmes seek to ensure the 'efficient, equitable and optimum utilization of the available water resources' for socio-economic development on a sustainable basis. Specific objectives include: the equitable development of water resources; efficiency and effective use; management of drought; combatting and regulation of floods; and conservation of water resources. The Policy recognises: decentralisation of management; the active engagement of women; and the importance of environmental management and watershed protection. Regions are responsible for developing their own water supply and sanitation programmes and targets.[103]

[98] In part the result of the number of broken and non-functional water points, the Government and development actors have been forced to provide emergency water from mobile water tankers in the recent droughts. Tocaire et al., 2011
[99] Zonal Water Office, 2018.
[100] Ibid.
[101] National Planning Commission, 2016.
[102] African Ministers' Council for Water, et. al., 2006
[103] Ministry of Water Resources. Undated.

While recognising water's strategic importance, the federal government provided just 9 per cent of funding for the water and sanitation sector in 2001-2002. The balance was provided by: regions - 55 per cent, development partners - 33 per cent, the Ethiopia Social Rehabilitation and Development Fund - 2 per cent, and other sources 1 per cent.[104] These estimates however did not include in-kind community contributions, which are known to be considerable. In the period 2006-2015, levels of expenditure are estimated to have risen to around US$100 million or more than double previous levels of expenditure. The international donor community however, continued to provide an estimated 70 per cent of the funds. Based on estimates of required finance to meet Ethiopia's Millennium Development Goals in 2005, the US$100 million was less than half the amount required.[105]

As indicated in Text Box 4, NGO investment in the water sector in Borana even within a single project can be considerable. With more than 40 NGOs registered to operate in Borana, the zone is understood to receive considerable investment support annually. Unfortunately, the result of different budgeting and accounting processes, it was not possible to identify annual figures.

Text Box 4. A case study of current investment

1) Innovations in Water Development (IWD) CARE Ethiopia

While not yet operational, the Innovations in Water Development (IWD) project will improve pastoral resilience through the rehabilitation of three existing and development of three new emergency boreholes and establishing gender-balanced Water Management Committees (WMC) where women hold half of all management positions. IWD will also promote different technologies: for rural areas - *ela*, ponds, boreholes, micro-dams and rainwater harvesting systems; and for urban areas - reservoirs, borehole wells, shallow wells, water storage tanks and cisterns.

2) Water Component: RESET II

Under this project, CARE will develop different technologies:

- *Roof rainwater harvesting systems*: for schools and health centres. Each will be fitted with a 20,000ltr 'Roto-tank'
- *Motorized pump*: including one scheme with a 6.2km pipeline and distribution system
- *Borehole rehabilitation*
- *Shallow well rehabilitation*: five planned and three completed
- *Drilling shallow wells*: fitted with hand or solar pumps
- *Ground catchment for rainwater harvesting*: with cisterns
- *Pond construction*: new ponds for livestock using cash for work. Up to 13,500 m^3
- *Pond rehabilitation*: three completed using cash-for-work and more than 120 people involved for more than three months
- *Provision of spare parts*: for woreda and WASH WMC

The total contribution to the water sector is valued at more than US$ 960,000.

3.7 Innovation and good practice

An NGO informant highlighted the support role development actors can play through investing in innovation. Examples currently supported by NGOs in Borana and other pastoral areas of Ethiopia include: solar-pumps, with improved recurrent cost savings; imported Australian 'Pioneer Tanks' with 500m^3 storage that can be installed in 5 days; sensors to monitor and report scheme failures; and desalinisation of brackish water for livestock water.[106]

In addition, efforts are also being made to reduce the costs associated with drilling groundwater including through an AcaciaWater, Aquacon and Unicef study funded by the European Union under the RESET II programme. In a Peer Review Workshop in Addis Ababa in September 2018, participants were invited to weight five criteria to overlay the analysis of GIS information and produce an overall groundwater suitability map. The criteria included: lithology/ permeability, lineament density, slope, recharge and land use/ land cover. Representatives of the Borana cluster scored land cover the lowest, as did six of the other seven clusters.[107] While these suitability maps will be of significant

[104] African Ministers' Council for Water, et. al., 2006
[105] Ibid.
[106] CARE Ethiopia, 2018b.
[107] AcaciaWater, et. al., 2018.

value in determining where and where not to drill for water, the weighting is likely to be a cause of some concern for livelihood and rangeland specialists, as land cover scored the lowest and no reference was made to customary rangeland management systems or institutions. For rangeland specialists, it is vitally important that all future investment in rural water supply is compatible with customary rangeland management practices and that the wrongs of the past are corrected.

Good practice guidelines

NGOs operating in the pastoral areas of the Horn of Africa recognise that more must be done in future to improve development outcomes associated with investment in the water sector and have as a result, developed good practice guidelines.[108] [109] Unfortunately, it appears the guidelines are not routinely used and several NGO donor reports reviewed during the study appear to again emphasise outputs over outcomes, citing as successes the numbers of water assessments completed, boreholes drilled, environmental health agents trained, water management committees revitalized and hygiene promotion activities undertaken.

Reasons for the poor take-up aside, it is worthwhile noting that the guidelines were well researched and sought to promote: livestock mobility; sustainable rangeland management; and the anticipation and mitigation of seasonality and drought. Furthermore, as can be seen in Text Box 5, the guidelines were usefully structured around four key project phases: planning, design, implementation and sustainability. In this way, they offered a useful checklist for the different phases of the project cycle.

Text Box 5: Water development guidelines

1. **Project Planning**
   - Understand livestock grazing patterns/seasonal movements before beginning any work
   - Understand the local context: social, economic, political, legal and cultural aspects of a given location
2. **Project Design**
   - Identify existing water points and explore options for their rehabilitation before designing new ones
   - Evaluate the need for and potential impact of new water points and identify necessary remedial measures
   - Select technologies based on appropriateness and cost in addition to expressed needs
   - Integrate water investment with other pastoral interventions
   - Ensure meaningful engagement throughout the project planning and design phases
3. **Project Implementation**
   - Ensure quality design and construction
   - Require cash and in-kind labour contributions
   - Strengthen local management, operation and maintenance capacity including through training of community members
4. **Project Sustainability**
   - Monitor community management after the completion of the project
   - Continue knowledge sharing and exchange visits for local community members and relevant government departments
   - Development strategic approaches to strengthen rather than undermine customary governance systems
   - Maintain resilient and effective management systems at key water points

FAO and Regional Learning and Advocacy Programme for Vulnerable Dryland Communities. 2013

[108] FAO, et. al., 2013.

[109] The good practice principles were drawn up during an ECHO Drought Cycle Management partners meeting in ILRI, Addis Ababa in May 2011, and edited by Helen de Jode, Consultant, REGLAP in November 2011. The guidelines were revised in 2013.

4 Findings of the Field Work

This section of the report presents the findings of the field work of the Borana water study, including the output from the mapping and focus groups and information collected from key informants.

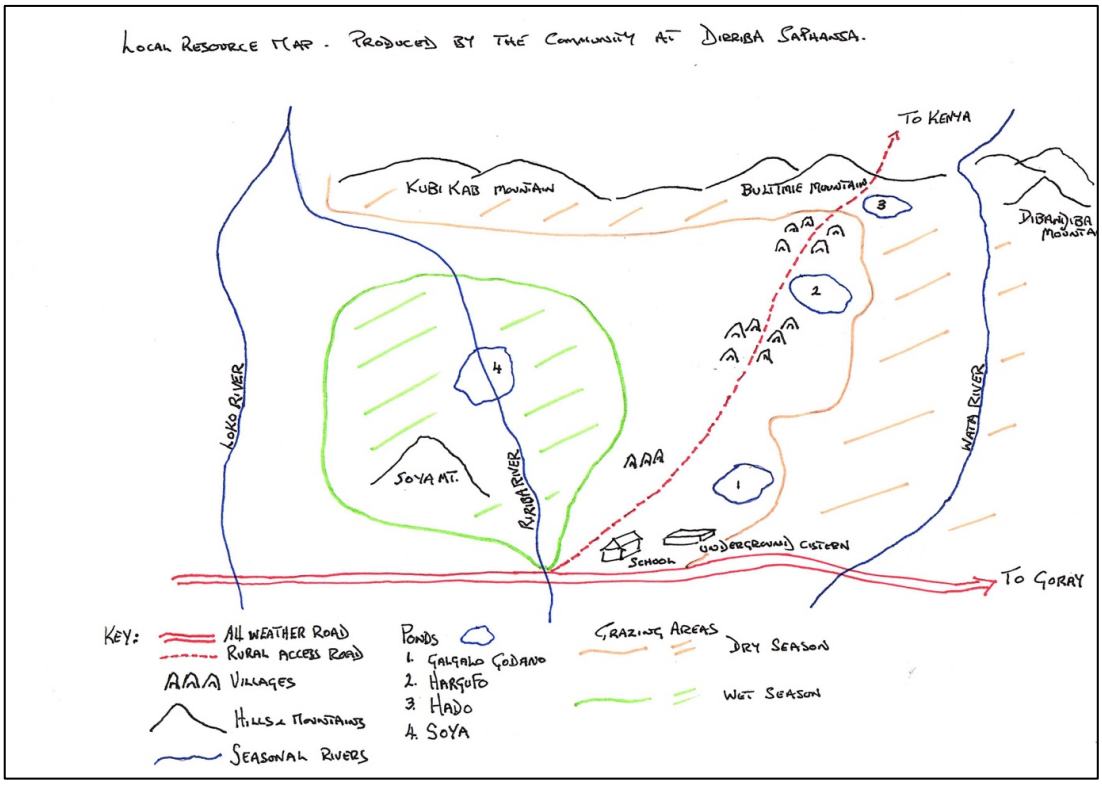
4.1 Resource mapping

Resource maps were developed by a sub-sample of representatives of two agro-pastoral and two pastoral groups. While all the resource maps have informed the analysis in this report, only one is included here for reasons of space, though all have been made available to the RESET II team. The sample resource map was produced by 18 representatives of the pastoral community at Dirriba Saphansa, Dillo *woreda* and was first developed on the ground, using locally available materials – ash, lines drawn in the soil, mounds of soil, leaves and sticks – as indicated in Figure 3. This information was then transposed onto a A3 sheet of paper as presented in Figure 4.

The following resources were mapped: administrative boundaries including the international border with Kenya; community infrastructure – a road, a school, various ponds and a rainwater harvesting cistern; settlements including *olla* or villages; and natural resources – hills, seasonal river systems, seasonal grazing areas and a natural swampy area. Importantly, the resource map confirms that despite all the changes that have taken place in Borana over the last 40 years, the community continues to manage wet and dry season grazing separately. This simple truth underlines the importance of developing rural water in Borana in consultation with livestock keepers in order that water resource development does not further disrupt local attempts to manage the rangelands effectively.

Figure 3. Photograph of resource map - Dirriba Saphansa, Goray, Dillo

Figure 4. Transposed resource map - Dirriba Saphansa, Goray, Dillo



The same community produced a *Gedaa*-based timeline of key water-related developments and the information is presented in Table 1. The elders identified new water sources in each *Gedaa*, starting with *Gedaa* Boru Guyo in 1984 and continuing through to *Gedaa* Guyo Goba in 2016. During this time, three ponds were excavated, and a natural depression enlarged in the community's dry season grazing areas for use by the *warra* or homestead-based livestock. This water was also used by human populations. In addition, an underground rainwater harvesting cistern was excavated to harvest surface rainwater run-off. In the current *Gedaa* Kura Jarso, the underground cistern failed, and the ponds have become badly silted. As a result, the community is increasingly dependent in the dry season on the well complex at Goray which is 12kms away.

4.2 Community-led water resource development

The mapping groups also provided detailed information on community-led efforts and their contributions to develop and maintain water resources development, and the number of people and livestock that are dependent on different water sources.

Table 1. Historical water resource timeline - Goray, Dillo *woreda* (N=18)

Gedaa	Water source developments
Gedaa Boru Guyo (1984-1992)	Garba Soya: the main water point, a swamp area that harvests rainwater run-off The Hado livestock pond was developed by the community The Mado depression was excavated by the community to hold more water
Gedaa Boru Mada (1992-2000)	The Gufo livestock pond was developed by the community
Gedaa Liben Jaldeso (2000-2008)	The Galgalo Godana livestock pond was developed by the community
Gedaa Guyo Goba (2008-2016)	An underground rainwater harvesting cistern was developed by AFD

Gedaa Kura Jarso (2016-present)	There have been no developments in this *Gedaa* period: the underground cistern has failed, and ponds have become increasingly silted

As can be seen in Table 2, the Borana community is actively engaged in the development of additional water sources including a range of different technologies. For traditional sources such as wells and ponds, the community typically takes the lead although, as confirmed in the literature review, development actors have also invested considerable resources in the expansion and rehabilitation of ponds. For other, modern technologies – motorized and hand pumps and rainwater harvesting systems – the community typically makes a contribution towards installation costs, but the primary costs are borne by either government or a development actor. In the examples given, the mapping groups reported that communities had contributed labour, milk, livestock and cash.

Based on a daily rate of ETB 80/ day, the average contribution over the different schemes is US$ 360/ day or, US$ 7,000/ month for a five-day week. As schemes may take several months to complete, the community contribution can be considerable. All too often such contributions are overlooked by development planners and donors who at times too quickly associate pastoralists with the 'dependency syndrome'.

Table 2. Community contribution to water source development costs

Water point	Number of people involved in construction	Community contribution
Pond		
Pond (Gufu)	Men: 132 Women: 68	Labour Milk - 200ltrs (value: ETB 2,000 or US$ 74)
Pond (Jarso Wuta)	Men: 100 Women: 32	Labour only
Rainwater harvesting cistern		
	Men: 100 Women: 60	Labour - collecting sand and stone Excavation
Ela		
Ela (Moru Sora)	Men: 65 Women: 40	Labour 4 cattle (value: ETB 18,000 or US$ 667) Cash contribution - ETB 27,000 or US$ 1,000)
Ela (Duba Bordicha)	Men: 90 Women: 55	Labour 8 cattle (value: Eth birr ETB 48,000 or US$ 1,778) Cash contribution - Eth birr 46,000
Hand pump		
	Men: 70 Women: 60	Labour only
Motorized pump		
	Men: 220 Women: 30	Labour Milk

A representative of the zonal Water Office noted: 'the Borana have traditional and effective rules and regulations to manage water in particular *ela* and ponds. Management of boreholes – shallow and deep – is done by Government and Water Management Committees. There are more problems as Water Management Committees are not always clear about their roles and responsibilities and sometimes use fees for other things. They need more help to set objectives and roles and responsibilities'.

Another representative of the zonal Water Office said: 'it would be good if we could document and promote the use of best practice in the sector'.

During the study it was learned that the Digalu clan was excavating a new *ela* in the crater at Goray, Dillo *woreda*. The study team was therefore able to visit the site and learned the following: clan members had contributed ETB 80,000 or nearly US$ 3,000; the excavation team consisted of 20 men working 6 days a week; the team had worked for two months and expected to complete the excavation in an additional three months; each team member receives a daily payment of ETB 100 or US$ 3.7[110], food and livestock were being slaughtered as part of the well-digging ritual. In total it is estimated the *ela* will cost the community US$ 10,000.

In addition to developing new sites, communities also contribute to maintenance and repair costs. As can be seen in Table 3, community contributions are again impressive, with cash contributions of ETB 50,000 or US$ 1,800 at two sites within the last year. In addition, communities contribute labour which if costed at ETB 80/ day averages across the different interventions at US$5,600/ month. Such contributions underline the importance attached by the community to ensuring fully functional water sources, in particular as it is very likely that similar efforts are being made by communities across the whole zone.

In contrast to community-led maintenance and repairs, the hand pumps cited by the mapping groups are the responsibility of local Government to repair and communities are not required to contribute to maintenance and repair costs.

Table 3. Community contribution to maintenance costs

Water point	Number of people involved in maintenance	Community contribution
Pond		
Pond (Jarso Wuta)	Men: 40 Women: 40	Cash contribution: ETB 2,000
Pond (Sora Jilo)	Men: 140 Women: 60	Coffee and tea - ETB 1,400 Goats - value ETB 2,000 Food contribution: significant Labour: significant
Ela		
Ela (Moru Sora)	Men: 40 Women: 20	Labour Cash contribution - ETB 12,000 Construction of cattle trough - ETB 30,000
Ela (Duba Bordicha)	Men: 50 Women: 30	Labour Cash contribution - ETB 50,000 (for one year)
Handpump		
Handpump	Government maintained	Nothing

An NGO representative said: 'if customary institutions are doing such good work, we should learn from them and focus less on hardware and work alongside them. If we worked more with them and the zonal Water Office, I think there would be fewer problems'.

One pastoral elder from Anole said that: 'NGOs and SORDU have helped to improve *ela,* building holding tanks and livestock water troughs and places where people can safely stand. This is really appreciated by all people.' He went on to say that, 'we used to have three motorized pumps but now we only have one. SORDU started to improve three more *ela* and did not finish. It is very important that you don't just write these problems down, but that you do something about them.'

[110] Using the exchange rate of the time.

During the field work the study team visited an *ela tula* at Dhas where members of the Kereyu clan were removing earth from a collapsed access pathway. The team learned that each day, teams of six or seven men and 10 or 12 women would work for several houses in the morning to remove the earth and in this way have the *ela* fully functional in time for the dry season that starts in January.

Finally, the mapping groups provided details on the numbers of people who use different water points and this information is presented in Table 4. From these examples, it can be seen that ponds and motorized pumps have the capacity to water thousands of livestock seasonally, while with the exception of the *ela* at Dharito, wells are typically able to support up to 2,000 animals. This is because chains of people lift groundwater up to the troughs where the cattle drink and, despite their hard work, there are limits to the amount of water that people can physically lift in a period of time.

Table 4. Community use of different water sources

Water source	Estimated number of households	Estimated number of livestock
Natural swampy area		
Natural swampy area (Garba Soya)	Wet season: 0	Wet season: 0
	Dry season: 187	Dry season: 2,050
Pond		
Pond (Kula Gulicha)	Wet: 50	Wet: 3,000
	Dry: 0	Dry: 0
Pond (by dozer)	Wet: 0	Wet: 3,000
	Dry: 500	Dry: 30,000
Pond (Muyate)	Wet: 500	Wet: 5,000
	Dry: 4,000	Dry: 20,000
Rainwater harvesting system		
	Wet: 0	Wet: 0
	Dry: 120	Dry: 0
***Ela adadi* (shallow well)**		
Ela (Moru Sora)	Wet: 0	Wet: 0
	Dry: 200	Dry: 2,000
Ela (Duba Bordicha)	Wet: 0	Wet: 0
	Dry: 130	Dry: 1,800
Ela (Darito)	Dry: 80	Dry: 600
	Dry: 3,000	Dry: 10,000
Hand pump		
	Wet: 62 households	Wet: 0
	Dry:	Dry: 0
	Dry: 0	Dry: 50
Motorized well *		
	Wet: 0	Wet: 0
	Dry: 0	Dry: 20,974

** Key informants from the community, woreda offices and the zonal Water Office confirmed the water provided is brackish and can only be used for livestock drinking water.*

> Several elders in Dharito suggested that: 'while it is important to discuss water, you can see the number of animals using these water points. We cannot forget about grazing. Grazing and water have to go together. This no longer happens in some people's thinking. We have to talk more about the rangelands'.

4.3 Findings from the women's focus groups

This section of the report presents the findings on water for community or household use as collected from eight groups of women: four agro-pastoral (N=58) and four pastoral (N=97).

Question 1: Identify the main dry season sources of water for domestic use in the Gedaa Boru Guyo(30 years ago) and today's Gedaa Kora Jarso

In response to this question, the women provided useful information on changes in the main sources of dry season water, the result of development investment over the last 30 years. The findings are presented in Table 5. As can be seen, in the past agro-pastoral women were very dependent on water from *ela* or wells. Today they access water in the dry season from different sources: motorized pumps, ponds and hand pumps.

In contrast, the pastoral women sample were less dependent on *ela* in the *Gedaa* Boru Guyo as they also had access to pond water in the dry season. Today, they have access to water from different sources: rehabilitated deep wells, shallow wells, motorized pumps, hand pumps and rainwater harvesting systems. Interestingly, in this sample, the pastoral women no longer have access to pond water in the dry season, the result of siltation.

Table 5: Changes in community water sources

Water source			Total scores	Notes
Agro-pastoral (N=58)				
Shallow well	Today	****	4	
	1988	**********	12	High scores confirm high use
Motorized pump (including a scheme by CARE)	Today	*****	5	
	1988		0	
Ponds	Today	****	4	
	1988	**	2	
Hand pumps	Today	***	3	
	1988		0	No score confirms not used at the time
Seasonal streamflow	Today	**	2	
	1988	***	3	
Rainwater harvesting system	Today	Non-functional	0	
	1988	*	1	Low scores confirm low use
Pastoral (N=97)				
Shallow well	Today	*****	5	
	1988	*******	7	
Deep well	Today	***	3	
	1988		0	
Hand pumps	Today	***	3	
	1988	***	3	
A natural depression (swampy area)	Today	***	3	
	1988	***	3	
Rock rainwater harvesting	Today	**	2	

system (by AFD)	1988		0
Motorized pump	Today	**	2
	1988		0
Ponds	Today		0
	1988	*****	5

Agro-pastoral woman, Gololee, Bule Korma, said: 'When the motorized pump breaks down, and it does quite often, we have an unplanned long walk to other water sources'

Pastoral woman, Dirriba Saphansa, Goray, said: 'The *ela adadi* (shallow well) we use in the dry season is far from here [12km]. It takes a long time to collect water from there'

The information provided confirms that for the sample, agro-pastoral and pastoral women have access to a wider range of water sources than they did 30 years ago. It also confirms significant levels of investment in the water sector. However, it also suggests that there are significantly increased demands on recurrent expenditure for maintenance and repairs and that multiplied up across the zone, these will be both considerable and beyond the capacity of the zone and communities to meet.

As a follow-up question, the women focus groups were asked to rank water sources in order of importance, using proportional piling of 100 stones. The responses combined across the agro-pastoral and pastoral women groups as shown in Figures 5 and 6 below. The agro-pastoral women ranked the following most highly: motorized pumps, shallow wells (including one excavated with the support of a local development actor, Action for Development) and ponds, followed by water from hand pumps, naturally occurring seasonal water, and a rainwater harvesting cistern. In contrast, the pastoral women ranked shallow wells first, followed by water from motorized pumps and natural depressions that harvest rainwater run-off, followed by deep wells, ponds and hand pumps. As can be seen, motorized pumps and wells – both shallow and deep – play a central role in the provision of water for domestic purposes. Significantly, both water sources require considerable investment to develop and maintain.

Figure 5. Dry season water sources ranked using proportional piling (agro-pastoral women)

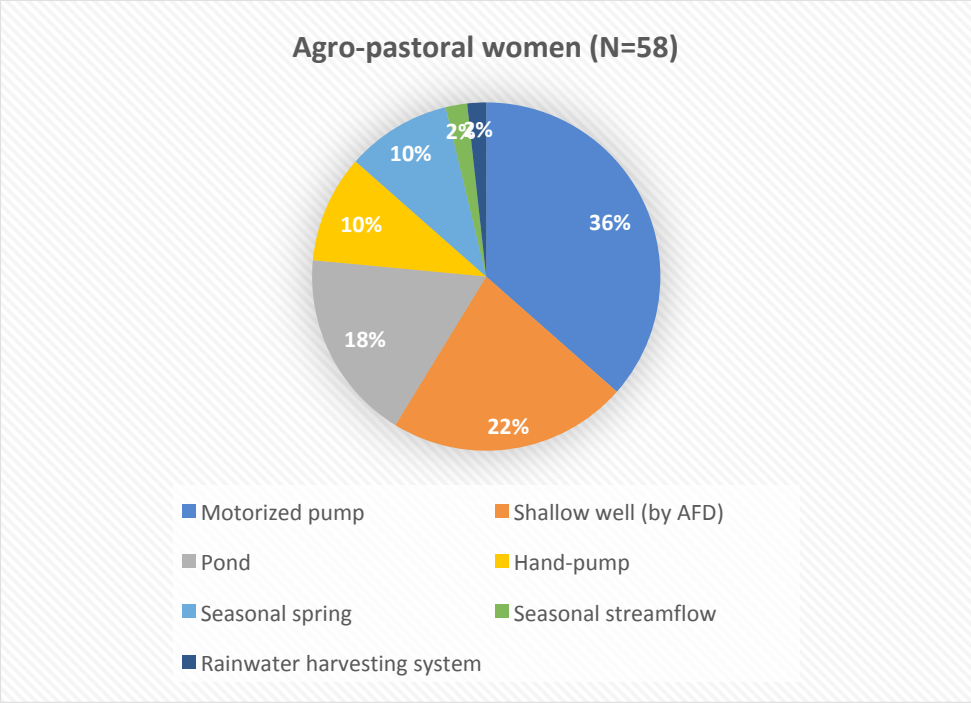
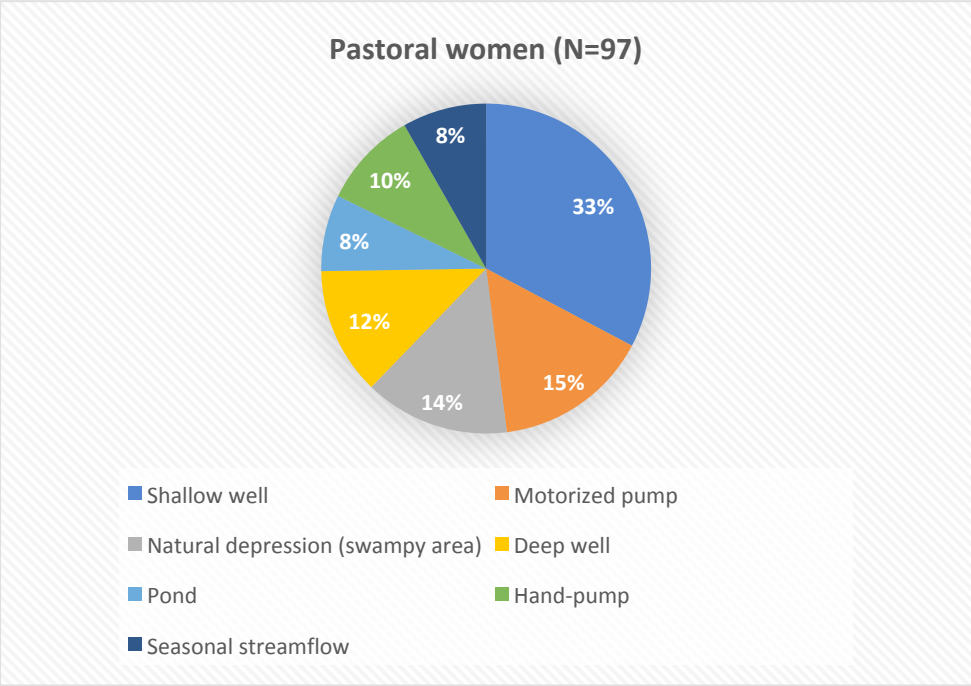


Figure 6. Dry season water sources ranked using proportional piling (pastoral women)



A pastoral woman from Gadda, Arero said that, 'because the water in ponds is dirty in the wet season, we have to buy medicine for people who become ill'.

Question 2: Identify and rank the 3 most important positive outcomes resulting from the development of water for human populations

The responses to this question are provided in Table 6. Both the agro-pastoral and pastoral women scored improved water quality first, followed by improved availability. These two positive outcomes significantly outscored other listed outcomes. Combined, these two positive outcomes represented 90 and 94 per cent of the total scores for agro-pastoral and pastoral women respectively. When invited to provide more detail on particular benefits associated with clean water, the women listed: improved health outcomes, better water for cooking, improved personal hygiene and clean clothes.

Table 6. Positive water development outcomes - ranked using proportional piling

Qualities	Total scores	Rank
Agro-pastoral (N=58)		
Quality: safe and clean water for drinking, cooking, personal hygiene and washing clothes	252	1
Availability: adequate source of water	108	2
Accessibility: ease of access	18	3
Appropriateness: ease of maintenance	12	4
Cost: no cost as a traditional source of water	10	5
Total	400	
Pastoral (N=97)		
Quality: safe and clean water for drinking, washing and washing clothes	235	1
Availability: adequate source of water	143	2
Economic: the water source attracts people to the trading centre	18	3

and is good for business		
Use: for house construction – plastering homes	4	4
Total	400	

As a follow up question, five women in each group were randomly selected and asked to provide information on the time take to collect water, 30 years ago and today. The responses to this question are presented in Figures 7 and 8. The results were mixed, with one sample of agro-pastoral women and one sample of pastoral women reporting no change in the time taken to collect water over the last 30 years, as they continued to use the same water source. The other women reported time savings as a result of the investment. Some groups reported significant savings, for example one group of five pastoral women reported savings of 10 hours. Averaged across the sub-sample, time-savings were 2.45 and 4.25 hours/ day respectively for the sub-samples of agro-pastoral and pastoral women. Such time savings significantly reduce women's work-load and substantially increase the time available for child-care in particular of young children and other productive, reproductive and community activities.

Figure 7. Water development-related timesaving

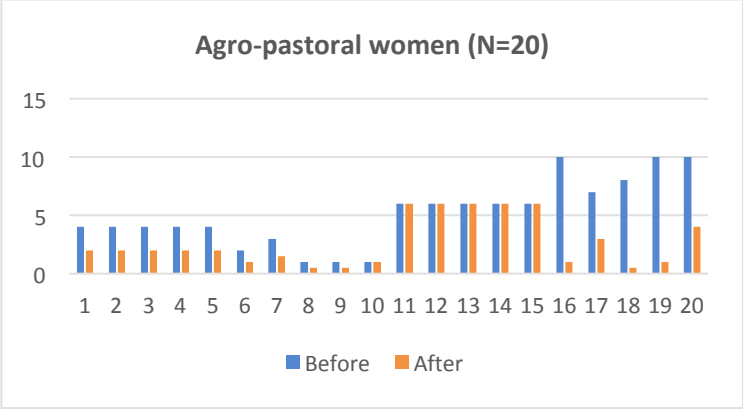
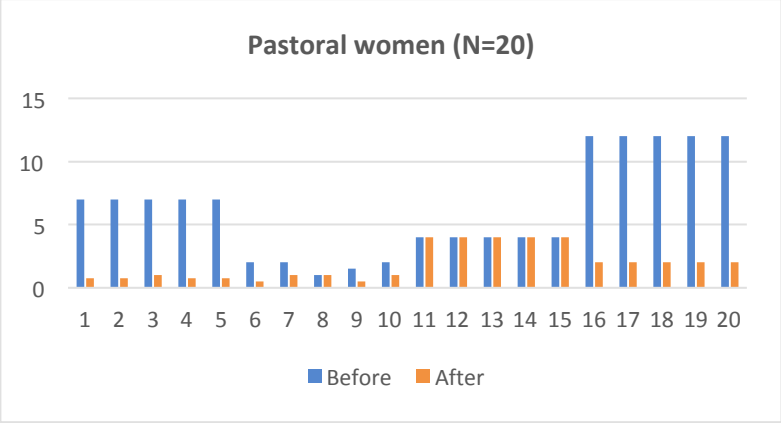


Figure 8. Water development-related timesaving



Zonal representative said 'when local Government and NGOs work together, they can have a huge impact. For example, the Boku project in Moyale where water has been piped for 60 km. This has reduced the need for people to go in search of water in the dry season. To ensure that such schemes are sustainable however we need to ensure that they are properly maintained, and that Water Management Committees are strong'

Question 3: Identify and rank three technical and three management-related recommendations for the improvement of local water sources

In response, groups developed a 'long list' of first technical and then management-related ideas, from which they selected three priority issues that they then scored and ranked. The responses are presented separately for technical and managerial issues in Tables 7 and 8.

Table 7. Recommended technical improvements

Long list of ideas	Priority recommendations	Total scores	Rank
Agro-pastoral (N=41)			
- Install more motorized wells - Improve routine maintenance to reduce long-term repair costs - Fund more rainwater harvesting systems to improve availability - Improve access to traditional wells to make safer - Train more operators - Make spare parts locally available - Construct dams - Rehabilitate ponds - Fence water points to reduce contamination	Improve access to wells (both *ela adadi* and *tula*) for people and livestock	**********	1
	Install additional motorized wells to improve the availability of clean water	******	2
	Improve routine maintenance to reduce long-term repair costs	*	3
Pastoral (N=97)			
- Remove silt from ponds - desilting - Treat water - Fence water points - Install motorized wells for drinking - Rehabilitate shallow wells - Hire guards - Contribute cash to ensure timely repairs - Install a pipeline from the well - Replace broken handpump - Install a water tank to store water - Excavate new deep wells - Construct rainwater harvesting systems at every *ola* or village - Rehabilitate and expand the pond - Lock handpumps when not used - Monitor the work of operators - Collect and use cash properly	Fence water points	*******	1
	Install more motorized wells for improved access to clean drinking water	*****	2
	Rehabilitate wells (*adadi* and *tula*)	*****	3
	Treat water	*	4
	Construct rainwater harvesting systems at every *ola*	*	5

An agro-pastoral woman from Debeka, Meti said, 'it is very important to improve the *ela* as this is an essential water point when the motorized pump breaks down'.

As can be seen, the agro-pastoral and pastoral women ranked the following technical improvements highly:

- the rehabilitation and improvement of *ela* – both *ela adadi* and *ela tula* – including access (a combined score of 15)
- increased investment in additional motorized schemes (a combined score of 11)
- the fencing of water points such as ponds to reduce contamination (a score of 7)

These prioritized technical recommended improvements again confirm the value attached to *ela* – both *adadi* and *tula* – and motorized pumps and offer a guide to the types of water-related development investment that is valued for domestic supply by the agro-pastoral and pastoral women samples.

Table 8. Recommended managerial improvements

Long list	Key recommendations	Total scores	Ranks
Agro-pastoral (N=41)			
Long list - Appoint *Abba Heregae* to manage all major water sources - Appointment of guards to protect water points - Traditional fines and punishment for misuse - Management – clear and clean - Water committee strengthening - Extend traditional governance to all water sites, including fines for misuse - Ensure regular maintenance, clearing and cleaning - More training for Water Management Committees	Appoint an *Abba Heregae* to oversee major water sources	******	1
	Extend traditional governance systems to all water sites, including fines for misuse	*****	2
	More training for Water Management Committees	**	3
	Ensure regular maintenance, clearing and cleaning	*	4
Pastoral (N=97)			
- Appoint an *Abba Heregae* who is respected to manage all water points - Respect for each other when watering - Re-introduce traditional rules and fines for misusers – first work, then cattle and then banning - Governance – equitable watering for all herds - Governance – fencing, clearing, cleaning and maintenance	Appoint an *Abba Heregae* who is respected to manage all water points	**********	1
	Re-introduce traditional rules and fines for misusers – first work, then cattle and then banning	******	2
	Governance – fencing, clearing, cleaning and maintenance	***	3
	Appoint a Konfi to follow-up on the management of water points	***	4

A pastoral woman from Tesso Morowa, Tesso-Qallo, Dhas said, 'water management committees are far too easily swayed by important people in the community. We need the *jarsa* elders to appoint *Abba Heregae* and guards for all important water points, so all decisions will be made fairly.'

Two of these management recommendations stand out:

- the appointment of *Abba Heregae* to supervise the management of important water points to ensure equitable access (combined score of 18)
- the extension of traditional governance systems to all water points including the introduction of penalties for misuse: community labour, fines of livestock and eventually the banning of persistent offenders from using a particular water source (combined score of 11)

These recommendations appear to reflect a level of frustration that development investment in the water sector operates outside known and respected customary management systems, and instead is promoting Water Management Committees that are accountable to local government. As identified in the literature review, while Water Management Committees may be able to manage day-to-day affairs, they are unable to handle major breakdowns or, it seems, ensure that all users operate

within traditional governance systems. This lack of authority reflects wider problems within local government that has at least in the past, a poor track record of accountability to the people and communities it serves.

4.4 Findings from the men's focus group discussions

This section of the report presents the findings from the men's focus groups on water for livestock use. The information was collected from eight groups: four agro-pastoral (N=80) and four pastoral (N=116).

Question 1: Identify the main dry season sources of water for livestock in the Gedaa Boru Guyo (30 years ago) and today's Gedaa Kora Jarso

The elders' responses to this question are presented in Table 9. Thirty years ago, cattle were watered from shallow and deep wells and, in pastoral areas, from excavated ponds. As indicated in the findings from the pastoral sample, some pastoralists lived in closer proximity to shallow wells, while others lived closer to deep wells in the central plains and hence the scoring is split between deep and shallow wells.

In contrast today, cattle are watered in traditional shallow and deep wells and from motorized pumps. Furthermore, for the sample at least, ponds played a limited role as maintenance had been poor and the ponds had silted. These findings confirm the changes brought about by investment in the water sector, resulting in an increase in the type and number of different water sources. As has also been mentioned, the increase in the number and type increases the resources required for routine maintenance and repair. These resources are typically not costed and budgeted for by communities or local government and hence failures are inevitable.

Table 9. Changes in livestock water sources

Water source			Total scores	Notes
Agro-pastoral (N=80)				
Traditional shallow well	Today	**********	14	
	1988	************************	25	High scores confirm high use
Motorized well	Today	********	9	
	1988	-	0	No scores confirm not used at the time
Pond	Today	**	2	Low scores confirm limited use
	1988	-	0	
Pastoral (N=116)				
Traditional shallow well	Today	********	8	
	1988	********	8	
Deep well	Today	****	4	
	1988	*****	5	
Handpump	Today	****	4	
	1988	-		
Motorized well	Today	****	4	
	1988	-		
Pond	Today	-		
	1988	*******	7	

An agro-pastoral elder, Dambi, Yabello: 'We would have ranked a pond that was constructed more than 40 years ago. This pond served more than 1,300 households and was important. When a contractor was constructing a road nearby, they dumped soil in the pond and it is now very badly silted. We would like this to be rehabilitated'.

A pastoral elder Tesso Morowa, Tesso-Qallo, Dhas: 'When the water becomes scarce here, we move the cattle herds to another area which is very far from here'.

As a follow-up to the first question, the elders were also asked to rank different technologies in order of importance and their responses are presented in Figures 9 and 10. The elders ranked the different technologies as follows: traditional and improved shallow wells, motorized pumps and deep wells. These were followed by a number of other technologies of lesser importance, including hand pumps and rainwater harvesting systems. This finding again confirms the strategic importance of wells and motorized pumps as sources of water for livestock during the annual dry seasons.

Figure 9. Livestock dry season water sources - ranked using proportional piling (agro-pastoral elders)

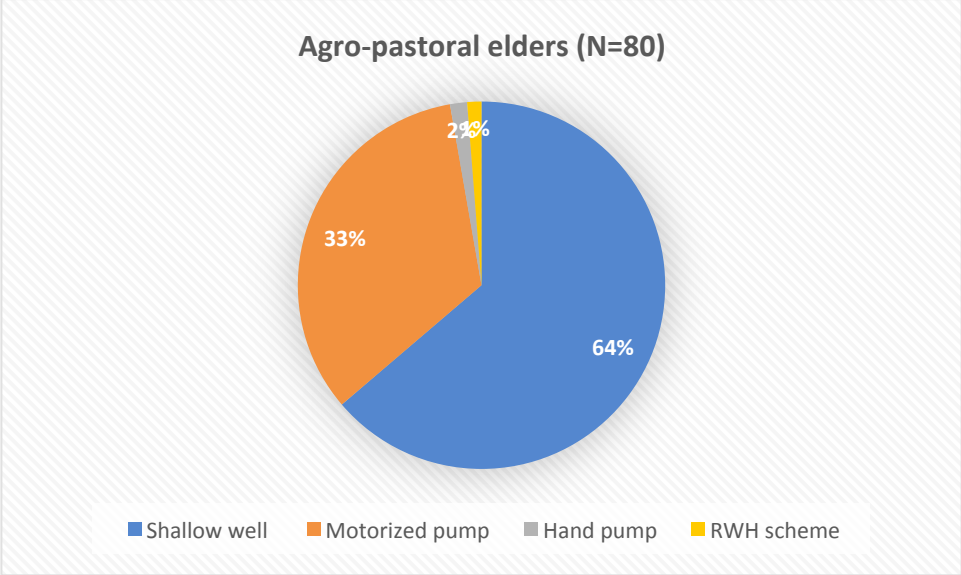
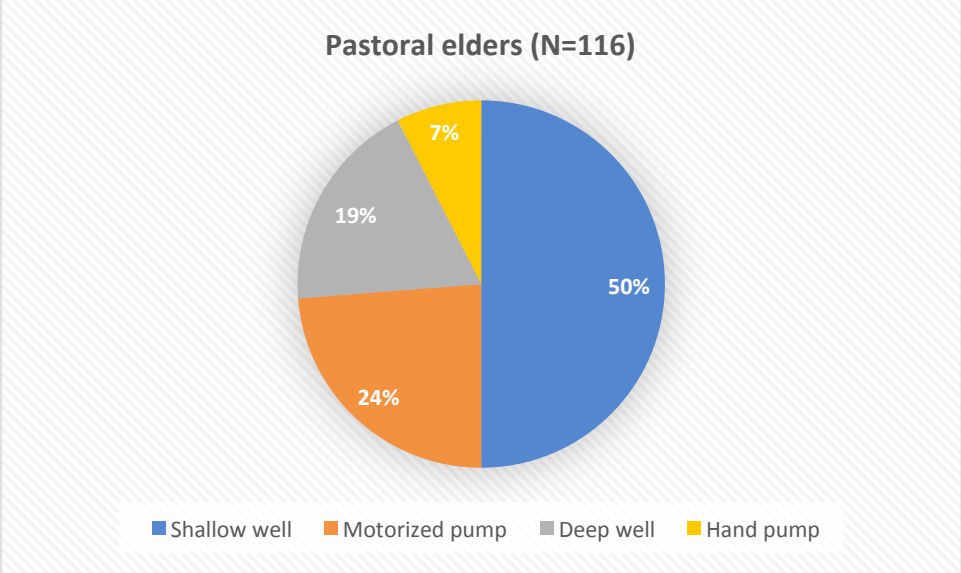


Figure 10. Livestock dry season water sources - ranked using proportional piling (pastoral elders)



A pastoral elder, Dhaga Dima, Anole, Dubluq said that, 'We continue to rely mainly on traditional wells as the water is free, it is also cultural, and we know this water. We cannot depend on motorized wells as they are always breaking down and the water is not free. We don't know this water. We know and can depend on water for our livestock from the wells'.

Question 2. Identify and rank the 3 most important positive outcomes resulting from the development of water for livestock populations

The information provided by the elders in response to this question is presented in Table 10. The elders scored and ranked the following positive outcomes: the provision of good quality water; availability; improved income and reduced costs. Improved quality and availability scored very highly and accounted for 86 and 95 per cent of the allocated scores respectively for the agro-pastoral and pastoral elders. When asked to detail specific benefits, they identified the health benefits for livestock associated with drinking clean water and reduced trekking times between grazing and water that ensured cattle remained fit and healthy, at least in normal dry seasons. These findings confirm that appropriate investment in water resources, in particular where there is adequate grazing in the vicinity, can result in positive livelihood outcomes for livestock keepers.

Table 10. Positive water development outcomes - ranked using proportional piling

Qualities	Total scores	Ranks
Agro-pastoral (N=80)		
Quality: good quality water ensures healthy animals	190	1
Availability: proximity reduces trekking time, and this helps cattle to remain healthy. They fatten quicker	157	2
Income: motorized scheme supports home gardening – vegetables and fruit. With more time, people can invest more in agriculture. Also, water-sellers can generate an income	38	3
Cost: traditional shallow wells do not charge for use	25	4
Total	400	
Pastoral (N=116)		
Quality: good quality is important for animal health	276	1
Availability: proximity reduces trekking times and cattle are healthier when they are not being trekked far distances	105	2
Income: motorized schemes support home gardening	19	3
Total	400	

A Konfi from Arero *woreda* noted: 'the loss of pasture and grazing in this *dheeda* is the direct result of the motorized pump that has resulted in all the livestock in the area moving to this area. This has not only resulted in the loss of grazing but has also undermined the customary management structures that existed. The important lesson to learn is that communities should be properly consulted before construction starts, in particular large schemes such as motorized pumps.' In addition, the Konfi went on to say that 'as well as being technically qualified, it is important that all Government technicians have access to adequate spare parts in order that they can effect repairs in a timely way'.

Question 3: Identify and rank 3 technical and 3 management-related suggested improvements

The elders were asked to list, short-list and score three technical and three management-related improvements that they felt would improve the provision of water for livestock in their localities.

The 'long list' of ideas, the short-listed recommendations and associated scores and ranks are presented in Tables 11 and 12.

Table 11. Recommended technical improvements

Long list	Key recommendations	Total scores	Ranks
Agro-pastoral (N=80)			
Long list - Install more motorized wells - Fence water points - Rehabilitate and extend ponds - Install concrete holding tanks and troughs in traditional wells - Train local operators - Develop adequate water for irrigation - Improve access to spare parts - Provide water trucks to distribute water - Add more troughs to motorized wells	Install more motorized wells	******	1
	Train local operators	****	2
	Rehabilitate and extend ponds	***	3
	Fence water points	***	4
	Install concrete holding tanks and troughs in traditional wells	***	5
	Improve access to spare parts	**	6
	Irrigated fodder	*	7
Pastoral (N=116)			
- Protect water sources - Remove rocks on the way into the Goray well (extinct volcano) - Dig out more soil to make the access less steep - Find and develop alternative routes to water that are shorter - clear bush - Plaster/ cement water troughs in *ela* - Rehabilitate ponds - Construct new ponds to reduce the need for migration - Train operators for motor pump - Fence - Collect and use fees for maintenance - Maintain motorized and hand pumps - Rehabilitate traditional *ela* - Construct larger ponds - Construct cement cattle troughs - Employ guards	Rehabilitation of *ela*	****	1
	Fence water points	***	2
	Clear bush for shorter routes to water	**	3
	Rehabilitate large ponds	**	4
	Maintain handpumps	**	5
	Train operators and Water Management Committees	**	6

An agro-pastoral elder from Kulalo, Dharito said that 'the motorized wells are improving the supply of clean water. What has to be improved is the supply of spare parts and the number of operators that are trained to maintain them.'

A pastoral elder from Teltele said that 'more than 20 people have fallen into the *ela* Tuti when watering their livestock and many died following the fall.'

The responses from the agro-pastoral and pastoral groups are different. The agro-pastoral elders ranked the following technical recommendations most highly: install more motorized pumps, train local operators, rehabilitate and expand ponds, fence water points, install concrete holding tanks and livestock drinking troughs at water points, improve access to spare parts and produce irrigated fodder. In contrast, the pastoral elders identified the following technical improvements: rehabilitate *ela*, fence water points, clear bush to provide stock-routes to water sources, rehabilitate large ponds, maintain handpumps and train operators and Water Management Committees.

These ranked recommendations for technical improvements of water points in their localities can help inform investment by local government and development actors, and certainly the process of participatory engagement in the identification of priorities is highly recommended. This said, if the recommendations were fully costed, they would represent a significant level of investment for what is in effect a relatively modest sample of the total agro-pastoral and pastoral population. Therefore, ways of phasing investment while managing expectations will need to be found and operationalized.

Table 12. Recommended managerial improvements

Long list	Key recommendations	Total scores	Ranks
Agro-pastoral (N=80)			
Long list - Improve management: maintenance, site protection and guarding - Strengthen Water Management Committees by adding *Abba Heregae* to help manage water points, schedule water use and ensure routine maintenance - Reintroduce traditional penalties for those who misuse: cleaning and maintenance, payment of a bull or heifer and an eventual banning (especially for people fighting for position in the rota and defaecating in the catchment area)	*Abba Heregae* appointed to support Water Management Committees and ensure effective governance	**********	1
	Reintroduce traditional management – cleaning, fencing	******	2
	Reintroduce traditional penalties for those who misuse	*****	3
Pastoral (N=116)			
- Strengthen governance of water - Strengthen community participation - Reintroduce penalties for people that mis-use or don't engage: work – fencing and desilting and then a fine up to 5 cattle - Reintroduce *Abba Heregae e* to organise the rota for pond use as now it is unregulated - Improve management: construct entrances to ponds for cattle and build trough to restrict movement, clean and maintain and fence ponds - Strengthen WMC with *Abba Heregae e* - Reintroduce clan contributions to ensure adequate resources for maintenance and rehabilitation	Strengthen governance by appointment of *Abba Heregae* to all modern major water sources	*********	1
	Strengthen governance of water and reintroduce *busa gonoffa* to ensure payment (milk and livestock) for rehabilitation	****	2
	Reintroduce penalties: work and cattle	****	2

A member of a Water Management Committee, Gadda *kebele*, Arero *woreda* expressed the view that, 'we meet together regularly to try to address all problems. We are also elected democratically and work well together and we have ensured that a cattle watering trough is built. This is one of the best things that we have done. However, we know the trough is too small and it would have been better if it had been bigger. We do not however have the capacity to improve the *ela* or to manage other water sources in the area including hand pump sites. For this we will need more help: improved access to spare parts, more training and better support to help educate the community in their responsibilities.'

A *woreda* water engineer stated that: 'there is inadequate on-going maintenance support from Government and NGOs water projects, with the result that there are failures:

motorized pumps are not serviced regularly enough, the retaining walls of ponds are eroded, leaking pipes are replaced. For local Government this is because there are too few technicians, for example, in my *woreda* there are only three trained technicians for 18 *kebeles* and even when a technician is free, there may not be spare parts. We don't have the overall capacity to address the problem of broken water sources'. He continued, 'this is before other important work is done: improved *ela*, expanded pipelines and concrete water troughs'.

At the managerial level, the responses from the agro-pastoral and pastoral elders were similar: appoint *Abba Heregae* to strengthen customary governance systems at major water points; reintroduce traditional management systems such as cleaning away livestock dung and silt and fencing of sites; and reintroduction of penalties for individuals and households who misuse water points. Reference was also made in the pastoral sample of the need in some areas at least to re-establish the *busa gonoffa* system that requires households to contribute milk and animals to support major rehabilitation efforts.

When challenged as to why the elders themselves do not simply introduce these traditional measures, the response given was that, with support from local government and development actors, Water Management Committees are responsible for the management of water points. Elders in some groups noted that customary governance systems have been marginalised. It was suggested that while recognising the hard work done by Water Management Committees, their limitations are also recognised, specifically that they are unable to provide effective management of large water points, while in other areas they even struggling to fence and clean sites.

4.5 Cost estimates provided by CARE Ethiopia

In addition to the information collected from the agro-pastoral and pastoral communities, CARE Ethiopia staff in Borana provided information on the estimated costs of developing water sources using different technologies. The information is presented in Table 13. As can be seen, the unit costs of ponds and hand pumps are relatively inexpensive, while the overall costs associated with relatively modest rainwater harvesting systems and hand pumps installed on shallow wells and boreholes offer inexpensive new sources of water for rural communities.

Table 13. Estimated development costs of different water technologies

Water Technologies	Unit costs	Estimated total cost
Surface water technologies	(US$/ m^3)	(US$/ 100/$m^3$)
Pond	2.4	240
Rainwater harvesting system and concrete cistern	56	5,600
Underground water technologies		**Total Costs**
Hand pump		445
Shallow borehole with hand pump and borehole		7,500
Motorized pump		3,700 – 4,800
Deep-borehole with motorized pump		50,000

5 Conclusions and Recommendations

This section of the report is presented in two separate sub-sections: water specific conclusions and recommendations, and generic conclusions and recommendations. The water specific sub-section reflects the broader structure of the report and is further sub-divided into a) surface and b) groundwater sources and technologies. Each conclusion is presented together with one or more recommendations, numbered for reference purposes.

5.1 Water-specific conclusions and recommendations

5.1.1 Surface water sources

In areas where the groundwater was historically difficult to tap, pastoralists have largely been dependent on seasonal surface water and, as water availability has become exhausted, they have been forced to migrate to areas where groundwater is available. Seasonal surface water is however typically contaminated and, if untreated, can cause dependent communities to suffer increased levels of ill-health. Levels of ill-health associated with contaminated water typically peak in the wet season, when large volumes of surface run-off are being regularly harvested in ponds and cisterns from unprotected catchments.

Traditionally, ponds in Borana were small and stored water that would perhaps last from several weeks to two or three months. Government and international development actors have however mobilized community labour and heavy earth-moving machinery to develop much larger ponds, some of which provide year-round water in areas where previously only seasonal water was previously available. The creation of large ponds has resulted in spontaneous settlement in former wet season grazing areas, the spread of dryland farming, and a breakdown in traditional rangeland management practices.

1. It is recommended that international development actors de-prioritise investment in large ponds and instead restrict investment to small ponds in remote, wet season grazing areas where they may help extend seasonal grazing by one or two months. In this way, they may ease livestock concentrations and associated rangeland degradation in other areas.

   It is however recommended any such investment should only be considered where: *dheeda* (landscape level rangeland management institutions) are functional and consulted and *dheeda* elders are able to ensure appropriate use, management and maintenance; and communities agree to fence ponds to prevent cattle from accessing and contaminating the water and ensure that they are watered in simple clay watering troughs at one side of the pond, as was the traditional practice.

   It is recommended that consideration be given to decommissioning livestock ponds that are associated with disruption of sustainable livestock systems. To do this, it is recommended that international development actors commission collaborative studies with *jarsa dheeda* (*dheeda* elders) to identify which ponds are appropriately and which inappropriately sited. Such studies may also identify that improvements can be made to settlement patterns and land-use.

2. It is recommended that the zonal Water Office and international development actors collaborate to produce guidance on the use of pond water, including recommended water treatment guidance to improve health outcomes.

3. It is recommended that international development actors fund a pilot to test the appropriateness and acceptance of ox-drawn earth scoops for desilting ponds, as an alternative to mobilising community labour.

Rainwater harvesting systems collect rainwater run-off from roofs, rock and ground catchments. Roof catchments are typically associated with schools and health posts, while rock and ground catchments typically serve rural communities. Recent investment in ground catchments and cisterns or 'birkads' follows a growing trend of community and private investment in rainwater harvesting in neighbouring Somali region. Whether birkads or cisterns, structures are typically roofed to minimize evapo-transpiration and reduce further contamination from wind-blown material and entrance by wildlife and people. As the water is often contained over several months, particles gradually settle and the risk of contamination decreases.

4. It is recommended that every opportunity is taken to invest in the development of rainwater harvesting systems at schools and health posts, provided it can be ensured the harvested water is routinely shared with children/ patients in particular women and girls, and not simply 'captured' by male teachers and medical staff. In the event such guarantees are not possible, it is recommended that such investment be deprioritised.

5. It is recommended that in remote locations where access to groundwater is limited, ground catchments and cisterns are prioritized only for water for human consumption. Where possible they may be constructed near ponds which can then be used for livestock drinking purposes only. All such investments however should be subject to discussions with *dheeda* institutions. Priority should be given to those areas where women are routinely required to walk more than two hours a day to collect water.

6. It is recommended that where such investment is considered, agreement with the community is reached ahead of construction that open defecation is prohibited in the catchment.

7. It is recommended that harvested water in cisterns is routinely treated according to good practice guidelines to improve health outcomes.

5.1.2 Groundwater sources

While water may be contaminated during collection process and even while water is being carried to the home, water from groundwater sources is typically cleaner and safer than water from surface water sources and is therefore preferred by women as a source of domestic water and by men as a source of water for livestock.

Ela adadi and ela tula (shallow and deep wells) have played a central role in the provision of water for both people and livestock in Borana over more than 400 years. As witnessed during the fieldwork, the Borana continue excavate and repair *ela* at their own expense. This investment bears testimony to the technological appropriateness and also to the effectiveness of the customary, clan-based management systems that have evolved around them. While on the one hand *ela* hold an important place in Ethiopia's and Africa's industrial heritage, so too they continue to make a significant contribution to Ethiopia's live animal export trade to the Middle East.

8. It is recommended that international development actors collaborate with the zonal Water Office to update and annotate the 1970s map of *ela adadi* and *ela tula*, including clan ownership. It is also recommended that development actors ensure that appropriate documentation and video footage is made available to local, regional and national pastoral learning platforms, archives and museums.

9. It is recommended that international development actors continue to support Borana clans to rehabilitate and improve *ela*, specifically: platforms that *totuu* or water lifters can safely stand on while working; reinforced concrete holding tanks and livestock troughs; and widening and

deepening the access pathways to improve access and reduce the number of *totuu* required to lift water. Such investment should be done on a strict rotational basis with each clan receiving assistance in turn.

It is also recommended that discussions with clans should ensure that they have the right to determine investment priorities: which *ela* in which location will be improved and requiring what type and level of assistance. In contrast, it is recommended that development actors do not support clans to undertake routine maintenance and repairs, as they have the capacity to do this themselves.

10. It is recommended that international development actors establish a monitoring system to record accidents, in a sample of *ela adadi* and *ela tula*, over one or two years, with a view to better understand levels of risk. Such information may help inform discussions with clans around investment priorities. Such a monitoring system might be done with the support of a university and an MSc student.

Hand pumps fitted to capped shallow wells and to boreholes play an important role in the provision of water in Borana for domestic purposes: drinking, cooking, hygiene and washing clothes; and, in some locations, for small numbers of *warra* or milking animals. In order to be able to provide a reliable source of water, it is important that hand pumps are properly installed and that they receive regular maintenance and early repair. This is well known and zonal and *woreda* Water Offices have provided considerable training for Water Management Committees and technicians. They have also established supply chains for spare parts. Despite this investment, significant numbers of hand pumps in Borana zone are non-functional at any one time. This results in women either collecting water from surface water sources that may be contaminated or walking considerable distances to alternative groundwater sources.

11. It is recommended that international development actors cooperate with the zonal Water Office to establish a monitoring system that routinely collects and analyses information on the functionality of hand pumps. Information could be submitted by community representatives using mobile phones. This information collected over 12 months would help inform investment choices: makes; installation; maintenance; repairs; the provision of spare parts – possibly including an expanded role of the private sector; training and equipping of technicians; and roles and responsibilities of community members.

    It is also recommended that consideration be given to equipping one or more local NGOs to establish a specialist capacity in hand pump maintenance and repair in order to improve functionality.

12. It is recommended that 50 per cent of all community operators and technicians who are trained in future are women and that they are selected by *marro* (women's) institutions in the locality. In this way, women will be empowered to maintain and repair community hand pumps and play a more active and central role in improving functionality.

13. It is recommended that international development actors and the zonal Water Office undertake a pilot to explore alternatives to Water Management Committees, through participatory discussions with *jarsa olla* (village elders) and *marro*. For example, it might be possible to test the use of a locally appointed *Abba Heregae* or indeed a woman *Heregae* to be responsible for use, maintenance and repair of individual hand pumps. As part of the pilot, it might be possible to install a hand pump for an individual clan and in this way test their capacity to improve the management of hand pumps.

Motorized pumps today play an important role in the provision of water for human and livestock populations: women value the quality of the water; and men appreciate the ease with which large numbers of livestock can be watered with minimum labour. While greatly valuing the role played by motorized pumps, men are aware that when these pumps fail, they have to trek their livestock to alternative water sources which may be far distant. For this reason, the men ranked motorized pumps after traditional wells, which they consider to be more reliable.

With the primary focus of the study on drinking water for human and livestock populations, there was little time to explore the impact of motorized pumps on grazing in the focus group discussion. There were however opportunities to discuss the relationship between water and grazing with key informants. Some, including a *Konfi* and *Abba Heregae,* confirmed that the installation of a high-volume motorized pump in their home area had attracted huge numbers of livestock from the surrounding area that were beyond the grazing potential of the immediate area. As a result, rangeland and livestock productivity in the area had been negatively affected. The key informants also explained that addressing this problem had proved challenging as motorized pumps are managed by local government with the support of Water Management Committees. Water Management Committees typically operate outside Borana customary systems and hence they have limited capacity and authority to address complex water and livestock management issues.

14. It is recommended that international development actors, perhaps supported by CARE and its RESET II partners, identify two or three pilot *dheeda* in which motorized pumps have been installed and undertake detailed benefit-cost assessments in order to understand better the medium and longer-term implications of this choice of technology.

    It is recommended that working with the *jarsa dheeda* and *marro* institutions efforts are made to address cost-related issues, including, as appropriate decommissioning, re-locating – although it is recognised that this will involve considerable additional costs – or regulating the use of motorized pumps in order that sustainable livestock grazing systems can be re-established, and rangeland degradation is arrested and reversed.

15. On a similar pilot basis, it is recommended that responsibility for day-to-day management of one or two motorized pumps is temporarily passed to the *jarsa dheeda* and *marro* representatives in order to be brought within the jurisdiction of customary institutions and management systems. As appropriate, the *jarsa dheeda* and *marro* representatives might be supported to appoint an *Abba Heregae* to manage the livestock watering rota with local herders for a trial period. Such pilots should be closely monitored and appropriately and fully documented and reported on. Based on the findings, decisions could be be made regarding the scaling-up of promising approaches.

16. It is recommended that no new motorized pump are installed without *dheeda-level* discussions and approval by elders and senior *marro* representatives. It is also recommended that ahead of any such investment *dheeda* representatives are required to produce detailed use, management and maintenance plans and grazing management plans that detail exactly how huge influxes of livestock from the surrounding area will be prevented. These plans could be developed by the *dheeda* representatives with the support of NGO monitoring and evaluation staff.

17. It is recommended that new motorized pumps are solar-powered and that over time diesel-powered pumps are replaced with solar pumps through innovative cost recovery schemes, rather than distributed free. As it can be expected that such upgrades will result in significant savings in future operation and maintenance costs, it should be possible for benefiting *dheeda*

or communities to invest revenue from the pumps in improved site management, more timely maintenance and eventual replacement.

5.1.3 Support for Innovation and Change

The field work, drawing on discussions with more than 400 agro-pastoral and pastoral women and men, confirms that communities have little confidence in managerial capacity of Water Management Committees, and that they would rather water be managed under customary arrangements. These discussions also confirmed that water points managed under customary rules require individuals and households that misuse water to do community work and as necessary pay fines. Currently, it appears that Water Management Committees have limited capacity to address misuse.

18. It is recommended that international development actors pilot the phased reintroduction of customary water management systems including the appointment of *Abba Heregae* across a range of water sources. Recognising that customary institutions themselves are not static but continue to evolve and develop over time, it may be possible to appoint a woman *Heregae* at pilot sites where women collecting water for domestic use are the primary users. Based on the documented outcomes of these pilots, it may be that international development agencies could support the emergence of more appropriate and sustainable water management systems that strengthen as opposed to undermining customary institutions and leadership.

Field observation supported by focus group discussions and key informant interviews confirmed impressive levels of community engagement in the development, rehabilitation, repair and management of water sources. Some ongoing initiatives for example involved community contributions of as much as US$7,000/ month. Typically, such community initiatives are overlooked by development planners from resource mobilization and organisational perspectives with the result that opportunities for collaboration are missed. Fortunately, there are examples of collaborative partnerships in Borana that have supported complex and costly rehabilitations and improvements. Such partnerships appear to offer a viable pathway for increased future investment in the future.

19. It is recommended that international development actors take a more collaborative approach to water resource development in Borana, with a shift in emphasis from donor requirements to local needs and priorities in the context of improved resilience and better natural resource management. As part of future such collaboration it is recommended that all development actors come together to agree a minimum community contribution. This could be set for example between 35 – 50 per cent of all costs and in this way, communities become partners in development as opposed to recipients of development.

The Government's Growth and Transformation Plan II (GTPII) sets a national rural target for water coverage of a permanent water point within 1.5kms of all households. While such a target may be appropriate for higher-density sedentary farming areas, this target is neither realistic nor appropriate for sparsely populated pastoral areas. This said, it is unacceptable that women in pastoral areas are required to walk up to 12 hours in a day to collect water for household use in the dry season, with the result that their health, childcare, other domestic chores, and livelihood activities all suffer.

20. It is recommended that Borana zone establish a Water Task Force that among other things sets realistic targets on the proximity of water points. While recognizing the Task Force must be allowed to set its own targets, it is suggested that the initial target for women from sedentary households be no more than 2 hours a day or 8kms to and from the primary water source. Setting targets however for pastoral women is more challenging as these households routinely

move between different seasonal grazing areas and hence the distance to and from water varies seasonally.

21. It is recommended the Water Task Force supports wider studies related to water, including a water and sustainable grazing systems study in partnership with one or more *dheeda.* The primary purpose of such a study would be to: map trends in rangeland productivity, identify good and innovative practices that can be taken to scale, and identify appropriate institutions and approaches to arrest and reverse rangeland degradation. Among other issues, the Task Force will need to address: the proliferation of water points and settlements; loss of livestock mobility; spread of dryland farming into prime grazing areas; and deterioration of rangeland and forest resources. The findings of such a study would support the water sector to re-align current ways of working, for improved resilience outcomes.

5.2 Generic conclusions and recommendations

The inclusion of a sub-section on generic conclusions and recommendation reflects one of the main findings of the study, that a narrow focus on water resource development alone will not address wider issues of resilience.

This study was carried out at a time of unprecedented change in Ethiopia. While recognising it may take months and possibly years for these changes to become the new political reality, there appears to be increasing policy space for international development actors to counter long-standing perspectives on pastoralism. In particular, it may be possible to challenge conventional thinking on mobile livestock production systems, in particular at a time of accelerating global climate change, when weather systems are forecast to become more rather than less erratic.

22. It is recommended that International development actors come together to coordinate messaging that recognises and promotes mobile livestock production and pastoralism as a viable livelihood option for households in Borana and wider in Ethiopia's arid and semi-arid pastoral lowlands.

The changes taking place in Ethiopia include improved opportunities for women and girls as, amongst other things, in October 2018 the Prime Minister appointed women to half of the ministerial posts in his cabinet.

23. It is recommended that international development actors review and, as required, set gender-balanced staff targets for 2020 and balanced senior staff targets for 2025 for their operations in Borana. This may require affirmative action recruitment with on the job training. Without the introduction of such targets, it is unlikely that gender equity will be achieved any time soon in the zone.

24. It is also recommended that international development actors make increased efforts to deploy local men and women to implement development, resilience and emergency programmes in Borana zone. Not only are local appointees likely to be more familiar with local customs and customary institutions, they are also more likely to be committed to living and working in the area over many years. As required, international development actors can offer in-house training, unpaid leave and sabbaticals for staff to upgrade their skills and qualifications and over time, support local staff to compete for more senior staff positions.

The Borana rangelands are degraded and, in some areas, grasslands have been out-competed by woody shrubs. Degraded rangelands support fewer cattle in particular in times of severe drought, when rangeland productivity is at its lowest. During such times, cattle are particularly at risk. In

response, the Borana have diversified their herds to include more camels and goats, as both are browsers and therefore able to survive on more drought tolerant shrubs.

25. It is recommended that international development actors support accelerated herd diversification by availing female camels on a cost recovery basis to pastoral households of average wealth with few or no camels.

26. It is also recommended that international development actors coordinate with local government to review the status of camel health delivery services and, as appropriate, invest in improved services, to enhance drought resilience and child nutrition outcomes.

As many as half of all Borana households are engaged in dryland cereal production and other income generating activities: poultry production, livestock and petty trading and the collection and sale of forest products. A growing number of very poor ex-pastoralists live in trading centres and market towns and support themselves by begging, the collection of firewood and other forest products and daily labour.

27. It is recommended that international development actors engage with and seek to support improved development, resilience, social protection and emergency outcomes for poor and very poor ex-pastoral households.

28. It is also recommended that international development actors coordinate efforts to research and develop good practice, 'do no harm' standards that ensure that future investment in ex-pastoral programming does not undermine local pastoral production systems.

Local government has recently recognised *dheeda* or customary landscape-level rangeland management institutions. This certification process offers international development actors new institutional partners for future development, resilience, social protection and emergency interventions, including water resource development.

29. It is recommended that in addition to continuing to work with zonal and *woreda*-level administrators and line-ministries, international development actors work with and alongside customary *dheeda* institutions. In this way, future development-related investments will achieve higher levels of participation, inclusivity and accountability.

Borana women are part of *marro* institutions that provide essential support to women in times of need. While customary social systems have recognised limitations, they potentially offer a more appropriate institutional basis for the delivery of women's programmes than externally imposed women's groups.

30. It is recommended development actors deliver women's empowerment and gender-specific interventions for women through *marro* institutions, with a view to strengthening rather than undermining existing Borana women's social institutions and capital.

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Annex 1. RESET II - Terms of Reference for an Investigative Study in Sustainable Water Resource Development in Borana, Ethiopia

Background: CARE Ethiopia / RESET II

CARE is a humanitarian non-governmental organization committed to working with poor women, men, boys, girls, communities, and institutions to have a significant impact on the underlying causes of poverty. CARE seeks to contribute to economic and social transformation, unleashing the power of the most vulnerable women and girls.

The RESET II project in Ethiopia, Oromia Region, Borana Zone is a 3-year EU-funded project running from October 2016 through to March 2020. This project supports pastoralist communities to improve their resilience to livelihood shocks and stresses. The project works in the; Health and WASH / Livelihoods and NRM / DRM / KM / Gender Empowerment, sectors. The project target 100,000 resource poor (PSNP) households. The RESET II project is implemented by CARE, AAH and OSHO. The project is led by CARE, which plays an overall leadership role as well as implementing field activities. The project covers 6 woredas.

Scope: RESET II

The Goal/Purpose of RESET II project is to; address the root causes of displacement and irregular migration in Borana Zone, through the creation of economic opportunities and increased resilience capacity of vulnerable communities. The project initiative has 5 expected outcomes outlined below:

To achieve the goal, the RESET II project implements the following key Outcomes / Activities:

- Increased access to improved Basic Health Services
- WASH
- Diversified Livelihoods Opportunities
- Natural Resource Management
- Improved Disaster Risk Reduction Management Capacity
- Enhanced Research and Knowledge Management
- Increased Women's Empowerment

Table 1. Geographic Area and Population Coverage

Region	District	Community	Total Households	Total Household Members
Oromia Region, Borana Zone	Dillo (CARE)	50% Kebeles	Estimated 3333	Estimated 16,666
Oromia Region, Borana Zone	Arero (CARE)	50% Kebeles	3333	16,666
Oromia Region, Borana Zone	Moyale (CARE)	50% Kebeles	3333	16,666
Oromia Region, Borana Zone	Miyo (AAH)	50% Kebeles	3333	16,666
Oromia Region, Borana Zone	Dhas (OSHO	50% Kebeles	3333	16,666
Oromia Region, Borana Zone	Dire (AAH)	50% Kebeles	3333	16,666

Table 2. Key Participants, Target, and Impact Groups

Key Participants	Impact or Target Group	No. Direct Participants	No. Indirect Participants
Government Offices At Zonal and Woreda levels	Health Office Pastoral Development Office Drought Risk Management Office Women Affairs Water, Mineral and Energy office, Planning and Economic Development office	60	120
Borana Rural Community Groups	Pastoral and Agro-Pastoral resource poor (PSNP) households	100,000	500,000

Research: Purpose, Objectives, and Rationale

The investigative research study to be conducted aims to investigate, review and recommend initiatives for**:**

- The improved management of water resources in the Borana lowlands.
- The study will focus on both the traditional management of water resources and the sustainable management of new water resources within a functional pastoralist rangeland management context.
- The study will focus on the changing roles of both men and women, as water managers and the introduction of new water system management.
- The study will also present, review and recommend the use of appropriate water management technologies at both the landscape and household level, and within rural and urban contexts.

This research study is important because water resource management roles for men and women are under stress in the Borana lowlands and in the modern context, are both increasingly unclear and changing over time. Traditionally, men primarily managed water resources. Traditional water management systems remain functional if undisturbed, however pressure on water resources use, increasing water use demand and the creation of new water resources, is undermining these rural based traditional management systems. Women also have a clear role in traditional water resource management, in that they have the key responsibility for family (and small livestock) access to clean water at the household level. This responsibility is a recognized labour burden for rural women and girls and there are also significant problems with water access, transport, storage and quality.

The Research Problem

Water management systems in the Borana lowlands are increasingly confused between traditional and modern water management systems and increasing rural and urban water resource demand. The current situation results in ineffective water resource management. This is not least the result of significant changes in water use stakeholders, rapid investment in new water resource infrastructure and an exponential rise in water demand by both people and animals in both rural and urban settlements.

The ***objectives*** of the research study are as follows:

- Investigate water resource demand and supply for both rural and urban populations in the Borana lowlands.
- Map all existing and planned water resources.
- Investigate and review the current state of management of water resources in the Borana Lowlands, with a clear focus on the roles of men and boys / women and girls – looking at specific rural and urban case studies.

- Clearly identifying the strengths and weaknesses of these different and defined water management systems in the modern sustainable development context.
- Investigate the water interventions of Government and Non-Government actors, in particular identifying which intervention are more successful and why.
- Investigate potential new roles for men and boys / women and girls in water management, both potential and emerging
- Make recommendations for strengthening rural and urban water resource management.
- Present and review appropriate water management systems and technologies, including latest innovations.

Intended Users and Use

The research study will produce a series of booklets that will address the specific research questions on a stand-alone basic. The study booklets will be combined to create the overall study report output;

The research findings will be used and shared by relevant stakeholders. The following table outlines the expected communications to be produced from the research findings and processes (i.e. reports, presentations, etc.), the purpose of the communications, as well as the intended users.

Table 3. Research Communication and Reporting Plan

Communication Format	Purpose of Communication	User	Person Responsible	Timing/Dates	Notes
Monthly update meetings	Keep CARE informed about research progress				
Mid-point workshop	Present preliminary findings				
End point Workshop	Present completed/final findings				
Borana Water Resource Management Documentation	Document production of the research findings: Study Booklets				
Borana Water Resource Management Workshop	Action plan Document based in recommendations				

Research Criteria and Questions

1) Investigate water resource demand and supply for both rural and urban populations in the Borana lowlands.
2) Map all existing and planned water resources.
3) Investigate and review the current state of management of water resources in the Borana Lowlands, with a clear focus on the roles of men and boys / women and girls – looking at specific rural and urban case studies.
4) Clearly identifying the strengths and weaknesses of these different and defined water management systems in the modern sustainable development context.
5) Investigate the water interventions of Government and Non-Government actors, in particular identifying which intervention are more successful and why.
6) Investigate potential new roles for men and boys / women and girls in water management, both potential and emerging
7) Make recommendations for strengthening rural and urban water resource management.

8) Present and review appropriate water management systems and technologies, including latest innovations.

Approach and Methodology

The applied research study is an investigation of a defined development problem (see above). The consultants will adopt an investigative and participatory approach, involving the RESET II project team / Government / other NGOs and Borana rural and urban communities in the investigative work and problem-solving discussions and processes. The consultants will define and conduct the applied research in close collaboration with the RESET II teams (CARE / AAH / OSHO. The consultant should specify the different techniques to be used for data collection and analysis, structured field visits and interactions with beneficiaries. Research tools, methodology and findings will be reviewed and validated with various stakeholders and approved by the RESET II manager at CARE.

Primary Data

The collection of primary data will involve mostly participatory methods, especially Participatory Learning and Action (PLA) tools. To answer the Key Research Questions, data will be collected using a stratified, gender disaggregated, purposive sampling methods. The sample size will cover all six RESET II target woredas.

Some of the key stakeholders that must be targeted through the primary data collection include:

- Rural and Urban communities including Borana *Gada* systems
- RESET II Implementation team – CARE / AAH / OSHO
- Relevant Regional / Zonal / Woreda Government offices
- Other NGO's working in the water sector
- RESET PLUS - UNICEF ground water mapping
- Private Sector actors
- Another

Secondary Data

The research process with include retrieving existing water research documents and data. This will include: a desk review of existing literature including Water sector reports, formative water resource research, government / NGO implementation water development plans, M&E data, formal policy documents, official statistics, and other relevant quantitative and qualitative secondary data that will support the research and investigation processes.

Final Report Requirements

The research consultants are accountable to maintain the requirements for the content, format, or length of the final report, overall quality and approved timelines. They will produce a comprehensive research report that assesses the problem and provide prioritized recommendations to overcome the problem.

Data Disclosure

The external evaluator should deliver, at minimum, all files including: quantitative data sets (raw and refined products), transcripts of qualitative data and others in an easy to read format and maintain naming conventions and labelling for the use of the project/program/initiative and key stakeholders.

The research will be divided in to specific areas of study, which will then be written up as specific topic booklets.

All documents should be compliant with the following conditions

- [Please insert clause on data ownership. Regulation on data ownership differs from country to country. Please ensure that a clause is inserted which ensures that CARE is compliant with necessary data ownership and data user regulation as well as with any donor requirements.]
- CARE requires that the datasets that are compiled or used in the process of external evaluation are submitted to CARE when the evaluation is completed.
- **Data must be disaggregated by gender**, age and other relevant diversity.
- Datasets must be anonymized with all identifying information removed. Each individual or household should be assigned a unique identifier. Datasets which have been anonymized will be accompanied by a password protected identifier key document to ensure that we are able to return to households or individuals for follow up. Stakeholders with access to this document will be limited and defined in collaboration with CARE.
- In the case of textual variables, textual datasets or transcripts please ensure that the data is suitable for dissemination with no de-anonymizing information **UNLESS** these are case studies designed for external communication and suitable permission has been granted from the person who provided the data. In these circumstances, please submit, with the case study, a record of the permission granted, for example a release form[111].
- Where there are multiple datasets (for example both tabular and textual datasets) identifiers must be consistent to ensure that cases can be traced across data lines and forms.
- CARE must be provided with a final template of any surveys, interview guides, or other materials used during data collection. Questions within surveys should be assigned numbers and these should be consistent with variable labelling within final datasets.
- Formats for transcripts (for example: summary; notes and quotes; or full transcript) should be defined in collaboration between CARE and the consultant.
- In the case of tabular datasets variable names and variable labels should be clear and indicative of the data that sits under them. Additionally, the labelling convention must be internally consistent, and a full codebook/data dictionary must be provided.
- We require that datasets are submitted in one of our acceptable format types.
- CARE must be informed of and approve the intended format to be delivered at inception phase. Should this need to be altered during the project CARE will be notified and approval will be needed for the new format.
- The external consultant will be responsible for obtaining all necessary permissions, approvals, insurance, and other required permits needed for data collection. These include required permits related to data collection from human subjects, including necessary ethical review board approvals (ERB) and health and accident insurance for consultant team members.

Roles, Responsibilities, and the Timeline

During data collection and analysis, the primary roles of CARE program staff and any implementing partner with a direct stake in the project, are as informants and reviewers. They may review and provide comments on data collection tools, instruments, and all other deliverables before they are finalized.

The following tables delineates the key roles and responsibilities of CARE Staff and the consultant during the evaluation process:

[111] All release forms should be agreed in advance with CARE.

Table 4. Roles and Responsibilities on Evaluation Team(s)

Person/Unit/Organization	Activity
Ben Irwin: PU Coordinator	Research design and oversight during the research
Did Boru: RESET II Project Manager	Research design and oversight during the research
Anteneh Berhane: PU LDM Manager	Support, communications, presentation, review, reporting responsibilities during the research
Project LDM Advisor	Support, communications, presentation, review, reporting responsibilities during the research

The following tables delineates the research timelines and milestones during the research process.

Table 5. Research Timeline and Milestones

Evaluation Activities	***Month 1***	***Month 2***	***Month 3***				
Research planning / inception							
Desk and technical reviews							
Field work and study							
Write up and presentation							
Review and finalization							

Annex 2. Itinerary in Ethiopia

Date	Activities
7th November	Departed Manchester Airport for Addis Ababa, via Istanbul
8th November	Arrived Addis Ababa. Meeting with Ben Irwin, Pastoral Unit Coordinator, CARE Ethiopia
9th November	Meetings with Pastoral Unit team, CARE Ethiopia and preparation for travel and fieldwork. Travelled Addis to Hawassa.
10th November	Travelled Hawassa to Yabello. Introductory meeting with RESET II Project Manager, CARE Ethiopia
11th November	Introductory workshop with CARE RESET II study team members Participatory Rural Appraisal training workshop for study team members
12th November	Field-testing the field methodology in Dambi *kebele*, Yabello *woreda*, followed by final adjustments to field methodology
13th November	Field work in Bule Korma *kebele*, Teltele *woreda*
14th November	Field work in Romso *kebele*, Dirre *woreda*
15th November	Field work in Meti *kebele*, Miyo *woreda*
16th November	Field work in Goray kebele, Dillo *woreda.* The field work included a visit to the
17th November	excavation site of a new *ela adadi* in the crater are Goray
18th November	Visit to Haro Bake livestock market and the Yabello Ranch where improved Borana cattle are bred
19th November	Field work in Dharito *kebele*, Yabello *woreda*
20th November	Field work in Tesso-Qallo *kebele,* Dhas *woreda*
21st November	Field work in Gadda *kebele*, Arero *woreda*
22nd November	Field work in Anole kebele, Dubluq *woreda*
23rd November	Field work in Surupa town
24th November	Data analysis
25th November	Travel to Hawassa
28th November	Travel to Addis Ababa
29th November	Data analysis and key informant interviews
30th November	Exit presentation at CARE Ethiopia
3rd November	Depart Addis Ababa for Manchester Airport, via Istanbul

Annex 3. Methodology

The study took place between November 7 to December 3, 2018 and structured around: a literature review, fieldwork and validation process. The fieldwork was carried out in Borana zone from November 12 to November 26, 2018 at purposively sampled locations: 4 agro-pastoral and 4 pastoral communities in 8 *woredas*;[112] and meetings with key informants at zonal, *woreda*, *kebele* and community level. Locations and main livelihood zones are presented in Table 1. The team met a total of 419 people: 170 women and 249 men.[113]

At each location, separate focus group discussions (FGDs) were organised for men and women under a convenient shade tree. The team used participatory rural appraisal (PRA) techniques, which encourage participation and reduced the risk of elite capture by special interest groups. Techniques included: mapping, historical timelines, proportional piling[114] using 100 stones or seeds, scoring/ ranking and verification/ triangulation. Following a training day,[115] the methodology was field-tested in Dambi *kebele*, Yabello *woreda* and adjusted to ensure the interviews were completed in under two hours. The field-test confirm that FGD participants responded well to pairs of mixed gender facilitators and this became modus operandum of the study.

Table 1. Location of the focus group discussions

Woreda	Kebele	Village	Livelihood zone
Yabello (field-test)	Dambi	Dambi	Pastoral
Teltele	Bule Korma	Gololee	Agro-pastoral
Dirre	Romso	Gawalee	Agro-pastoral
Miyo	Meti	Debeka	Agro-pastoral
Dillo	Goray	Dirriba Saphansa	Pastoral
Yabello	Dharito	Kulalo	Agro-pastoral
Dhas	Tesso-Qallo	Tesso Morowa	Pastoral
Arero	Gadda	Gadda	Pastoral
Dubluq	Anole	Dhaga Dima	Pastoral

The FGDs were structured around themes and key questions as presented in Table 2. In addition, the team met 2 groups of 10 – 12 agro-pastoralists and pastoralists to: map water and rangeland resources, develop historical timelines and collect details of selected water sources: construction, maintenance and use. Details of the tasks and questions are presented in Table 3.

[112] With a primary focus on the southern agro-pastoral and market-isolated cattle and shoat and Borana-Guji cattle pastoral zones as conflict in Moyale prevented access to pastoralists in the border area with Kenya. For livelihoods in Borana zone see: USAID. (2018). Household Economy Analysis Results: Oromia Regional Overview 2018 and Changes in Livelihoods Since 2007.

[113] Mobilization was the same for men and women. Women FDGs were however more poorly attended than men's because they were involved in other household duties including fetching water.

[114] The review team used locally available materials such as stones to assess the relationship between different variables or indicators, with the biggest number of the 100 stones or assigned to the most important and the least number to the least important.

[115] The author facilitated a PRA training day to familiarise the study team with the techniques to deliver the study methodology.

Table 2. Key themes and questions

Theme 1. Water sources
1. What are the main dry season sources of water in this community today: *Gedaa* Kora Jarso and 32 years ago: *Gedaa* Boru Guyo?
Theme 2. Development outcomes
1. Identify and rank 3 important positive outcomes resulting from the development of water for human and livestock populations For the women's groups: detail the savings for 5 randomly selected women - before and after the development of a named water source
Theme 3: Recommended improvements
2. Identify and rank 3 technical improvements for water sources in your location
3. Identify and rank 3 managerial improvements for water sources in your location

Table 3. Details of additional information collected

1.	**Mapping:** map key water and grazing resources including for the *ganna* and *bona hagaya* seasons
2.	**Timelines:** develop historical timelines to represent the development of key water sources
3.	**Profiles: construction, maintenance and use**
3.1	How many people were involved in the construction and what was the estimated value of their contributions?
3.2	How many people are involved in maintenance and what is their contribution – daily, monthly, annually?
3.3	How many people and livestock regularly use these water points in the wet and dry seasons?

The team also met 22 key informants, representing: government – including the Zonal Administrative Office and Ministry of Water, Irrigation and Electricity; the RESET II team and other CARE staff; other international and local NGOs; and customary institutions. Key informant names and contact details are presented in Table 4. The main questions asked to key informants are presented in Table 5.

Table 4. Key informants

Name	Title
Ben Irwin	Coordinator, Pastoral Unit, CARE Ethiopia
Sintayehu Mesele	programme Quality and Learning Coordinator , CARE Ethiopia and former Lowland WASH Manager
Dhenge Boru	Zonal Administrator, Borana Zone
Guyo Qanchora	Deputy Pastoral Development Office Head
Galma Hussein	Deputy Head and Process Team Leader – Steering and Design, Zonal Water, Energy and Mines Office
Wako Liban	Zonal Water, Energy and Mines Office Head
Tari Malicha	Head of Water Office, Arero *Woreda*
Mohamed Aliyo	Head of Water Office, Gomole *Woreda*
Marijana Simic	Country Representative, IRC
Jockus Zamari	Senior Water Specialist, IRC
Abarufa Jatani	Project Manager, PRIME, Mercy Corps
Mintesinotyifru Gamachisa Bekele	Project Manager, Action for Development
Liban Halake	WASH Officer, CIFA
Did Boru Ali	Team Leader, RESET II, Yabello
Gizaw Nedhassa	RESET II WASH Construction Specialist
Tura Duba Golicha	*Abba Dheeda* – customary leader
Tula Oditus Dabessa Dube Halake	*Konfi* – customary leaders

Boru Golicha Boru Godana Wako Gedo	*Abba Heregae* – customary leader

Table 5. Questions for key informants

1.	**Achievements**: what do you think has been done well in water resource development in the last 32 years - *Gedaa* Boru Guyo
2.	C**hallenges:** what do you think has been done less well in water resource development in the last 32 years - *Gedaa* Boru Guyo?
3.	**Recommendations:** what recommendation do you have to either consolidate or build on successes or to address weaknesses?
4.	Do you have any other questions or comments?

Finally, the author of the report presented preliminary study findings at a meeting of CARE Ethiopia staff in Addis Ababa. The names of the staff present are presented in Table 6. Broad themes that were discussed at the workshop are presented in Text Box 1. Information and ideas generated in this meeting have been incorporated in the final report.

Table 6. CARE Ethiopia staff present at the presentation of preliminary findings meeting

No	Participants Name	Role
1.	Silke Handley	Program Director
2.	Cassandra Craven	Interim Program Director
3.	Meron Kidane	Deputy Program Director
4.	Elisabeth Teshager	Emergency Programs Coordinator
5.	Sintayehu Melese	PQL Coordinator
6.	Alebachew Adem	CCA Advisor
7.	Sisay Awugichew	DFSA Coordinator
8.	Gardachew Tilahun	WASH LDM Advisor
9.	Martha Alemayehu	LDM Advisor, SRH
10.	Daniel Dinku	Emergency Programs Officer
11.	Anteneh Berhanu	PU, LDM Manager

Text Box 1: Summary of the Discussions at the Presentation Meeting of the Study Findings

Q1. Are the conclusions and recommendations for CARE Ethiopia or are they intended to be broader?
Response: this is not an evaluation of CARE Ethiopia's work in Borana. Hence the conclusions and recommendations are broader than CARE's programming. It may be however that CARE Ethiopia could take a lead in promoting some of the recommendations. I can also prepare some specific recommendations for CARE Ethiopia. This will however be done separately and outside the main body of the report

Q2. It is important that the conclusions and recommendations are relevant for the zone and region as well as for international NGOs. Have you considered this in your study?
Response: we have tried to cover all aspects of water from a zonal, woreda, NGO and community perspective.

Q3. Did the study consider sand-dams as it appears to be a promising technology?
Response: the study team only covered those water technologies that were used in the areas where the focus groups were held. No mention was made of sand-dams.

Q4. The Government is promoting boreholes and pipelines as groundwater is clean and improves

health outcomes. UNICEF and others are undertaking a groundwater survey that should reduce the number of dry drillings. Shouldn't the main focus of the report be on boreholes in particular at a time of global climate change when water tables may well be falling?
Response: boreholes are important groundwater sources of water in particular in the dry season. There are however other important sources of water: ponds and *ela* or wells. Motorized pumps on deep boreholes also breakdown and repairs sometimes take a long time. It is important that the water sector moves forward with a balance of technologies.

Q5: Boreholes are managed by Water Management Committees and your report suggests they have capacity constraints. Why did you not recommend more training? The same for ponds and pond maintenance. Isn't it mainly a capacity problem that we are facing that can be best addressed through training?
Response: I think we agree that there is a capacity problem and that if this can be addressed then water systems in Borana will be more reliable. I think however I wonder if training can address this problem alone as there are wider issues that also need to be addressed. For example, can effective capacity building be done, outside the customary rangeland management system? Perhaps in towns this is possible. But in the rural areas, I wonder.

Q6: Three *dheedas* have been recognized officially. These are in pastoral areas. Others have not yet been recognized. How do we continue to promote change and development and build resilience in Borana when there are parallel systems working?
Response: this is a very good question to which I have no real answer. What I think I do know however is that the customary structures and institutions are still there and that appropriately supported, I think they could play a central role in resilience building in the future.

Q7: CARE has been operating in Borana since 1984. It implements different projects, but these are rarely maintained in the long-term and the lessons learned are often quickly forgotten. Some of the work that CARE Ethiopia has done in Borana has been excellent. But unfortunately, no-one has looked at CARE's work in Borana from a systems approach. What do you think can be done to better learn and build on CARE's work in Borana?
Response: It is really important I think that CARE Ethiopia capture all the lessons that it has learned in Borana in a strategic plan.

Q8: I think it is important to continue to invest in ponds as they play a strategically important role in particular in the wet season. Perhaps it would be better to continue to invest in small ponds in remote areas where groundwater is not easily available.
Response: it may be that there is a role for ponds as a seasonal water source to extend grazing in some more remote areas by one or two months, but certainly not for large ponds that radically affect and undermine seasonal grazing patterns. Seasonal grazing is of critical importance to the sustainability of the Borana livestock grazing system.

Q9: Is investment in Borana making the people more resilient? Are we getting real value for money? If not, should we consider large-scale water development for irrigated fodder and agriculture?
Response: I think that resilience is a difficult concept to measure and it seems from much of the research that is being carried out in the pastoral areas of Ethiopia that limited progress is being made to improve resilience. I think the same is true in Borana as there are more, poor Borana today than there were 20 and 40 years ago. It seems very likely that towns will need to grow to absorb ex-pastoral households and support them to establish diversified livelihoods. To be successful, Government and donors will need to support and to champion the findings of evidence-based resilience building work. Without an evidence-base it is not clear what is working and what is not.

Q10: We have the One-WASH programme in Ethiopia that works mainly in the highlands. Don't we need to know what the key messages are and to replicate these in the lowlands in order that there is consistency across the country?

Response: As I think I say in my findings, I think it is important that we have a different approach to water in the lowlands and that those delivering WASH projects are encouraged to operate to different and more locally appropriate standards. It would be helpful if CARE Ethiopia brought together its Pastoral and Lowland WASH programmes with a view to harmonising learning and messaging, as an example to other organisations of what might be achieved. At present different projects within agencies stress different aspects of programming and different agencies prioritise completely different interventions as a result.

Q11. Solar systems offer new and innovative solutions to the difficulties of motorized pumps and could be the best way to address challenges of functionality of water schemes in Borana. Wouldn't it be worthwhile recommending this in the report?
Response: I absolutely agree that it makes every sense to promote solar technology in Borana. It is however important too that all water development takes place within an appropriate institutional framework if water sources are to be maintained.

Q12: Why is not hygiene and sanitation analysis not included in the study findings? Also, isn't important to ensure that institutions e.g. school and health posts get access to water?
Response: I agree that it would have been useful to have had the time to collect more information on hygiene and sanitation, but with the time available this was not possible. I agree too that it is important that schools and health posts have access to water, but not that these interventions are co-opted by senior staff and others are denied the benefits. I think investment therefore is risky.

Q13. Fifty years ago, things were better than they are today and there was grass everywhere. Today the grazing is fragmented by settlement and cropping. I wonder if what you are proposing is really still possible? Do customary institutions have the capacity to be able to take a positive lead on development?
Response: I absolutely agree that this becoming more difficult. This said, I think that if any sustainable way forward is to be found to improve resilience at the household and community-levels, then I think it will necessarily require the engagement of customary institutions.