

Water Master Plan Kate and Bori sub-locations Moyale

Kenya Arid Lands Disaster Risk Reduction (KALDRR-WASH) program

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MILLENNIUM WATER
ALLIANCE

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Acronyms and abbreviations

AfDB	African Development Bank
CG	County Government
FBO	Faith-Based Organisation
FGD	Focus Group Discussion
FH	Food for the Hungry
GoK	Government of Kenya
HH	Household
IP	Implementing Partners
KALDRR	Kenya Arid Land Disaster Risk Reduction
KALR	Kenya Arid Land Region
KWS	Kenya Wildlife Service
LCCA	Life Cycle Cost Approach
LU	Livestock Unit
MUS	Multiple Use water Services
MWA	Millennium WASH Alliance
MWI	Ministry of Water and Irrigation
NGO	Non-Governmental Organisation
O&M	Operation and Maintenance
RIDA	Resources – Infrastructures – Demand – Access
WASH	Water Sanitation Hygiene
WC	Water Committee
WMP	Water Master Plan
WRMA	Water Resource Management Authority
WRUA	Water Resource User Association
WUA	Water User Association
WVI	World Vision International
3R	Recharge Retention Re-use

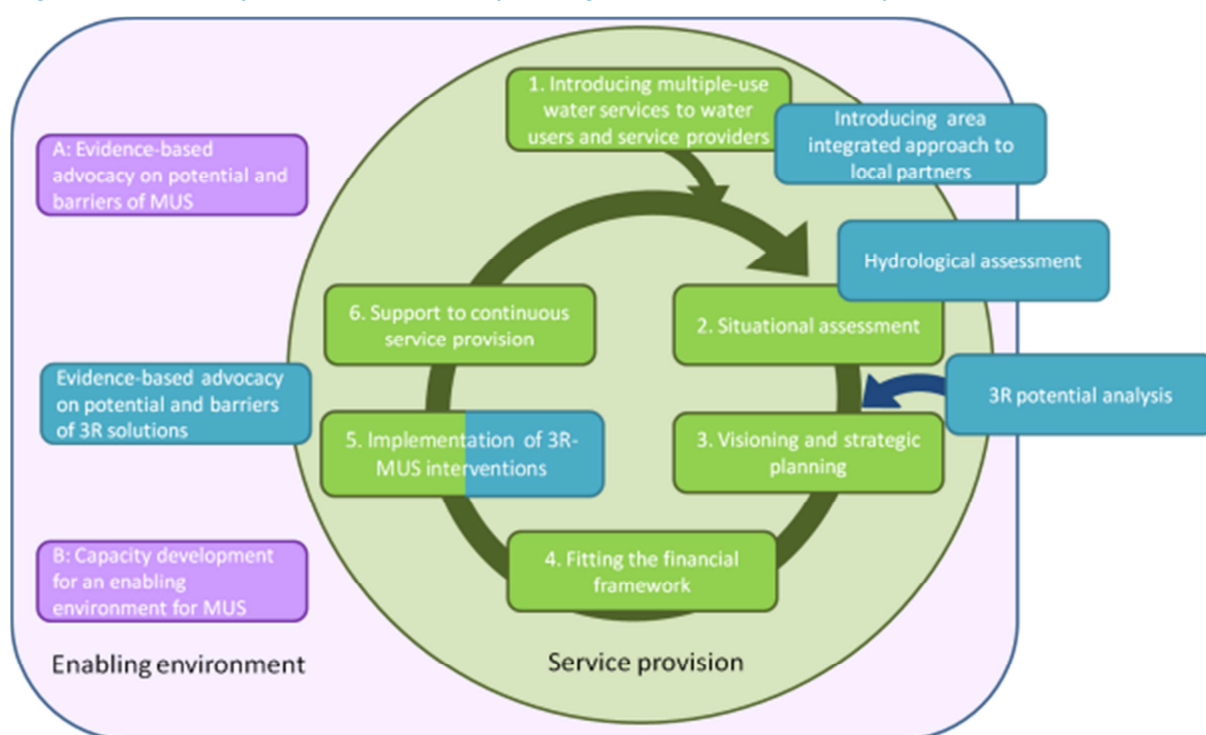
1 Introduction

1.1 Background

This report illustrates the third step of the 2-years KALDRR-WASH programme (2013–2014) of the Millennium Water Alliance (MWA), which aims at conducting water master plans in four pilot areas in the Kenya Arid Lands Regions (KALR), in partnership with MWA local implementing partners (IP)¹. The final objective of the programme is to improve resilience of the communities to recurrent drought events by improving the overall management of water supply and use of water resources in the pilot areas.

The figure below (a combination of MUS guidelines² and the 3R approach) summarizes the steps of the process; the KALDR-WASH programme focus till present has been on steps 1, 2 (situational assessment) and 3 (visioning and strategic planning through the setting-up of a Water Master Plan).

Figure 1: Process cycle for water master planning in the KALDRR-WASH pilot areas



Source: Acacia, IRC, 2013

The situational assessment for Moyale was conducted in September 2013 in targeted sub-locations by IRC and Acacia Water. This assessment methodology was based upon the RIDA framework (Resources – Infrastructures – Demand – Access) and included presentation of the MUS (Multiple Use of water Services) and 3R (Recharge, Retention, Re-use) principles to the IPs, field visits to the communities, analysis of the multiple use of water and an in-depth hydrological

¹ The implementing partners are FH (Food for the Hungry) in Marsabit, CRS (Catholic Relief Service) in Wajir, World Vision in Turkana and CARE in Moyale.

² Adank (2012). Guidelines for Planning and Providing Multiple-Use Water Services, Adank et al., MUSGROUP, IRC and IWMI, 2012.

analysis of the area using the 3R approach. Field visits were followed by a one-day stakeholder meeting to work on a vision for the area (full report of the situational assessment available on IRC website³).

The Kate-Bori Water Master Plan (WMP) is the result of a stakeholder discussion and participatory analysis conducted through 2 workshops. The first workshop on 29 and 30 January 2014 in Moyale, organised by CARE and IRC, brought together 27 participants representing 12 groups of stakeholders. These included community and local government representatives as well as civil society organisations active in the area. **Annex 1** presents the full list of participants. Based on the workshop discussions, IRC and Care have drafted the WMP for endorsement and implementation by Moyale stakeholders. This Water Master plan was further detailed and updated in December 2014, following a second workshop which took place in Moyale on 8 and 9 of October 2014; this workshop focused on financing for sustainable water service provision, using the Life-cycle Cost Approach (LCCA).

The Kate-Bori WMP is an important milestone in the planning process for sustainable water management in the area.

1.2 Purpose of the Water Master Plan (WMP)

The purpose of a local WMP is to achieve an effective, equitable and efficient use of water on a local level that will build resilience of the population against droughts and water related shocks.

The goal is to delegate planning and management to the local level, to ensure that water resources are used rationally and shared equitably and fairly among the communities in a sustainable way considering all different needs.

During the workshops, the following objectives of the WMP were discussed:

- Plan and guide implementation of water related infrastructure and water services for all types of water uses.
- Address priorities for potential water related activities.
- Achieve long-term investment and develop projects in the water sector.
- Promote conservation of water and natural resources.

It is recognized that the water planning process for Kate-Bori needs to link up with the on-going decentralisation processes and contribute to overall rural development in the area.

1.3 Water Master Plan workshops objectives and methodology

The two WMP workshops, which took place in January and October 2014, had six main objectives:

1. Bring stakeholders together in a planning forum to enable a joint search for solutions to the water gap in Kate-Bori area, including agreeing assumptions for arriving at conclusions.
2. Agree on the development and implementation a water master plan for the Kate-Bori area.

³ "Towards a better balance between water demand and supply: The Local Water Resource and Service Management approach applied to the pilot area of Kalemgorok-Katilu in Turkana"(ACACIA, IRC, 2013), <http://www.ircwash.org/resources/towards-better-balance-between-water-demand-and-supply>.

3. Identify and agree on the strategic building blocks for the water master plan for the Kate-Bori area.
4. Enable stakeholders understand and own the water balance analysis.
5. Agree on planning for actions based on the water master plan for the Kate-Bori area.
6. Build a detailed budget of prioritized activities for 2015.

The workshops consisted mostly of plenary sessions and working group sessions. Plenary sessions enabled participants to have a shared understanding of the issues under discussion in order to reach common agreements and conclusions. This was important especially for community members who could only participate actively through interpretation of discussions. The working group session enabled participants, working in small groups, to focus on key issues of governance, water service management and capacity building with a view to identifying challenges and suggesting areas of improvement. The working group findings were presented and discussed in plenary.

The body of the present report focuses on the outcomes of the first workshop, while outcomes of the second workshop are detailed in **Annex 2**.

1.4 Stakeholder Identification

The workshop participants in general felt that the stakeholders for Kate-Bori were well represented with the remark that in future the private sector and WRMA should be involved as well. The latter was invited for the workshop, but was not able to participate.

2 Description and problem analysis of the Kate-Bori area

2.1 Moyale County

According to FEWSNET Moyale county belongs to the agro-pastoral zone that is situated in the northern parts of Wajir district extending slightly to the northwestern parts of Mandera and northeastern parts of Moyale districts. This livelihood zone borders Ethiopia to the north, the Northern Pastoral Zone to the West and the Northeastern Pastoral Zone to the south and east.

The zone is arid with average annual temperatures ranging from 20°C–36°C. Although this zone lies within an area where rainfall is scanty and erratic with an annual average of 250mm, the zone receives slightly more rain than neighbouring zones which in turn supports a small amount crop production. There are two rainy seasons: the long rains from April–May and short rains from October–November. The hottest months are January–March and September–October.

The inhabitants are principally Somali, Garreh-Ajuran, Degodia and Borana. Nearly half of the inhabitants is fully settled though over a third is fully nomadic. The average household keeps 10–30 goats, 10–20 camels, 5–10 sheep and 5–15 cattle. Livestock production contributes approximately 60% to household income, with goats making up the highest contribution. On the other hand, cattle provide the highest contribution to household food needs. Households mainly cultivate drought resistant crops and grow nearly all sorghum and millet consumed by households within the zone. Households also grow about a third of the beans and other pulses consumed; over two thirds of milk and dairy products consumed are also produced by households themselves. Market purchases make up the remaining food need with households purchasing maize, beans, cooking fats and oils, rice and vegetables.

Much of the staple food purchased in this zone is sourced from Ethiopia while vegetables are transported from Meru via Isiolo. Crops are mainly cultivated under rainfed conditions. However, in Moyale district in the eastern part of the zone, floods from Ethiopia highlands are also important for agriculture. Crop production is limited by erratic rainfall patterns as well as limited access to agricultural inputs. Often households plant seed purchased from Ethiopia, which is not suited to the agro-ecology of the zone.

Insecurity, poor road infrastructure and low levels of education are some of the underlying factors causing high food insecurity in the zone. Although markets are poorly integrated and characterized by high inefficiency, supplies often flow in from Ethiopia through Moyale and Marsabit (April–July) thereby contributing to food availability.

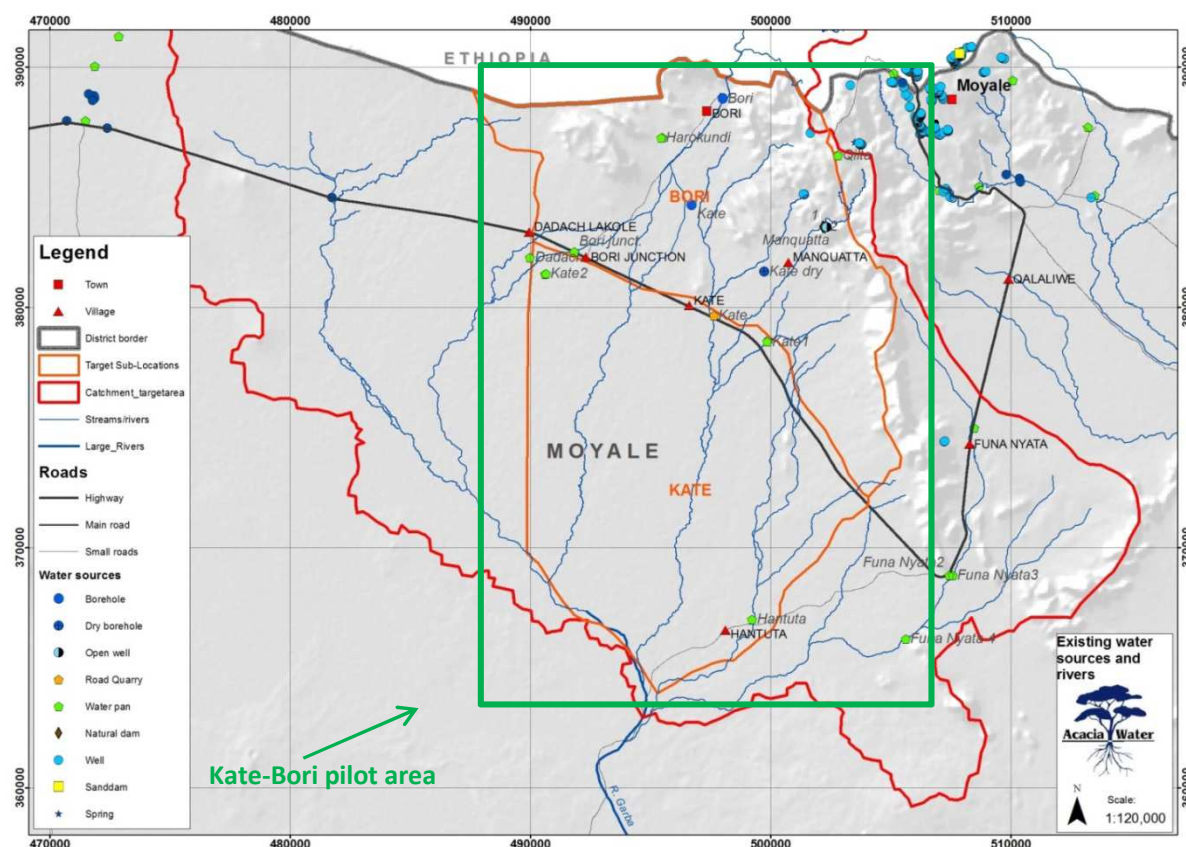
Other elements that hamper development activities in general in the area are:

- Insecurity due to conflicts caused by cattle rustling and competition over access and control of natural resources, in particular water and grazing lands.
- Although improving, both the communication and roads networks in the area are still poor and make interactive communication and logistics for support services a challenge.
- Droughts and intermittent floods set back development interventions and when they trigger emergency interventions these may interfere with the development related processes.
- Dependency culture in the community which translates to a laid back attitude to project participation, with many people strategically relies on support from NGOs and government.

Moyale district has been under food assistance programmes since 2006. The intermittent poor performance of rain seasons has necessitated food assistance programmes to vulnerable households over the years. Crop failures, livestock deaths and resource-based conflict negatively impact the livelihoods of pastoralists and agro pastoralists in these areas, which continue to experience food insecurity at the household level.

2.2 Kate-Bori sub-locations

Figure 2: Kate-Bori 3R/MUS pilot area (in green rectangle)



Source:Acacia, 2013

The 2009 population census of Kate and Bori sub-locations was revised by the workshop participants, based on data of the chief of the area. It was estimated that in 2014 6,690 persons are living in the area where for future projections an estimated growth rate of 3.0% and an average household size of 6 persons/household has been assumed (District Livestock Officer).

During the workshop the following key observations related to the area were made by the participants:

- Bori borehole is the only functional borehole in the area as the borehole in Kate has been in a dysfunctional state for close to four years.
- The Kate borehole has remained in a state of disrepair due to ongoing wrangling between the people of Kate and Bori sub-locations.
- During dry spells, most of the earth pans and sand dams dry up, as is the case currently.

- During dry spells (like the current case), there is high competition for water for livestock and domestic use at the Bori borehole, since all livestock from Bori location and beyond, together with herders as well as livestock from other locations, congregate at the Bori borehole:
 - While Bori borehole – which is to the north of Bori location – provides a dry season (all weather) water source for domestic and livestock from within and outside the Bori location, on the contrary, dry season grazing areas are to the south of Bori location, around Antuta.
 - Due to the discrepancy between the dry season watering and grazing areas, people end up losing livestock, either due to lack of water if they stay in the grazing areas or lack of pasture if they stay around the watering area at the Bori borehole.
- Seasonal migration for livestock is 0.5 the population of livestock of Bori (and in some cases, Antuta) location, for up to 3 months in a row.
- As result of high livestock and human activity in Bori sub-location during dry seasons, there is a lot of environmental degradation in the area.
- Often, there are conflicts over water during the dry seasons as everybody tries to access water for domestic and livestock use.
- In practice, the above situation means that Bori locations is the custodian of both pasture and water during dry seasons, hence the need for domestic and livestock water to be placed at different locations within the Kate-Bori area.

Detailed feedback on the visioning done by stakeholders during the initial field assessment can be found in the report 'Towards a better balance between water demand and supply: The Local Water Resource and Service Management approach applied to the pilot area Kate-Bori in Moyale (Acacia, IRC, 2013).

3 Vision for 2023 by stakeholders

The people of Kate-Bori area are concerned that their communities have become too aid dependent and that aid has undermined traditional strengths. They see that a lot of infrastructure has been put in the ground over the past years, but because poor management and poor governance and coordination services are still far from adequate. The recent violence underlines the overall feeling that the communities have less control over their future than in the past. In addition to what was mentioned as elements of their vision the previous year, the participants felt that for the livestock population it should be taken into account that due to the changing climatic conditions in which dry spells and drought periods are in the increase, more and more people will take to camel and goat rearing (and other livelihood activities) as these are hardy animals and can withstand drought better than cattle and sheep.

During the stakeholders meeting in May 2013 the following elements for the vision for the Kate-Bori area was identified:

Table 1: Vision elements Kate-Bori area

A - How would you like to see the situation in your area in 2025? (description of the “ideal” situation)
• Sufficient and safe water for all households and cattle. • Proper management of water sources. • Water management institutions functional. • Irrigation of farmland (mentioned by all groups). • Pasture and fodder enterprise (organized grazing systems). • Organised grazing systems and ranching. • Integrated health care and livelihood systems. • Area needs to be sustainable: – Improved infrastructure, Better quality of water, Permanent water available, Entrepreneurship and marketing, National resource management, Conflict management, Ranch management (grazing lands wet and dry), Rural electrification.
B - What are the main issues we should work on in the meantime to get to this situation?
• Reduced distance for water fetching. • Construction of mega-dams for irrigation, using the run off from the hills. • Make water available in the grazing lands. • Use greenhouses i.e. with irrigation to improve livelihoods and reduce dependency of food aid. • To get cows that produce more milk: Breeding programmes, Create ranch lands, bring back the Boranna cow.
Key issues mentioned include:
• Coordination and governance. Resources are not used well or applied different than meant for. • Dependency syndrome: wrong attitude of the communities who rely and depend on aid. • Aid has undermined traditional institutions. In the past people were putting in place coping mechanisms during crisis; this has now been replaced by external aid. • Urbanisation, decentralisation trend and changing of lifestyle (moving from pastoralism to settling down) (e.g. for accessing schooling for children) leads to people left idle in towns. They are confused and become alcoholics. They should be educated that their pastoralist life can be better than an idle life in the towns. • For the above and other education and capacity building, leadership is required. In that way we should get rid of Food Aid, WFP, FFA programmes. • Address water quality and hygiene. • Lot of infrastructure, but there is no good management. • Land management to protect environment, this is required before new infrastructure are put in. • Sanitation and Hygiene has to be pushed forward for the purpose of improving the quality of water. • Agree on use of water for the water points (allocation to domestic use versus allocation to livelihood). • Manage marketing better, e.g. Create livestock marketing society, to take out the middlemen (“Livestock marketing operating society”). • ‘Prosopis’(?) (exotic) plant that was brought in in the nineties (ASAL programme is damaging pasture development). • Water User Association, and in particular the position of water users, need to be strengthened through

capacity building (water rights).

- Households don't engage sufficiently in agriculture, they should be educated about the potential
- Issue of uncontrolled entering of herds to the area:
 - Good coordination could deal with both the back and forth transfer of herds with Ethiopia and the dry period migration from Wajir.
 - During colonial times the coordination of this herds migration was much better.
 - Strengthen resource associations and groups and also the cross-border meetings and declarations.
- Create learning mechanisms for improving knowledge for all, but in particular the communities, to better understand the challenges.

A few observations arising from the vision brainstorm and discussions that are worthwhile to make are:

- There is a strong desire to improve water management and governance, taking into account the different types of water use and the functioning of the different institutions;
- Acknowledgement that water issues are strongly linked to more general developments, like urbanization and to other sectors, like agriculture.
- Recognition of need for behavior change among the population, in particular related to the 'dependency-syndrome'.

4 Water gap analysis

4.1 Definitions and assumptions

The water gap is expressed as the amount of water (m³) that will be required to provide for all the different types of water uses during a dry period of 10 months. It is assumed therefore that the water storage facilities, like water pans or sub-surface dams are not replenished by rain water during this period. Deep boreholes that tap from sources much older are calculated to provide water 8 hours/day during the whole dry period.

The water gap for the Kate-Bori area has been defined as:

$$\text{Water gap in 2024} = (\text{Demand in 2024}) - (\text{Existing capacity in 2014})$$

The objective of estimating the water gap for the different water uses is to be able to quantify and qualify interventions in the WMP that will bridge the gap. The following assumptions are made:

- Estimation is for the year 2024.
- Calculation for a typical dry year with a period with no rainfall during 10 months.

It is important to realise that all figures used are broad estimates and may still show considerable variations in reality. However, where possible the figures have been verified by using different source of information and confirmation by the stakeholders of the area.

Calculations were carried out with the help of a special tool⁴ developed for the KALDRR-WASH programme. **All tables presented in this report and related to the calculation of water demand were extracted directly from the calculation tool.**

4.2 Calculation of total water gap

4.2.1 Estimated capacity of existing water infrastructure

The following table provides the estimated capacity of all existing water infrastructure in the Kate-Bori sub-location for a 10 months' dry spell, as estimated during the stakeholders during the January 2014 meeting. It is assumed that infrastructure that is at present non-functional or partly functional can be brought back to its design capacity. The volumes mentioned are the volumes in m³ that can be stored for (water pans) or produced during (boreholes) the 10 months dry period.

Table 2: Estimated available water infrastructure potential capacity in 2014 in Kati-Bori area

No.	Name	Type	Supply/Volume
1	Kate	Borehole	12,000
2	Bori	Borehole	54,000
3	Kogitare	Water pan	14,000
4	Hantuta	Water pan	6,000
5	Kate	Water pan	10,000
6	Dadachlakole	Water pan	3,000
7	Kundi 1	Water pan	6,000

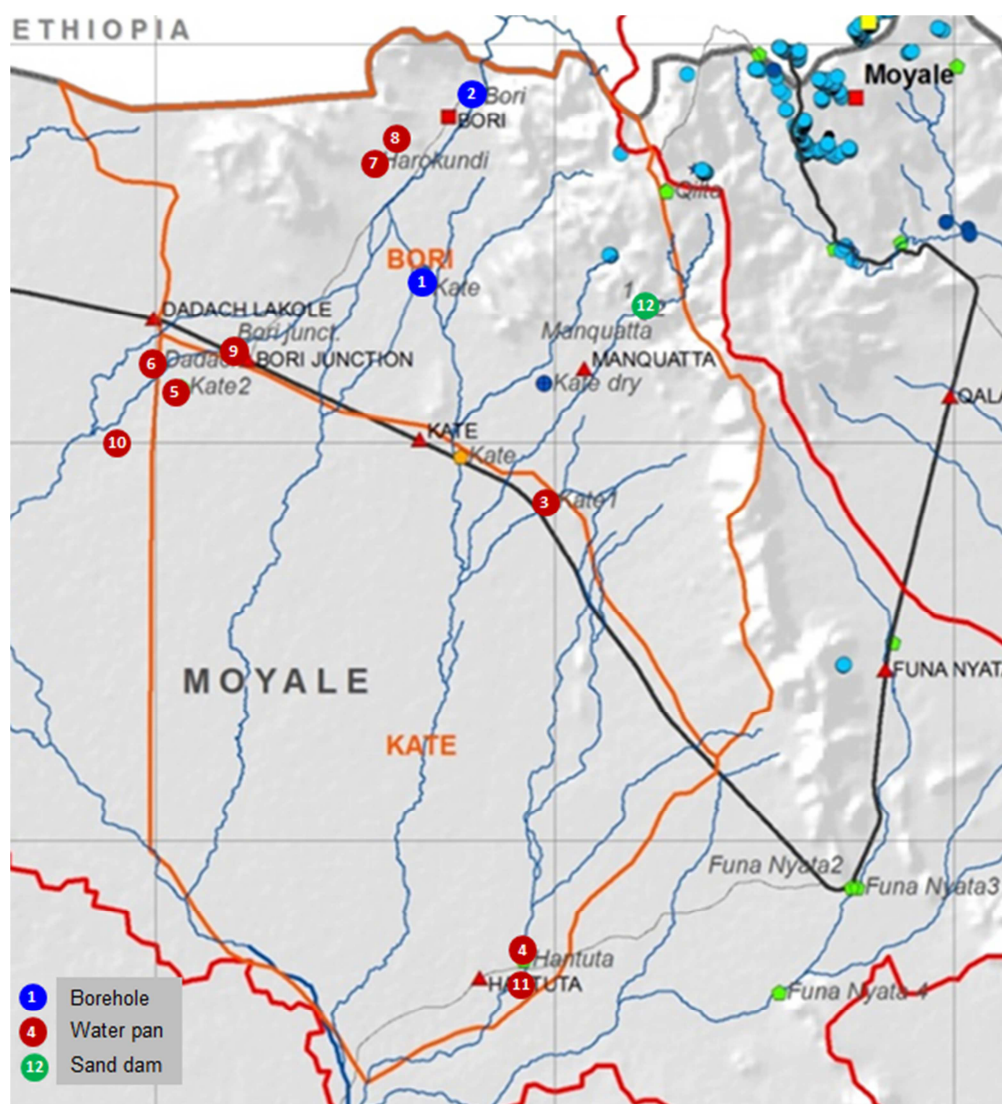
⁴ The tool was developed using Excel and is available upon request with CARE.

No.	Name	Type	Supply/Volume
8	Kundi 2	Water pan	6,000
9	Godoro (IYES)	Water pan	3,000
10	Malka Gambela	Water pan	2,000
11	Hantuta 2	Water pan	10,000
12	Manquatta	Sand dam	1,000

Note: Although Kalabate is mentioned in the IRC/ACACIA report 2013 as water pan, this is actually water that collects in culverts by the road side and is therefore not a formal water source. Moreover, with the ongoing road construction (Marsabit-Moyale), these culverts that hold water on road reserves after rains, will be removed and this source of water will no longer exist. The stakeholder meeting agreed therefore to not take Kalabate into consideration in the identification of existing water sources.

The figure below shows the locations of the above listed water sources:

Figure 3: Location available water infrastructure in Kati-Bori area



4.2.2 Domestic water demand

Figure 4: Domestic Water Demand Kate-Bori

		Water demand (L /h/day)	
		Basic domestic	
		20	
Year	Population		
2014	6,960	139,200 L / d	139 m3/d
2024	9,354	187,073 L / d	187 m3/d
2034	12,571	251,411 L / d	251 m3/d

For a 10 months dry period this results in a rounded domestic water demand in 2024 of = 55,000 m³.

4.2.3 Livestock water demand

After discussion by the stakeholders of Kate-Bori, the figures of the initial livestock water demand based on FEWSNET data need to be corrected downwards as the average numbers of livestock owned by the families are estimated to be considerably less. Current and projected livestock population in the next ten years was made based on the assumption that due to the changing climatic conditions in which dry spells and drought periods are in the increase, more and more people will take to camel and goat rearing (and other livelihood activities) as these are hardy animals and can withstand drought better than cattle and sheep. The projections of livestock numbers for households in the area are presented in the table below.

Table 3: Estimated livestock numbers Kate-Bori area

Average number of livestock per household in 2014 and projected average number per household in 2024		
Livestock	Numbers per household in 2014	Projected numbers per household in 2024
Camel	1	3
Cattle	4	4
Goats	6	12
Sheep	0.5	0.5
Donkey	0.2	0.2

The set of assumptions now used for assessing the livestock water demand is summarise in the following table.

Figure 5: Assumptions for estimating Livestock Water Demand Kate-Bori

<u>Assumptions:</u>	Stakeholders estimate on livestock per HH	Water Demand L / head / day (FEWSNET)
Cattle	3	25
Goats	12	5
Sheep	0.5	5
Camels	4	55
Donkey	0.2	30

The following table shows the estimated livestock water demand for Kate-Bori.

Figure 6: Livestock Water Demand Kate-Bori

Number of livestock heads						
Year	Cattle	Goats	Sheep	Camels	Donkey	Livestock Unit
2014	3,480	13,920	580	4,640	232	8,433
2024	4,677	18,707	779	6,236	312	11,334
2034	6,285	25,141	1,048	8,380	419	15,231

Water demand (L or m3/day)		
Livestock		
Year		
2014	421,660	L / d
	422	m3/d
2024	566,676	L / d
	567	m3/d
2034	761,565	L / d
	762	m3/d

The livestock water demand of 567 m³/d and the 10 month dry period provides a rounded demand of 170,000 m³.

4.2.4 Agriculture

Farming the fields is definitely on the rise in the area, but it is still difficult to make a reliable prediction on how much crop agriculture will pick up. Factors as market development and how strong the cultural barriers against transforming from a full pastoralist to an agro-pastoralist society are still largely unknown. Figure 7 provides the assumptions made and Figure 8 the estimated irrigation water need.

Figure 7: Assumptions for agriculture water demand Kate-Bori

Assumption 1:

Eto = 8.5 mm/day

Assumption 2:

Information are provided only for crops selected within the targeted area

Crop	Growing period (days)	Harvest 1	Harvest 2
Beans			
Cabbage			
Groundnut			
Maize	90	July	January
Melon			
Millet			
Onion dry			
Sorghum	120	July	January
Spinach	60	July	January
Tomato			

Assumption 3:

Rainfal station used: Lokitaung

Assumption 4:

Surface of land per HH (acre): 1.0

% of HH having a garden: 40%

% of the surface in drip irrigation: 90%

Assumption 5:

Crop	% of each crop in the garden	% of water saving with drip irrigation
Beans		
Cabbage		
Groundnut		
Maize	50%	50%
Melon		
Millet		
Onion dry		
Sorghum	30%	50%
Spinach	20%	50%
Tomato		

Some definitions

Eto: reference crop evapo-transpiration (in this case, grass is taken as reference crop)

Kc: crop factor; factor between the reference grass crop and the crop actually grown

ETCrop: crop water need; amount of water needed to meet the loss through evapo-transpiration

Growing period: period between sowing to the last day of the harvest

Figure 8: Agriculture Water Demand Kate-Bori

Irrigation water need (m3/month and average m3/day)													
Agriculture													
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
2014	month	4,774	0	0	1,286	2,694	4,738	2,852	0	0	1,855	2,798	1,785
	day	159	0	0	43	90	158	95	0	0	62	93	59
2024	month	6,415	0	0	1,728	3,621	6,368	3,833	0	0	2,494	3,760	2,399
	day	214	0	0	58	121	212	128	0	0	83	125	80
2034	month	8,622	0	0	2,322	4,866	8,558	5,151	0	0	3,351	5,053	3,224
	day	287	0	0	77	162	285	172	0	0	112	168	107

4.2.5 Seasonal migration

The stakeholder meeting assessed that for seasonal migration water demand estimates, we should take 0.5 of the population of livestock of Bori sub-location, for up to 3 months in a row using the Bori borehole. Assumptions and water demand for seasonal migration are given in Figure 9 and Figure 10.

Figure 9: Assumptions for seasonal migration water demand Kate-Bori

<u>Assumption 1:</u>	Number of livestock and people coming to the area at peak period:		
	Seasonal livestock	# heads	LU
	Cattle	975	0
	Goats	1,300	
	Sheep	3,900	
	Camels	163	
	Donkey	7	
			325 people
<u>Assumption 2:</u>	Months for which seasonal population was considered:		
	Month	Migration	Month
	January	X	July
	February	X	August
	March		September
	April		October
	May		November
	June		December
			X

Figure 10: Seasonal Water Demand Kate-Bori

Seasonal water demand (m3/month and average m3/day)													
Migration of people and livestock													
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	month	2,469	2,469	0	0	0	0	0	0	0	0	0	2,469
	day	82	82	0	0	0	0	0	0	0	0	0	82
2024	month	3,319	3,319	0	0	0	0	0	0	0	0	0	3,319
	day	111	111	0	0	0	0	0	0	0	0	0	111
2034	month	4,460	4,460	0	0	0	0	0	0	0	0	0	4,460
	day	149	149	0	0	0	0	0	0	0	0	0	149

The total rounded estimated figure for the agriculture water demand in 2024 is = 10,000 m³.

4.2.6 Wildlife

The stakeholder meeting of January 2014 agreed that wildlife consumption is almost negligible. It is assumed that it will be less than 2% of the livestock water consumption.

The total rounded estimated figure for the wildlife water demand in 2024 is = 3,000 m³.

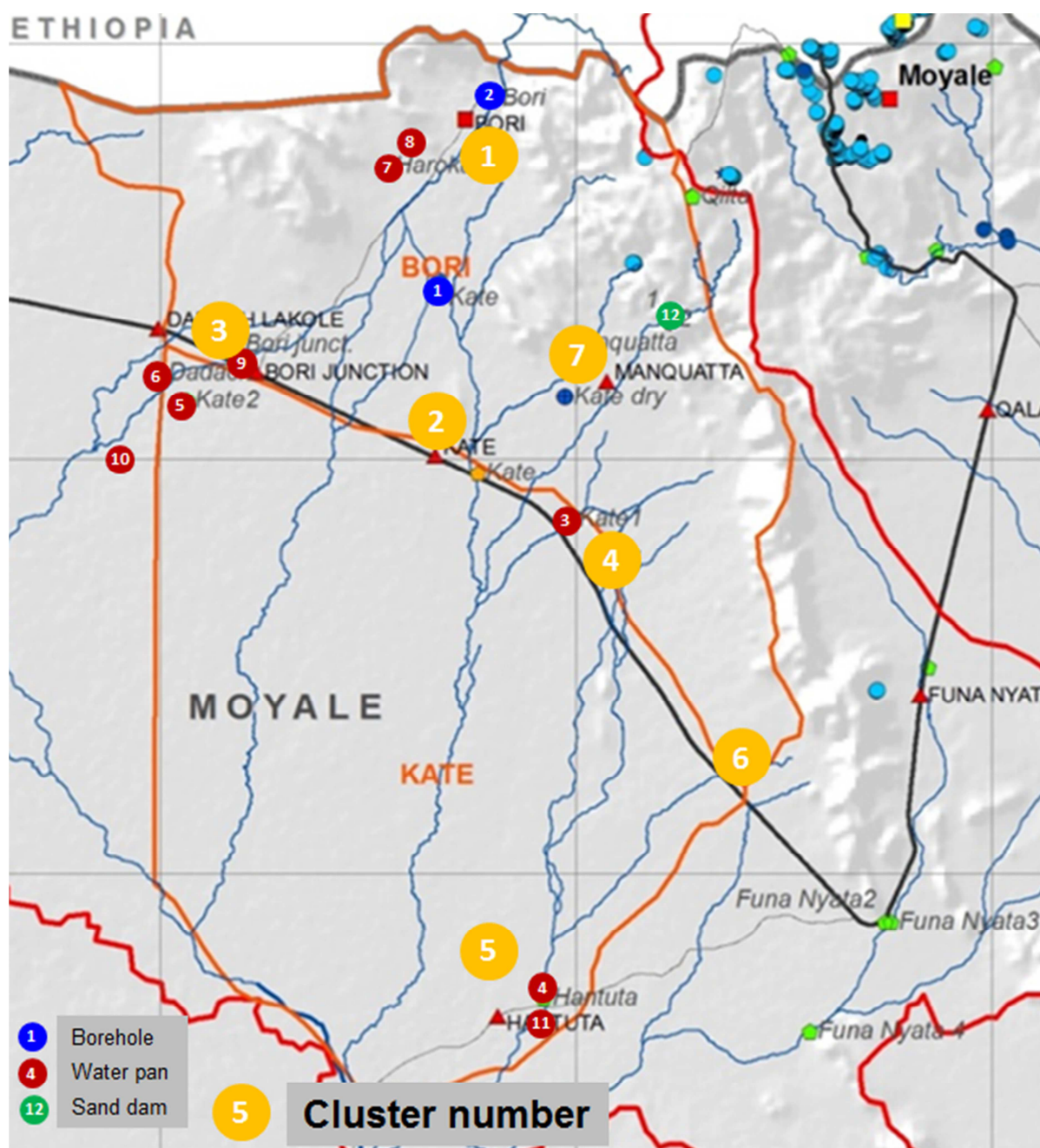
4.3 Location of water demand and gaps

During the WMP workshop the stakeholders agreed how the different types of water demands are spread over the Kate-Bori area. To allocate the water demands, the area is divided in seven clusters. The water demand values are provided in Table 4 and Figure 11.

Table 4: Location of water demands Kate-Bori

Cluster no	Cluster	Total water demand 10 months	Domestic	Livestock	Agriculture	Seasonal migration	Wildlife
1	Bori	71,000	8,000	50,000	4,500	7,000	1,500
2	Kate	17,000	11,000		6,000		
3	Bori junction	16,500	10,500		6,000		
4	Kate East	16,500	10,500		6,000		
5	Antuta	133,500	6,000	120,000	3,000	3,000	1,500
6	Antuta Road	9,000	6,000		3,000		
7	Manquatta	4,500	3,000		1,500		
	Totals	268,000	55,000	170,000	30,000	10,000	3,000

Figure 11: Location of clusters with water demands



To obtain the projected water gaps for 2024, the potential of the existing infrastructure (water allocation) is deducted from the demands above. There are of course different ways how one can allocate which water to which type of demand. In principle this is a water governance decision. Here 2 options are shown, but in more variations are possible, in particular when also new sources are taken into account. During the WMP meeting in January the stakeholders agreed that first priority needs to be given to domestic water needs, which needs to be provided by a safe source, like the deep boreholes. This has been applied for both options. Some general arguments, comments and observations by the stakeholders when discussing the water gap analysis remain valid for any option and included:

- Water for domestic use should be separated from water for livestock and other uses as much as possible. This will make it easier for water management to ensure catering for domestic needs.
- Because the dry season grazing areas are to the south of Bori Location, in the Antuta area, water for livestock needs to concentrate away from the habitations and brought closer to the grazing lands. This will also reduce tensions between providing water for domestic versus water for livestock.
- When the boreholes Kate and Bori are prioritised for domestic water supply, it will require to consider to develop a piped water supply systems to supply to the clusters Bori, Kate, Bori junction, Kate East and Manquatta.

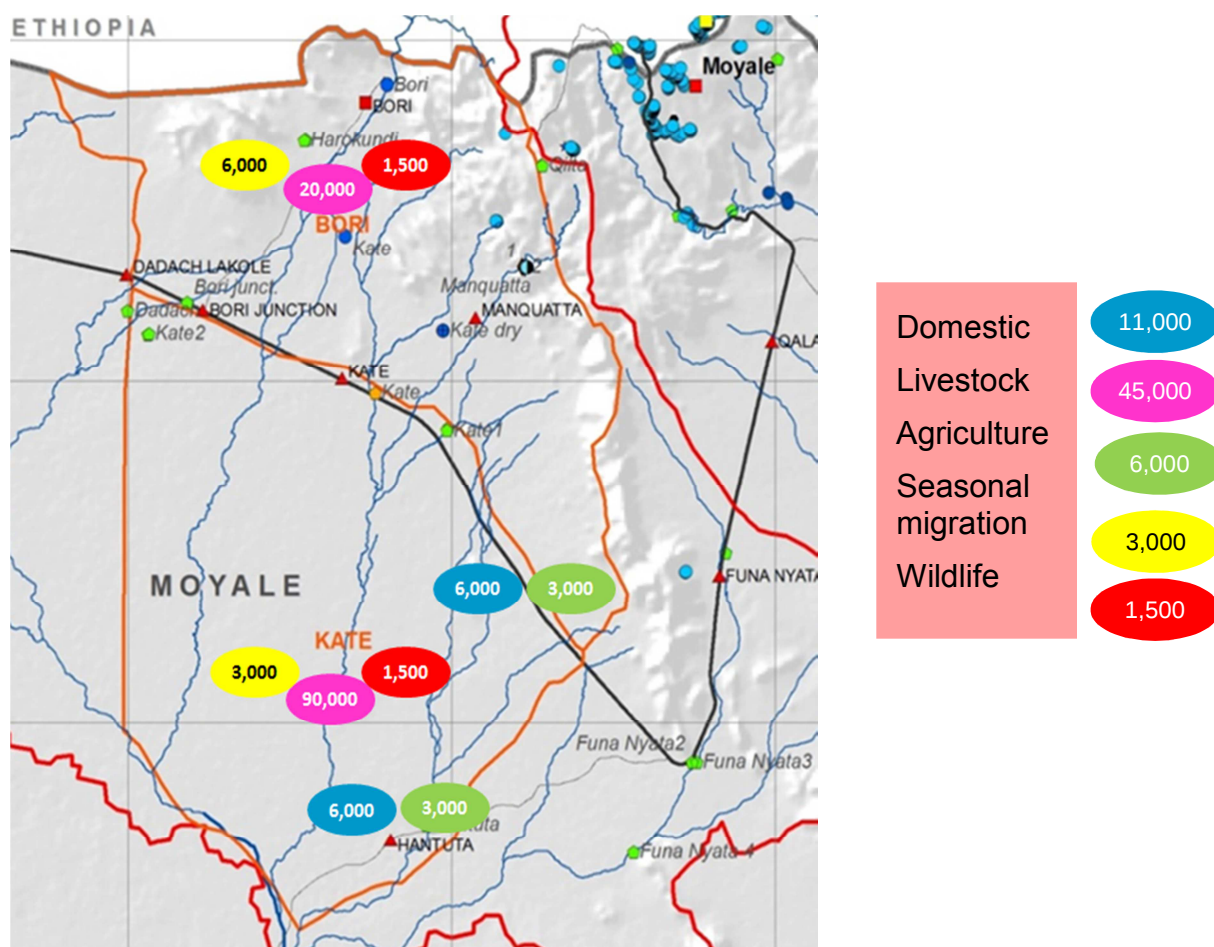
4.3.1 Option 1: remaining borehole water used for small scale agriculture

The first option (Table 5) and Figure 12 assumes that after securing the domestic water demand, the remaining water from the boreholes is used to provide for small agriculture purposes, like kitchen gardens and small vegetable fields using drip irrigation. Figure 12 shows what water gaps remain if no other water infrastructure measures are taken.

Table 5: Option 1: allocation of water supply and remaining water gaps per demand type (in Km3)

Cluster No.	Cluster	Domestic			Livestock			Agriculture			Seasonal migration			Wildlife		
Demand, Allocation, Gap		D	A	G	D	A	G	D	A	G	D	A	G	D	A	G
1	Bori	8	8	0	50	30	20	4,5	4,5	0	7	0	7	1,5	0	1,5
2	Kate	11	11	0				6	6	0						
3	Bori junction	10,5	10,5	0				6	6	0						
4	Kate East	10,5	10,5	0				6	6	0						
5	Antuta	6		6	120	30	90	3		3	3	0	3	1,5	0	1,5
6	Antutta Road	6		6				3		3						
7	Manquatta	3	3	0				1,5	1,5	0						
Totals		55	43	12	170	60	110	30	24	6	10	0	10	3	0	3

Figure 12: Option 1: volumes and locations of water gaps per type of demand in 2024 (in m3).



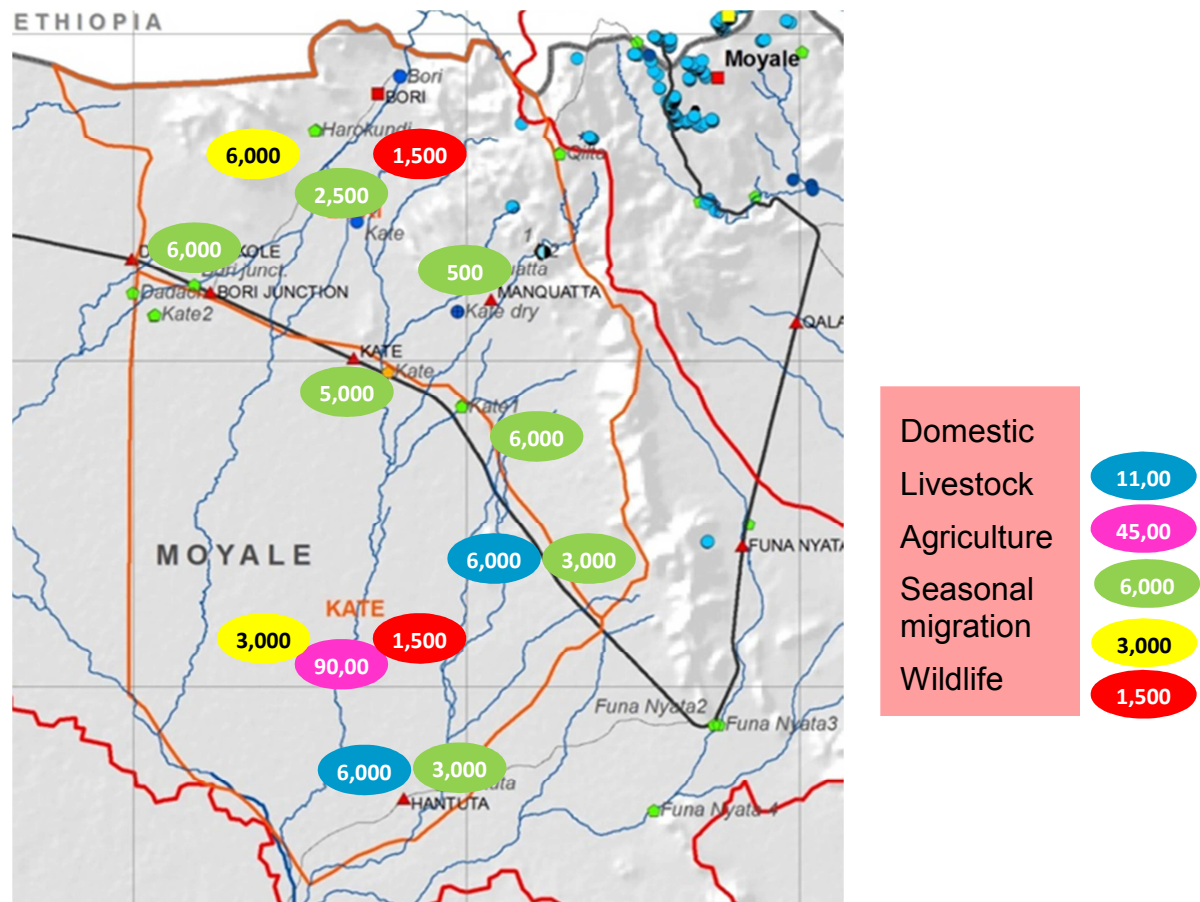
4.3.2 Option 2: remaining borehole water used for livestock

More in line with the present practice and current priorities by the community for water allocation is the choice to use the remaining borehole water for watering the animals. The results of this choice for the water gap analysis are shown in Table 6 and Figure 13.

Table 6: Option 2: allocation of water supply and remaining water gaps per demand type (in Km3)

Cluster No.	Cluster	Domestic			Livestock			Agriculture			Seasonal migration			Wildlife		
Demand, Allocation, Gap		D	A	G	D	A	G	D	A	G	D	A	G	D	A	G
1	Bori	8	8	0	50	50	0	4,5	2	2,5	7	0	7	1,5	0	1,5
2	Kate	11	11	0				6	1	5						
3	Bori junction	10,5	10,5	0				6	0	6						
4	Kate east	10,5	10,5	0				6	0	6						
5	Antuta	6		6	120	30	90	3	0	3	3	0	3	1,5	0	1,5
6	Antutta Road	6		6				3	0	3						
7	Manquatta	3	3	0				1,5	1	0,5						
Totals		55	43	12	170	80	90	30	4	26	10	0	10	3	0	3

Figure 13: Option 2: volumes and locations of water gaps per type of demand in 2024 (in m³)



5 Strategic building blocks for the water master plan

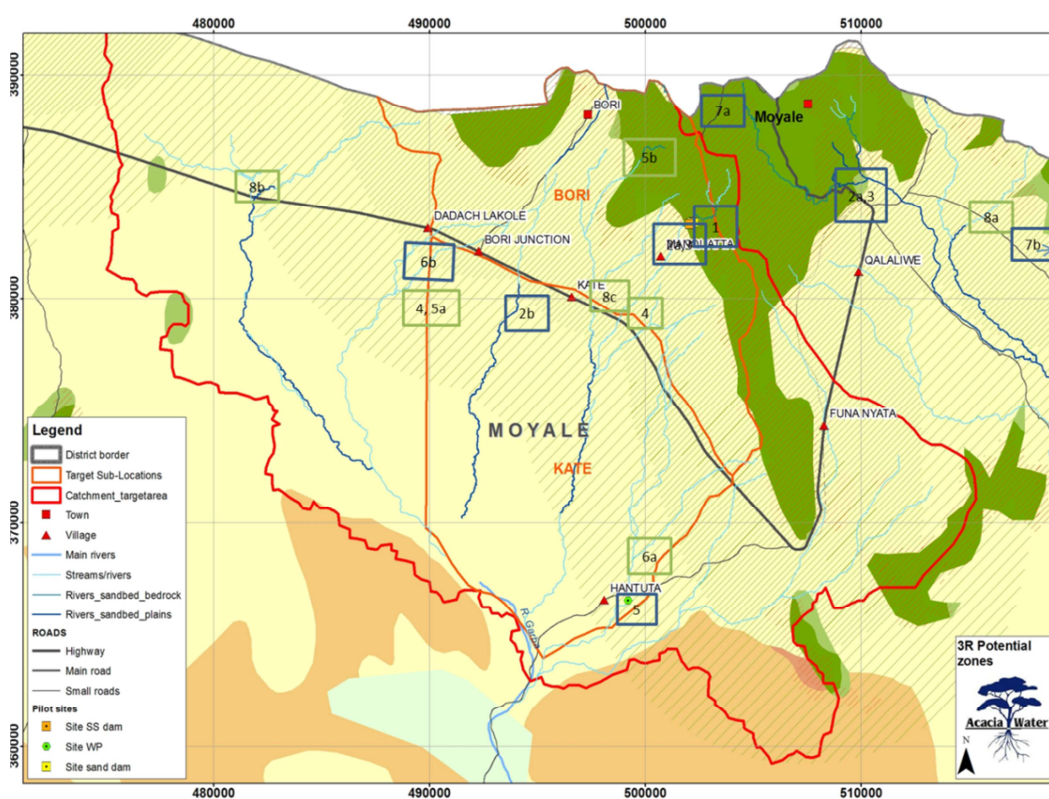
In the previous chapter the analysis has been made how much water is required (or is in surplus) for the different types of water uses and at which location in the pilot area. To bridge these water gaps interventions need to be planned. Not only infrastructure interventions, which are discussed in the next section, but also interventions need to be planned in the areas of: water governance (5.2); water service management (5.3); and, capacity development for all stakeholders (5.4). The four areas are the strategic building blocks of the WMP. The stakeholders involved in the process divide responsibilities for the coordination of these different strategies that form together the area Water Master Plan.

5.1 Water infrastructure planning

5.1.1 Potential 3R interventions

At locations with water shortage, 3R interventions can be used to increase the amount of water available during the dry season, by storing and buffering water that falls during the rainy season. For this, several techniques can be selected. Which technique fits best depends on both the types of water demand, and on the physical possibilities for water recharge and retention within the physical landscape. An analysis of the area for potential 3R interventions has produced an area map⁵ (Figure 14 and Figure 15), dividing the area in zones where different 3R techniques are most beneficial.

Figure 14: 3R potential zones in the Kate-Bori area



⁵ See report: (Acacia, A4A, IRC, 2013): Towards a better balance between water demand and supply: The Local Water Resource and Service Management approach applied to the pilot area Kate-Bori in Moyale.

Figure 15: 3R potential zones in the Kate-Bori area clarification colour scheme

3R potential zones

Zone 1: Basement rocks

- 1A, basement, mountains
- 1B, basement, plain areas

Zone 2: Lowlands near basement areas

- 2A/B, buffer 5km from basement
- 2A/B, buffer 10 km from basement

Zone 3: Volcanic rocks

- 3A, volcanic mountains, low permeability, weathering products suitable for storage
- 3C, volcanic mountains, permeability and weathering products variable
- 3E, volcanic mountains, high permeability, weathering products unsuitable for storage
- 3B, volcanic plains, low permeability, weathering products suitable for storage
- 3D, volcanic plains, permeability and weathering products variable
- 3F, volcanic plains, high permeability, weathering products unsuitable for storage

Zone 4: Sedimentary formations

- 4A, alluvial
- 4B, sands and sandstones
- 4C, variable sedimentary formations

Zone 5: Areas with steep slopes

- 5, slopes >10°

Examples:

1. Rock barrier in sand river
2. Wide river bed with sandy sediments
 - a. At foot of mountains (zone 1A)
 - b. In the sedimentary areas, within the buffer zone (zone 4C and 2)
3. Transmission zone between mountains and plain areas, where rivers spread out
4. Old well maintained water pan, mainly for livestock
5. Water pans preserved for specific use
 - a. Water pan for domestic use
 - b. Water pan for domestic use with infiltration gallery
6. Flooding areas
 - a. River floodplains
 - b. Floodwater used for irrigation
7. Erosion reduction
 - a. Gully's present on steep slopes
 - b. Gulleys in plains eroding the road
8. Road water harvesting
 - a. Road crossing creating sanddam / gully-plug
 - b. Road causing floodwater spreading
 - c. Water storage created by former road quarry

In the Kate-Bori target region the following 3R potential zones are present:

- Zone 1A Basement rocks in mountainous areas.
- Zone 2 Buffer zone around basement rock area (5 and 10 km).
- Zone 3F Volcanic rocks, high permeability, weathering products unsuitable for storage, plains.
- Zone 4C Variable sediments with mostly moderate permeability, and low vertical resistance when clayey sediments /layers are present & possibly shallow groundwater potential.
- Zone 5 Mountainous areas with slopes steeper than 10 degree.

Figure 16: Indication of the kind of 3R interventions that may be possible in the zones

	A Pans and water key dams	B Sanddams	C Subsurface dams	D Shallow, free-flowing groundwater: wells and riverbank infiltration	E (Flood)water spreading and a slope irrigation	F Gully plugging, check dams, and other run-off reduction /infiltration options	H Closed tanks	G Deep, confined aquifer groundwater wells / boreholes
Zone 1A	x ¹	X	x	x		x	x	x
Zone 2	x	x ²	x ²	x?	x	x	x	x
Zone 3F	x			(x)		x	x	x
Zone 4C	x			x?	x		x	x
Zone 5	x	(x)		x		x	x	x

The crosses denote the potential:

- x. possible
- x. high potential
- X. very high potential
- (x). limited potential
- ? unknown

The superscripts denote:

1. Possibly sealing required
2. Combined with 3B, 3D, 3F, 4C, 4D if impermeable layer is present

This study focuses on shallow groundwater systems; deep groundwater is outside the scope of the 3R study and is only indicated as alternative possibility.

Figure 16 provides an indication of which 3R interventions the most promising interventions may be possible in the area. A more elaborate analysis and description can be found in the assessment report of 2013.

5.1.2 Other considerations

The WMP meeting made the following additional observations related to water infrastructure:

- While currently the only available all weather watering source for both domestic and livestock is the Bori borehole, there is opportunity for enhancing availability and access to water by:
 - Rehabilitating/expanding existing earth pans/sand dams (based on results of feasibility studies).
 - Rehabilitating/repairing the Kate borehole after resolving the Kate community/BOKA conflict.
 - Constructing new earth pans, sand dams and one new borehole in the dry season grazing area, around Antuta, based on results of a feasibility study;
- The plan should strengthen watering potential in the Antuta area where the grazing area is located in order to ‘decongest’ the Bori area from excessive human and livestock activity at the Bori borehole during dry spells, and also to enable livestock have water closer to the grazing areas.

5.1.3 Recommendations for infrastructure planning

Table 7: Recommendations for infrastructure planning

Use	Requirement	Infrastructure options for bridging the water gap
Domestic	6,000 for Antuta	1. Feasibility study for options, including 3R options: • New borehole(s). • Pipeline from Bori (and Kate) Boreholes to Antuta grazing area. • Sand dams.
	For all settlements	2. Establishment of water kiosks in villages to bring services closer to the people.
		3. Consider how water quality can be better safeguarded (eg. Chlorination).
Livestock	0 - 20,000 Bori 90,000 Antuta	<i>Priority</i> • Rehabilitation of existing water pans (based on feasibility studies). • New Water pan. <i>Other options for consideration</i> • A borehole. • Sand dams. • Water catchment.
Agriculture	1,500	<i>Priority</i> New water pans with allocations for small scale agricultural use.

5.2 Water governance

5.2.1 Effectiveness of existing water governance structures

The Kate-Bori stakeholders discussed water governance in their area and observed the following:

- County level: At the County level, the Sub-County (former district) water office is supposed to be the representative of the WSB. However, it was not clear if this is the case as the Water Office was not represented at the workshop.
- BOKA Water Service Provider is responsible for the management of water services at the Bori and Kate boreholes on behalf of the NWSB.
- Other management structures that influence water (resource) management in the area: traditional water management committees; environmental management committee; and the Provincial Administration (Chief).
- Although the basic requirement for the Water Act with BOKA is fulfilled, a number of weaknesses are identified:
 - The water governance structures and institutions as spelt out in the Water Act are not effective/operational or respected at the local level.
 - The BOKA WSP and the communities which they are supposed to serve are not sensitized on the water policy and the water act, including roles and responsibilities of various actors.
 - Related point is the poor enforcement of the water policy/act, which leads to role conflicts and competing interests between the BOKA which is supposed to act on behalf of the NWSB and the traditional water management systems (Abaharegas) which are supposed to be responsible for the management of earth pans, shallow wells and other non-mechanised water sources.
 - The provincial administration (Chief) steps in to fill the gap created by the confusion, thus making him a biased party (in the eyes of some) and therefore unable to play his arbitration/conflict resolution role effectively and objectively.
- Inadequate human resource capacity within the institutions responsible for water, .e.g. the sub-county water office which represents the Water Service Board at the sub-county level has only 2 staff. This renders the office unable to undertake the critical oversight and monitoring role, including resolving the Kate borehole conflict between the Boka and the Abaharega, which in turn has led to the Kate borehole being in a non-functional state for four years.
- Prolonged terms of office tenure by the BOKA whose term of office continues to be renewed despite the demands by the community for elections to be undertaken every five years as stipulated by the Water/WSB act of parliament.
- Lack of transparency in management of water levies.

5.2.2 How to improve water governance and management

Domestic:

1. Adopting good water governance policies which should include:
 - a. Entrusting the BOKA with the governance of all public investment water infrastructure, including those that are financed/implemented by local and international NGOs, whether they are water pans or mechanised systems.
 - b. Review the BOKA water service policy.
 - c. Activities of the BOKA should be monitored and guided by the sub-county water office or the WSB as provided for in law.
 - d. Strengthen and link local water service provider BOKA to the Northern Water Service Board (NWSB) and the National water Service Board (NWSB).
 - e. Traditional management systems (Abaharegas) to oversee governance of water sources that are not regulated or publicly financed e.g. karabates, shallow wells, ponds etc., but also given a role to monitor the activities of the BOKA.
2. Establishment of water kiosks in villages to bring services closer to the people:

Livestock:

For livestock water, the emphasis must be on:

- Strengthening the watering capacity at the grazing land by constructing boreholes, water pans and/or piping water from existing boreholes;
- Coordination with neighbouring communities/settlements and fencing off of water sources.

In addition, the stakeholders suggested:

- Construction of livestock watering troughs, separated from the watering fetching point for people.
- Watering of livestock in shifts to avoid congestion and conflict, especially during dry spells.

Agriculture:

- Support establishment of greenhouses as these use little water.
- Introduction of drought resistant crops.

Seasonal migration:

- Increase water levies for outsiders.
- Put measures in place to control migrating populations.

Wildlife:

Leave left-over water in troughs to cater for wildlife.

5.3 Water service management

5.3.1 Existing water service management strategies and challenges

In summary the understanding of the existing water management system is that:

1. Policy development and regulation of water services:
 - a. There is Water Act which defines how water service provision should be managed including the establishment of WUAs.
 - b. Each water facility, especially boreholes, has a constitution that governs management of water services.
 - c. It is in the policy that in time of scarcity, priority is given to water for domestic use.
2. In practice, water service is managed by WUA/Chief, the priority order for supplying water is:
 - a. Locals/residents for domestic water usage.
 - b. Livestock belonging to locals/residents.
 - c. Water for domestic use to non-residents (e.g. from Ethiopia and North Eastern Kenya);
 - d. Some water is left (overnight) in livestock watering troughs, for wildlife usage.
3. Payment for water.

There are two sources of funds that should be used for operation and maintenance of boreholes. The first is membership registration fee (Ksh 2000/=) and the second are the different tariffs as shown in the table below:

Table 8: Sources of O&M funds

No	Sources of O&M Funds: Payment system			
	Usage/Purpose	Quantity	Amount for Members (KSHs)	Amount for non-members (KSHs)
1.	Membership registration fee	N/A	2000	N/A
2.	Water for Domestic use	20 l	3	3
3.	Livestock	Cattle per head	3	5
		Camel per head	6	8
		Shoats (sheep/goat)	2	2
4.	Penalties			
	<i>Type of penalty</i>		<i>Penalty in Kshs</i>	
a.	Fighting over water usage		500	
b.	Contaminating water		500	
c.	Jumping the queue		1000	
d.	Abusive language		1000	
e.	Corruption/fraud/cutting deals		1000	
f.	If a management committee members beats someone		1 cow	
Note: The Management committee is allowed to use executive powers to waive payment for the very poor/vulnerable people				

4. Operation and maintenance

- The engine runs for 10 to 15 hours/day (but with intervals).
- There are two (2) water engine operators.
- Diesel is always bought in advance (20 l/day).
- Minor repairs done by water operator.
- Minor service is undertaken every 750 hours.
- Major service is undertaken annually by water technicians from the water office at a cost of Ksh 25,000/= charged to the water management committee.

5. Effectiveness of existing strategies

- Through the existing strategies, there is an available water service (in Bori only).
- Maintenance is inadequate.
- Revenue collected from water services not adequate/not known due to lack of transparency and accountability by the water service managers.

5.3.2 How to improve water service management?

Operation and maintenance

- Establishment of water kiosks in villages to bring services closer to the people.
- Reduce the pumping hours to assure longer life of the water engine.

Water tariffs

The current tariffs are estimated to be too low for covering sustainable operation and should be reviewed to enable collection for better operation and maintenance.

- Carry out financial analysis (costs and funding options) for sustainable financial operation of the water sources, in particular the boreholes.

5.4 Capacity building

The workshop noted that following the devolved governance system in Kenya, water governance and water service provision and management strategies are being realigned, and it is not currently clear who would be responsible for what aspect, making it difficult to identify capacity gaps. For example, currently, there are insufficient, unclear and unknown national and county government water policies.

5.4.1 Existing capacity gaps

1. Bookkeeping.
 - a. Poorly kept financial records’.
 - b. No inventory records.
 - c. No activity records.
2. Technical.
 - a. Borehole operators lack basic technical understanding and knowledge of the equipment they are operating.
3. Group dynamics.
 - a. Poor leadership capabilities by the BOKA and traditional leadership.
 - b. No properly written constitution/by-laws to govern water management and governance.
4. Poor environmental management.
 - a. There is no ecosystem balance among human, livestock, wildlife, and agriculture water usage.
5. Inadequate/lack of monitoring and evaluation of water governance, management and related capacities of the BOKA water committee by the Sub-County Water office or the NWSB.

5.4.2 Opportunities

The following opportunities are identified that can be explored to start bridging the capacity gaps.

1. Identification of capacity gaps within the sub-county WSB office and the county water office and designing appropriate capacity building strategies accordingly.
2. Harmonization/clarification of roles of various stakeholders, in particular – the Abaharega (traditional water custodian) and BOKA and building their capacities according to their respective roles.
3. Sensitization of stakeholders and communities on the water governance and water service management policies and laws to enable them hold WSPs and managers to account.
4. Sensitisation of water management committees and communities on national and county government water policies and provisions of the water act.
5. Linkage and networking with relevant stakeholders e.g. social services, cooperatives and NGOs for efficient service deliveries.
6. Mobilization of resources for capacity building including exchange/learning tours.

In addition, the WMP meeting recommended the following concrete training activities:

1. Training of community level artisans on basic operation and maintenance skills to ensure timely repair of minor “machine ailments” at the local level, in order to save on O&M monies.
2. Training of water service management committees on:
 - a. Record keeping.

- b. Financial management.
 - c. Water management (equity in water service provision).
 - d. Hygiene and sanitation.
3. Facilitating exchange/study tours/visits to communities with successful water service governance and management systems.

6 Action Plan 2014

The action plan for 2014 is summarised in Table 9: Action Plan 2014 Kate-Bori area

Table 9: Action Plan 2014 Kate-Bori area

Issue	Priority Action	Organization with lead responsibility for implementing action	Name of lead coordinator
Overall coordination	Overall WSM Implementation Coordination	Care, in collaboration with the County and sub-County Water officers	Dima
Infrastructure	• Resource mobilization for feasibility studies and infrastructure implementation. • Procurement of technical support for: – Feasibility studies on existing water infrastructure, especially the water pans in order to decide on infrastructure options that would satisfy the livestock demand for the entire project area. – Feasibility study on the proposed new borehole. – EIA. • Implementation of the planned sand dam and water pan proposed by Care for 2014. • Implementation of other proposed interventions based on the feasibility and EIA studies. • Stakeholders to prepare their action plans taking the WMP into account.	PACIDA/Care	Tache Elema
Water Governance	1. Create awareness on the water governance policy and provisions of the Water Act. 2. Operationalize the water governance structures and institutions as stipulated by law, i.e. a. Entrust Bokas with the governance of all public investment water infrastructure, including those that are financed/implemented by local and international NGOs, whether they are water pans or mechanised systems. b. Ensure activities of the Boka are monitored and guided by: – The sub-County water office or the WSB as provided for in law. – County Water Executive Office responsible for water at the county level. 3. Traditional management systems (Abaharegas) to oversee governance of water sources that are not	ALCHA	Gufu Jattani

	regulated or publicly financed e.g. karabates, shallow wells, ponds etc. 4. Undertake elections of management committee within the timeframe stipulated in the water act.		
Water Service Management	<u>Priority Actions for 2014</u> • Resolve the Kate/Boka conflict. • Upward review of user fees. • Replace the machine at Kate borehole. • Drill new boreholes. • Build the capacity of the Boka management committee (after successfully resolving the conflict). • Encourage small scale irrigated agriculture as an alternative source of livelihood. Destock livestock to reduce pressure on scarce water.	Care, in collaboration with the County and Sub-County water offices	Dima
Capacity Building	1. Expose water management committee to the national and county water policies. 2. Sensitization of stakeholders and communities at all levels on the water policies and the water act, as well as roles and responsibilities of various actors. This would encourage communities to demand for efficient and cost effective services (accountability) from the water service providers. 3. Harmonize roles of stakeholders, in particular, Water Service Board and the Sub-County Water office. For example, currently it is unclear whether the Sub-County Water office is the designated representative of the Northern Water Service Board or the national level department of water. This confusion in turn makes it unclear on responsibility for oversight of the BOKA water service provider or who to hold to account when such oversight is not provided. A case in point is the continuing conflict between the BOKA and the Kate community over the management of the Kate borehole: whose responsibility is it to resolve this conflict? 4. Training of water management committee and communities in their respective roles. 5. Linkage and networking with relevant stakeholders, e.g. government departments and NGOs. 6. Training of community based artisans on basic O&M skills. 7. Mobilizing resources for capacity building including undertake exchange visits/learning tours to successfully managed boreholes.	Livestock Department	Alex Mbundu and Peter Golicha
The Kate borehole conflict	Kate Borehole Conflict Resolution	Social Service (supported by Care)	Boru Sarapana

Annexes

Annex 1: List of participants WMP Kate-Bori workshop, 29 and 30 January 2014

No	Name	Title	Organization/Community
1.	Dima Bonaya	Project Officer	Care (WASH), Moyale
2.	Abdinoor Omar Ali	Field Officer	Care, Moyale
3.	Nuria Kasa Ali	Field Officer	Care, KALDRR, Moyale
4.	Jackson Guyo	DEO	Ministry of Education, Moyale
5.	Adan Waqo Dabasa	Livestock Health Assistant (LHA)	ALCHA, Moyale
6.	Gufu Jattani	Programme Manager	ALCHA, Moyale
7.	Tache Elena	Programme Manager	Pastoralist Community Initiative and Development Assistance (PACIDA)
8.	Hussein Mohamed	Monitoring and Evaluation Officer	World Vision, Moyale
9.	Alex K Mbundu	DAPO	Ministry of Agriculture, Livestock and Fisheries, Moyale
10.	Hassan Malicha	Bori WUA Chairman	Bori/Kate, Moyale
11.	Galgalo Guyo Tune	Antuta WUA	Bori/Kate, Moyale
12.	Jillo Boru	Chief	Bori Location
13.	Amina Abukar	WUA	Antuta
14.	Rahma Abkuna	Community Development Facilitator	SND
15.	Dr Wabomaba Hudson	MOH, Moyale District Hospital	Ministry of Health, Moyale
16.	Adan Hassan Adan	Programme Officer	PISP, Moyale
17.	Rukia Gulam		MYWO, Moyale
18.	Rob Hawalche	Youth Officer	Youth Department, Moyale
19.	Abduba Golicha D	Sub-County Agriculture Officer	Ministry of Agriculture
20.	Sarapana Boru	DSDO	Social Services
21.	Abdi Suku	PHO	DPHO-Office, Moyale
22.	John Kirsawa	ACCI	National Government
23.	Abraham Bonaya	Pastor	AIC
24.	Adan Wachu	Chief Officer	NARDA
25.	Dari Doti	P/Officer	IUCN
26.	Tache Golicha	Range Officer	MOALD&F, Moyale
27.	Tume Doti		KWS, Moyale
28.	Rene van Lieshout		IRC
29.	Margaret Ombai	IRC Consultant	Tacitus Ltd

Annex 2: Outcome of the "Financing sustainability" workshop - October 2014 – Moyale

1-Introduction

This annex presents the results of the third step of the 2-year KALDRR-WASH programme (2013–2014) of the Millennium Water Alliance (MWA), which aims at conducting water master plans in four pilot areas in the Kenya Arid Lands Regions (KALR), in partnership with MWA local implementing partners. The final objective of the programme is to improve resilience of the communities to recurrent drought events by improving the overall management of water supply and use of water resources in the pilot areas. The third step includes an update of the plan for 2015, including the annual budget based on the Life-Cycle Cost Approach (LCCA).

On 8 and 9 October a LCCA workshop was organised in Moyale by CARE, in collaboration with IRC. The objectives of this workshop were that by the end of the workshop:

- Key stakeholders have a deep/clear understanding of LCCA,
- Stakeholders have their capacity built in planning processes,
- The Water Master Plan is further developed including financial planning,
- Next steps have been listed, including who does what when and how.

A set of representatives from national and local government and civil society actively participated in this workshop.

During the workshop, the activities as described in the Moyale Water Master Plan were presented and discussed in plenary, after which they were further reviewed, detailed out and updated in smaller working groups. Participants were trained on the life cycle costs approach for financing sustainable water services. This included an introduction to the concept of service levels and the different cost components, which need to be covered by either tariffs, taxes or transfers in order to sustain water services: capital expenditure; capital maintenance expenditure; operation and minor maintenance expenditure; direct support costs; indirect support costs; costs of capital. Following the LCCA training, participants used the LCCA concepts to develop an annual budget for the 2015 work plan. This was again initially done in smaller working groups, after which the results were compiled and discussed in plenary.

2-Feedback on the Water Master Plan

On the first day of the workshop, the Water Master Plan document, which was the output of the stakeholder workshop in January 2014, was presented to the participants. The following observations, comments and additions were provided by the participants:

- Only 2 of the participants of the previous planning workshop of January 2014 are now present.
- CARE rehabilitated Kate borehole: pump repaired with new generator set; community repaired the pipework – carried out in April 2014
- County representative of Butiye was involved in one team meeting. Meeting with BOKA WMC. In principle management is now separated between Bori and Kate. Administration is also separate. CARE has observed that there is good record keeping at Kate.
- For security a watchman is put on salary for the Kate borehole
- Concern Worldwide has supported with fuel subsidy for Bori, because many (new) users

- New water pan realized near Antuta; Initially managed by Kate: 20,000 m3 including infiltration gallery with handpump
- Discussion around livestock numbers. The figures of the Ministry are much higher than of the report. Advice is to keep the present numbers
- Trend in agriculture: farmers are cultivating more land, due to government tractors; most farmers have not been provided with drip irrigation kits and the farmers will not have money to purchase.
 - **This is a point to be taken into account in the action plan**
- Migration: Influx is mainly between Jun – August; Actual influx has different peaks (eg Dec – Feb; Jun – Aug). But also other periods influx happens in certain years. Is not directly affecting the water gap analysis as it is not seasonal.
- Further refinement of water gap analysis would be to make the water gap analysis seasonal.

3-Activities and budget for 2015

On day 1, participants elaborated on the activities for the year to come, related to the water master plan. On day two, they developed the budget, bringing into practice the lessons learnt from the LCCA training. Table 1 provides an overview of costs for each of the main cost components, using the categories of the LCCA. Figure 1 explains briefly the different cost categories. The allocation of each activity to a certain cost category is done in Table 3. Table 2 presents the estimated costs of 2015 activities related to each pillar: infrastructure; water governance; water management; and capacity building. Table 3 is providing the same cost information, but also includes the suggestions of the participants for the source of funding for the activity.

Figure 1: The Life-cycle costs of water services

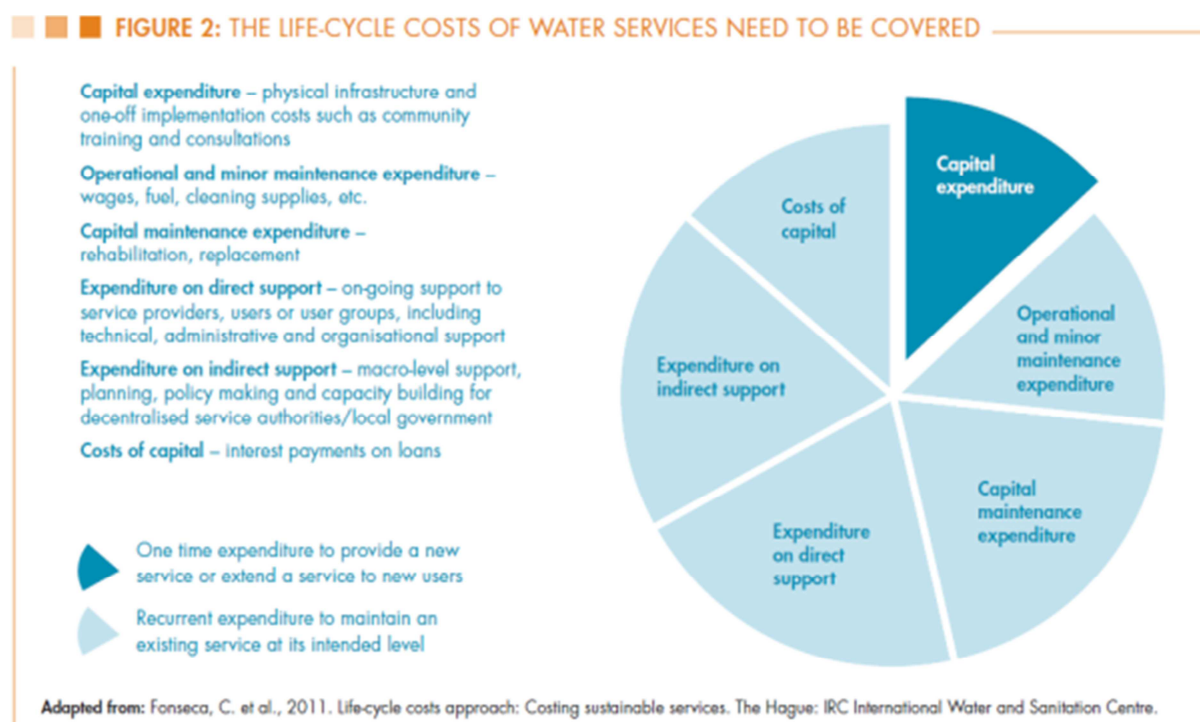


Table 1: Budget per cost category

Cost category	Total costs (in KES) in 2015	Costs per person (KES/ person) in 2015 (based on an average population of 7,000 people)
Total capital expenditure	22,100,000	3157
Operation and minor maintenance costs*	63,600	9
Direct support costs	2,179,100	311
Indirect support costs	0	0
Total	24,342,700	3478

* excludes daily fuel and salary costs, because it wasn't calculated during the workshop

Table 2: Detailed costs per pillar

		Frequency (in 2015)	Unit cost (KES)	Total cost (KES/year)
A - INFRASTRUCTURE				
A1	Feasibility study for piping of domestic water to Bori junction + Lakole (Needs to include extra storage capacity at the kiosks in Bori junction and Lakole)	1	2,000,000	2,000,000
A2	Survey for additional boreholes to decongest Antuta grazing areas (in 3 areas: Antuta + 2 adjacent areas)	1	1,500,000	1,500,000
A3	Flash flood management study (Bori)	1	500,000	500,000
A4	Rehabilitation of waterpans: Kubitari and Kate (rehabilitation includes desilting, trough for livestock, fencing, sanitation facilities)	1	8,100,000	8,100,000
A5	Merge Water pans Kundi 1 and Kundi 2 to increase capacity + rehab	1	8,000,000	8,000,000
A6	Feasibility study for irrigation based on water from large water pan built by Chinese for road construction (near Lakole) IF REALISTIC FOR 2015	1	2,000,000	2,000,000
			<i>sub-total A</i>	22,100,000
B - WATER GOVERNANCE				
B1	Training on water policy for community opinion leaders and WSP officials (20 persons for 2 days)	2	118,000	236,000
B2	Conduct public barazas on governance policy	5	42,500	212,500

B3	Organize workshops/seminars on water policy	2	93,400	186,800
B4	Distribute posters in key locations (200 pieces)	1	50,000	50,000
B5	Conduct training on roles and responsibilities of the water service provider officials + Financial management (for 11 persons for 2 days)	2	186,800	373,600
B6	Monitoring of the Water Committees [8 people per community (8 Kate and 8 Bori)]; by subcounty officer, officers from CARE, BH operators, ward administrators, SCPHO and chief (conflict resolution + agreeing on water tariff, performance of water service management: amount of fees collected by WC, number of animals the BH can sustain/day)	4	73,200	292,800
			<i>sub-total B</i>	1,351,700

C - WATER MANAGEMENT				
C1	Conducting a financial analysis to set-up the right tariff (cost recovery) at BH level	1	51,800	51,800
C2	Purchasing (WCM/WUA) lubricants to extend life of engines x 2 WCM	12	5,300	63,600
C3	Creating a storage at NDMA office of spare parts + genset (to be used in case of emergency)	1	2,000,000	2,000,000
C4	Organising a 3-days campaign on destocking of animals from the 2 BH (done by 1 sub-county vet. officer + sub-county livestock and production officer + 1 officer NDMA)	2	85,800	171,600
			<i>sub-total C</i>	2,287,000

D - CAPACITY BUILDING				
D1	Technical 5 days-training of caretaker/pump operators (2 per WCM) on O&M	1	109,000	109,000
D2	Training of BH operators (2 operators / BH, so 4 operators in total) for 3 months in a technical institute	1	160,000	160,000
D3	Exposure tours for WUA (5 days)	1	335,000	335,000
			<i>sub-total D</i>	604,000
			TOTAL	26,342,700

Table 3: Budget per cost category, including suggestions by participants

WATER MASTER PLAN - Pilot area: Kate-Bori								
ACTIVITIES AND BUDGET 2015								
Date: 09/10/2014 - By IRC, CARE and stakeholders								
Priority			Frequency (in 2015)	Unit cost (KES)	Total cost (KES/year)	Cost category	How it was calculated	Source of funding
A - INFRASTRUCTURE								
2	A1	Feasibility study for piping of domestic water to Bori junction + Lakole (Needs to include extra storage capacity at the kiosks in Bori junction and Lakole)	1	2,000,000	2,000,000	Capex	Topographic survey + Water office visit + Reporting	County government and/or IP
	A2	Survey for additional boreholes to decongest Antuta grazing areas (in 3 areas: Antuta + 2 adjacent areas)	1	1,500,000	1,500,000	Capex	Hydrogeological survey + intervention of experts	County government and/or IP
1	A3	Flash flood management study (Bori)	1	500,000	500,000	Capex	1 expert for few days + reporting	County government and/or IP
1-Kubitari	A4	Rehabilitation of waterpans: Kubitari and Kate (rehabilitation includes desilting, trough for livestock, fencing, sanitation facilities)	1	8,100,000	8,100,000	Capex	Desilting (3,000,000), trough (250,000), Fencing (600,000), sanitation (100,000x2) per water pan	County government / CDF
	A5	Merge Water pans Kundi 1 and Kundi 2 to increase capacity + rehab	1	8,000,000	8,000,000	Capex		County government / CDF

	A6	Feasibility study for irrigation based on water from large water pan built by Chinese for road construction (near Lakole) IF REALISTIC FOR 2015	1	2,000,000	2,000,000	Capex	200,000 KES per day for the survey team x 10 days	County government and/or IP
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sub-total
A

22,100,000

B - WATER GOVERNANCE

1	B1	Training on water policy for community opinion leaders and WSP officials (20 persons for 2 days)	2	118,000	236,000	ExpDS	include per diem, food, hotel	County government + IP?
	B2	Conduct public barazas on governance policy	5	42,500	212,500	ExpDS	Transport, lunch, per diem, facilitation, accomodation	County government + IP?
	B3	Organize workshops/seminars on water policy	2	93,400	186,800	ExpDS	idem	County government + IP?
	B4	Distribute posters in key locations (200 pieces)	1	50,000	50,000	ExpDS	Purchase posters (30,000) + distribution (10,000 for car hire)x2	County government + IP?
2	B5	Conduct training on roles and responsibilities of the water service provider officials + Financial management (for 11 persons for 2 days)	2	186,800	373,600	ExpDS	See B3	County government + IP?
3	B6	Monitoring of the Water Committees [8 people per community (8 Kate and 8 Bori)]; by subcounty officer, officers from CARE, BH operators, ward adminstrators, SCPHO and chief (conflict resolution + agreeing on water tariff, performance of water service management: amount of fees collected by WC, number of animals the BH can sustain/day)	4	73,200	292,800	ExpDS	Vehicle hire (10,000), allowance (25,000) per trip	County government + IP?

sub-total
B

1,351,700

C - WATER MANAGEMENT

	C1	Conducting a financial analysis to set-up the right tariff (cost recovery) at BH level	1	51,800	51,800	ExpDS	<i>Water officer + driver + 1 officer from CARE + 1 accountant + 1 ward admin + chief + cost log (fuel etc)</i>	IPs + County government
un-avoidable	C2	Purchasing (WCM/WUA) lubricants to extend life of engines x 2 WCM	12	5,300	63,600	OpEx		WCM
1	C3	Creating a storage at NDMA office of spare parts + genset (to be used in case of emergency)	1	2,000,000	2,000,000	CapManEX	<i>Genset (1,500,000) + Spare parts (500,000)</i>	IPs + NDMA
	C4	Organising a 3-days campaign on destocking of animals from the 2 BH (done by 1 sub-county vet. officer + sub-county livestock and production officer + 1 officer NDMA)	2	85,800	171,600	ExpDS	<i>Per day: 10,000 (car hire) per day+fuel (7,800 for 3 days)+salaries</i>	County government

sub-total
C

2,287,000

D - CAPACITY BUILDING								
1	D1	Technical 5 days-training of caretaker/pump operators (2 per WCM) on O&M	1	109,000	109,000	ExpDS	□	WCM/community and/or country water office and/or IPs
	D2	Training of BH operators (2 operators / BH, so 4 operators in total) for 3 months in a technical institute	1	160,000	160,000	ExpDS	□	WCM/community and/or IPs
	D3	Exposure tours for WUA (5 days)	1	335,000	335,000	ExpDS	<i>Car hire + allowances for 8 people+facilitators (duration: 5 days)</i>	WCM/community and/or IPs

sub-total
D

604,000

TOTAL

26,342,700