Comprehensive study of pastoral livelihoods, WASH and natural resource managment in Northern Marsabit

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SOLIDARITÉS INTERNATIONAL

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ACRONYMS

ASAL	Arid and semi-arid lands
DRR	Drought Risk Reduction
HDI	Human Development Index
HPI	Human Poverty Index
UNDP	United Nations Development Program

EXECUTIVE SUMMARY

Since 2009, Solidarités has been providing assistance to the North Horr population affected by natural disasters (drought) and man-made crises (such as conflict around water resources) by implementing a program addressing food security and WASH sectors. Solidarités International (SI) is keen to improve its understanding of the pastoral livelihoods, WASH and natural resources management in the Northern Marsabit area. SI, along with other development partners, is currently implementing a number of water facility and sanitation projects in the Arid and Semi Arid Lands (ASAL) in the Northern part of Marsabit District (Loiyangalani, Chalbi and North Horr).

In this context, a comprehensive study on the local communities' societies is an essential aspect of any water access and natural resources management project. Indeed, SI has to ensure that the future project is informed by what the community itself wants and needs and not what donors think it needs. Therefore, a better knowledge of the local governance of natural resources and pastoralists' livelihoods will enable Solidarités to more effective planning of future projects. In a context of structural climatic hazards and community conflicts over natural resources, a Disaster Risk Reduction (DRR) perspective is required. This report is the outcome of a comprehensive study of pastoral livelihoods, WASH and natural resource management commissioned by SI in Northern Marsabit District.

Both secondary and primary research methods were used in the collection of data. A survey was undertaken to collect relevant secondary data on North Horr's physical, economic, social and environmental conditions to provide baseline information. A territorial diagnosis was carried out with the aim of understanding the role of all stakeholders in the management of natural resources, WASH infrastructures and disaster risk reduction in the North Horr area. Informal discussions, focus group discussions and interviews with key informants were used to ascertain the ownership and management of livestock, traditional and customary institutions and identification of main grazing routes. In addition, questionnaires were designed and distributed amongst randomly sampled households in mainly North Horr and Kalacha areas in order to gain an insight into household livelihoods, their access to and use of natural resources (grazing land, open wells) and social services at the micro- level. Data analysis was executed with help of SPSS and MS Excel.

A number of key findings emerged with reference to the pastoral livelihood profile in North Horr:

- The sedentarisation of former pastoralists is on-going process and unlikely to stop in the years to come. The increasing settlement has social as well as environmental implications, compounded by the limited provisioning of social amenities in the region. In order to address vulnerability and development in the study areas, there is a need to implement interventions that strike a balance between pastoral mobility and an ongoing process of sedentarization.
- Mobility, especially of herds, remains important for pastoral populations and their way of life. However, insecurity and, more recently, climatic changes continue to curtail herd mobility, especially vis-a-vis access to water and pasture resources. The problem is compounded in areas where inter-ethnic cooperative access and sharing of natural resources (which work to combat insecurity and mitigate to some extent pressure on resources) are lacking.

- Another key aspect of the pastoral system is livestock exchange for addressing vulnerability and reducing risk. The study's findings show that livestock wealth of the settled populations has declined over time and this seems to undermine social security functions traditionally performed by livestock. In this regard, improving households' livestock wealth capacity to boost resource sharing is needed in order to address the frequent risks that pastoral households face.
- The traditional institutions and customary structures of the pastoral communities serve as a basis for maintaining social order. They also perform livelihood functions which do not appear to exist amongst settled pastoral populations. This would suggest that new or hybrid of institutions would be required, for instance for WASH facilities, as pastoralists continue to settle.
- Pastoral communities have early warning systems for responding to risk where possible. However, traditionally people believe that risks such as drought originate from God (*Waaq'a*) and that humans therefore have no control over their occurrence or indeed their devastating consequences. As a result, minimal planning seems to be undertaken in preparation for future disasters. Attention should thus be focused on strategic and proactive planning around livelihood strategies which may help to mitigate risks ahead of time.
- There is some variance / disparity between life in the towns and the hinterland in terms of access to and management of natural resources, pastoral livelihoods, social services, WASH and socio-cultural life. Generally, the rural areas experience similar problems to the towns but with greater intensity. ,
- It was observed that although it is thought that ownership of facilities will lead to responsibility for their management; it is not because a community owns a facility that the population will acquire a sense of responsibility for its management, nor does it guarantee a willingness to manage or pay for its maintenance. However, it was established that enhanced ownership gives facilities a better chance for sustainability.

Having analysed the data, several recommendations were proposed. The recommendations include the need for targeted interventions to strike a balance between pastoral mobility and the on-going sedentarization process in order to enhance livelihoods; increased capacity-building and awareness creation about disaster preparedness; focus of future efforts on building structures and capacities of individuals and communities to cope with risk and shock factors; the need for comparing water distribution and household allocation schedule to the geographical data among others that will be discussed in detail in the main document.

1. INTRODUCTION

1.1. The Specific Context of North Horr

The main focus of this study is the North Horr area, which is located in northern Marsabit District. The district covers a total area of 69,340 km2 (Adano and Witsenburg, 2004). It is generally a semi-arid climate with poor soil, except for in a few high altitude areas. Rainfall is usually erratic, unreliable, and highly variable in time and space. This area averages between 800 mm and 1000 mm of rain annually in the highlands, and between 200 mm and 250 mm in the lowlands. The northern Marsabit area, including North Horr, borders Ethiopia to the north, Lake Turkana to the northwest, and Laisamis to the south. There are no permanent rivers in the entire district, and hand dug shallow wells are important sources of water. The majority of the population in the district practice pastoralism, making use of the communally shared rangeland resources, especially water, pasture, and vegetation.

North Horr lies in agro-ecological zone VI– a zone considered a semi-desert and the driest part of Kenya. The area is close to the Chalbi desert (old lake beds), which is ecologically sensitive to changes in environmental conditions. The area is covered with dwarf bushland and *Acacia tortilis* woodland is the major vegetation type. The vegetation has been negatively impacted upon as formerly mobile households permanently settle around water sources, causing local degradation of vegetation. The North Horr area is generally a livestock-based economy, predominantly involving the rearing of camel, small stock (goats and sheep), cattle, and some donkeys. These livestock types provide, either directly or indirectly, the main sustenance for the pastoral groups in the region. The region is a highly vulnerable environment because of inter - annual and inter - seasonal fluctuations in rainfall. Partly in response to rainfall fluctuations, herd splitting, inter - household livestock exchange, and regular migrations are defining characteristics of the pastoralists in the region. Social relations and inter-personal networks are highly valued because of unreliable climatic conditions, high livelihood vulnerability, and the lack of formal insurance. Northern Marsabit District (including the North Horr area) is mainly inhabited by the Gabra (majority), Dassanetch, and the El Molo (predominantly a fishing community). These groups are no longer entirely dependent on livestock for their livelihood needs. Some families have settled and others continue to settle because of being dropped out of the mainstream pastoral economy (based on mobility and reliance on livestock) or because of the need to diversify outside of the livestock subsector.

The North Horr area receives mean annual rainfall of about 160 mm or a median of 200 mm (GoK, 1991)[1]. Even so, rainfall is the most important environmental factor in the dry land. Rainfall occurs in two seasons: March to May (long rains) and October to December (short rains), separated by two dry seasons. Rainfall is erratic and highly unpredictable as to when it occurs. The timing and distribution of rainfall define availability and distribution of rangeland resources, the most important for the pastoral economy being water and pasture. Thus, the pastoralists in the study area practice herd mobility in order to make opportunistic use of resources. Climate changes have dire implications for peoples' livelihoods in the

[1] Government of Kenya (1991). Range Management Handbook of Kenya, Vol II, 1, Republic of Kenya: Ministry of Livestock Development, Nairobi: Government Printer.

absence of formal insurance arrangements, poor livestock marketing structures, and weak social networks of resource sharing and reciprocity.

Recent evidence shows indications of increased intensity and frequency of droughts that have weakened community coping strategies and means of rebuilding assets against future shocks. In the absence of robust social institutions for resource sharing, households become vulnerable to climatic or market shocks, as well as hazards associated with phenomenon such as 1997/98 heavy *el Niño* rains and 2000 drought.

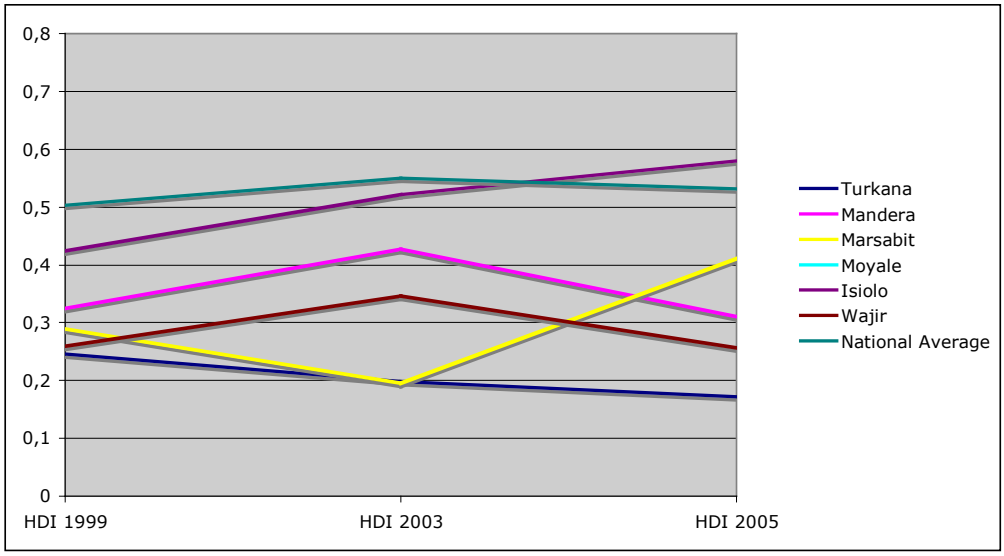
This study gathered rainfall data, population (human and livestock) numbers, and other relevant information to explore trends and implications for livelihood changes in the area. This section examines the notion of "pastoralist livelihoods" through descriptions of the pastoral system in the past and today in North Horr district. It further attempts to investigate and understand the mix of the livelihood options used by the studied populations along with strategies used to cope with risks.

1.2. Framework of the Study

The framework of this study on *pastoralist livelihoods, WASH (Water, Sanitation, and Health), and management of natural resources* covers the region including North Horr district that was recently created and includes the North Horr constituency (including North Horr and Maikona divisions). The main area of study is North Horr district that was one of the six divisions of Marsabit district until 2010. North Horr is one of the more than dozen districts that constitute the eastern province of Kenya.

It borders the Ethiopian frontiers to the north, Lake Turkana to the West, Loyangalani district to the south and Chalbi district to the east south east. It is an expansive area that is mainly arid, including one part of the Chalbi desert. North Horr trading centre is located at the northern point of the Chalbi desert. Most of the population in North Horr keep or own some livestock and participate in a form of pastoralist economy. According the agro-ecological zone classification (GoK 1991), the North Horr District mainly consists of arid (28%) and very arid (69%) lands (2009) and is one of the poorest areas in Kenya.

Figure 1: Human Development Index



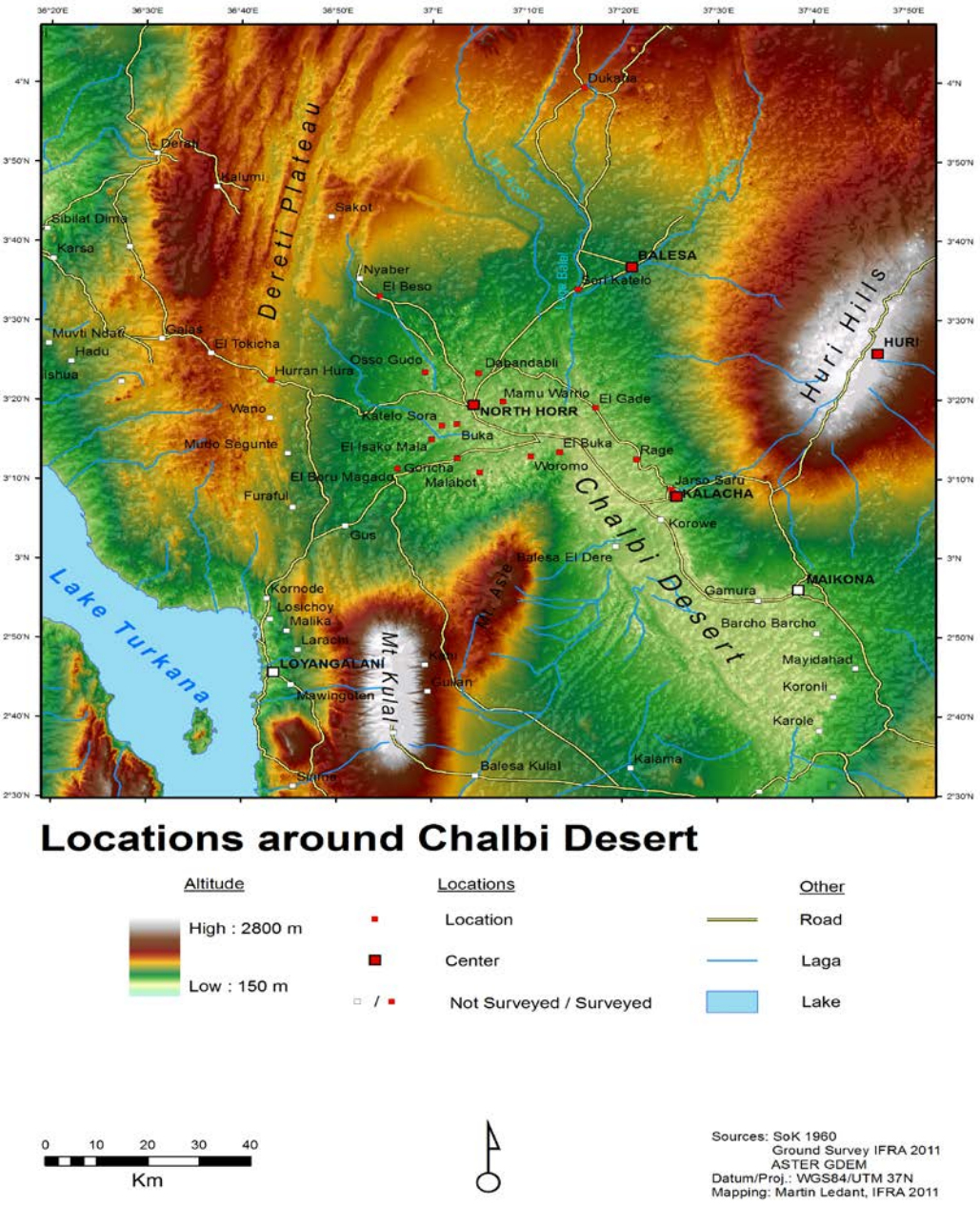
Source: Kenya, Republic of (2007). KIHBS, 2005/06, Vol.1 Basic Report, January 2007)

Even though North Horr administrative district boundaries are changing, links to Marsabit remain very strong. In expert and academic literature, northern Marsabit is generally described as one of the poorest regions in Kenya and also the eastern Horn of Africa. This statement is partly linked to international standards established to understand the livelihood of a specific population, defined as a complex relationship between income and well-being. Northern Marsabit belongs to the group of pastoralist districts across the Greater Horn of Africa (GHA) where "*pastoralists are some of the poorest and most vulnerable populations in the region* (HPG, 2010: 7)". Between 1999 and 2005, the Human Development Index (HDI) of Marsabit has remained below the national average while the Human Poverty Index (HPI) (42.3) is at the same level as the national average. This means that the inhabitants of Northern Marsabit do not have the same opportunities as the rest of Kenyans in other regions in terms of life expectancy (duration of life and health), education (adult literacy rates/knowledge base), and standard of living. The prevailing poverty level, based on a number of social and economic indicators, to a large measure reflects the high vulnerability of the households (and humans) to frequent droughts and other stress factors.

1.3. Delimitation of the Area of Study

To overcome the lack of clarity arising from the changes of the administrative boundaries of North Horr, the team has taken into account the relations between physical space and the spatial practices of populations in the district. The natural resources available are linked to a broader regional ecosystem: fragile vast desert plains (300 m) and mountains ranging between 900 and 2355 meters. Pastoral practices that developed in relation to the ecosystem lead people to permanently overcome administrative boundaries. Map 1 illustrates the physical space of the study and shows all the locations (settlements and semi-nomadic settlements) included in the pastoral system area around North Horr, Dukana, Balesa, Kalacha, Hurri Hills, Hurran Hura, Malabot, Wormo and El Beso. The study also covered semi-nomadic settlements (the *Ollas* or villages) around trading centres, including Kiluile (south Balesa), El Boru Magado, El Isako Mala, and El Buka.

Map 1: Physical map and trading centres in the study area



1.4. An Underdeveloped Demography: The Census and the Lack of Comprehensive Data

Since independence, Kenyan authorities, with the exception of a few experts on pastoralism, have largely forgotten the Northern Territories. Data on people living in the north of Marsabit district remains very poor and difficult to get. When data does exist, such as from periodic censuses, the data are heterogeneous because the focus changes from one survey to the next and the borders of administrative districts shift from time to time. North Horr was a sub-division of Marsabit district in 2009. More recently, it has been recognized as a constituency and became its own district in 2010, despite the fact that administrative representatives have remained in Marsabit. While the 2010 census claimed to be a complete count of the country's population (Census, 2010), it is clear that the northern territories, particularly the current North Horr district have long been a white column on the census tables. From 1962 to 1979, the main reasons explaining this lack of data are the conflict with Somalia (Shifta war), and secondly the insecurity in northern territories that was one consequence of sedentarization. War and the consequences of sedentarization are not the only ways to explain the lack of data. As a report of Kenya Human Rights Commission notes, the North Eastern Province of Kenya (1997) had been severely marginalized until the end of 1990.

The North Eastern Territories in the Kenyan Census

1962 "*The figures relate to the de facto population, **except in northern province**, where the census of the African and Somali population was conducted on a de jure basis. In the case of the African populations of Turkana, Samburu, Marsabit and Isiolo Districts and of the East Pokot division of Baringo district, the figures are based on sample counts rather than complete enumeration; they have therefore been rounded to the nearest hundred*".

1970 "*The figures refer to the de facto population enumerated in Kenya with respect to the night of 24th/25th August 1969. There was complete coverage of the entire country except for a part of Turkana district. Enumeration in this district was not completed (although the major part of it was covered) due to **the disturbances created in some areas by cattle raiders at the time of the census was taken***". (1970:1).

1989 "*The 1989 population and housing census was the third census since independence. The volume contains information on distribution of the population by sex, sub location, age, school attendance, educational status, literacy status and tribe. Subsequent volumes will concentrate on urbanization, demographic indices (fertility, mortality, nuptuality, and migration), labour force characteristics, household and housing"*.

If the motive for this disenfranchisement refers to the question of the place of Somali-Kenyans in the building of Kenyan nation, the lack of data on the Northern Marsabit area suggests that conceptual tools of the population census have been based for long time on models of the sedentary way of life more than on a pastoralist or nomadic mode. As L. Maalki demonstrated (1992), the census reflects the

territorialisation of a national identity in the process of nation state building that excludes mobility[2]. The focus on urbanization and migration of the 1989 population census provides an illustration of this dilemma. Even if some data on Northern Marsabit area appeared with this census, the focus of this census was not relevant because of the low density of population in northern territory. None of the localities of northern Marsabit is part of the 10 largest urban centres in Kenya, which contribute about 69% of the urban population. Yet the demographic pressure in Marsabit town remains a major challenge for the development of this district. The main problem of the census remains that conceptual tools were not adopted to account for the specific dynamics of the settlements and the livelihoods that are based on pastoral mobility in the area.

1.4.1. Population Size and Growth

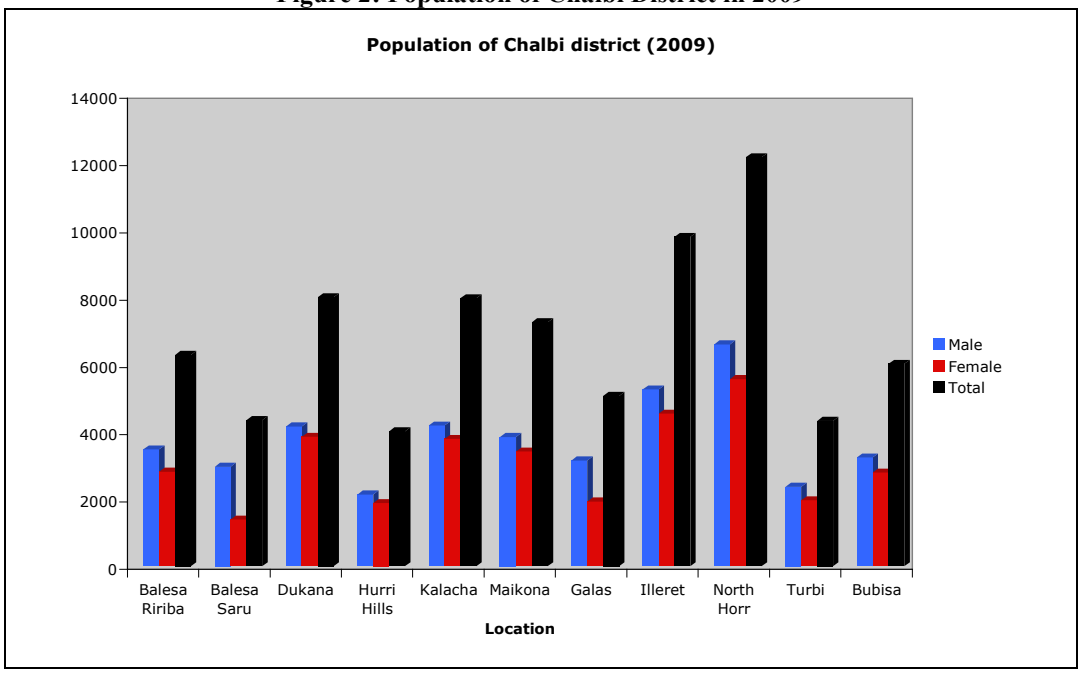
Despite the historical and political factors that explain the shortcomings of demographic studies on the north of Kenya, the sub-population of the northern Marsabit territory continues to play an important role in the socio-economic dynamics of the region. With a total population of 121,478 inhabitants and an area of 61,297 square kilometres, the Marsabit district has a density of population of less than 2 inhabitants per square kilometre (1.98 inh. / sq km), and is among the most sparsely populated areas in Kenya. Representing 35% of the total population of Marsabit district, the sub-district of North Horr has a significant population with 43,057 inhabitants for 38,953 sq km, representing an average density of 1.1 inhabitants/sq km. The rest of the population is divided between the districts of Laisamis and Saku.
At the scale of the Marsabit district, these low densities reinforce a widely-held assumption that peripheral rural areas located in the low lands form pockets of rural emigration to the town of Marsabit which is situated in the highlands and has had a growing urban population for the last decade. Yet the idea of a depopulation of rural areas of the district in favour of urban centres is based on a misunderstanding of the complexity of mobility and of the dynamics of settlements in the northern territories of Kenya. Without a doubt, the central place of mobility in the building of localities is one of the main findings of this research. On many occasions, the team was surprised to discover, in places seemingly inhospitable to human presence, many sustainable settlements and temporary settlements, with varying populations, but still well organized.

A retrospective view of demographic data available for northern Marsabit suggests an increasing population and a relatively stable dynamics of settlements rather than a depletion of the driest areas. Regarding data from the successive censuses, the population of North Horr has increased from 5098 inhabitants in 1979 to 14,745 inhabitants in 2009, and doubled in size in 10 years from 7472 inhabitants in 1989 to 14,742 in 1999. The sex ratio of the district population is 1.2 and is slightly higher (1.46) for the City of North Horr (see table 1). Moreover, population densities do not show a decrease in the number of people across the district: while there were 0.08 inh / sq km in 1979, there were 0.2 inh. / Sq km in 2009. More broadly, these observations are essentially the same as for the districts of Moyale, Loyengalani, and Maikona. This data is congruent with the strong feeling of belonging to the territories, even if it is a desert affected by severe drought, that the Gabra pastoralists expressed through interviews. These facts invite us to avoid reducing the dynamics of settlement in northern Marsabit to migration and to take into account the full complexity of pastoral mobility.

[2] Maalki, L. (1992) "National Geographic: The Rooting of Peoples and the Territorialization of National Identity among Scholars and Refugees." *Cultural Anthropology*, vol. 7(1).

Although population densities are low, the population of the District of North Horr is distributed in 9 subdivisions that represent both an administrative centres and marketplaces (see Figure 2).

Figure 2: Population of Chalbi District in 2009



Source: Census 2009

Among the 9 centres, the subdivision of North Horr represents the largest urban densification before Illeret, Kalacha, and Dukane. Resulting from the policy of sedentarization, these places reflect the recent development of sectors that are not directly related to the pastoral economy (trade, services, and wage employment) and centres where the administrative structures of education, health, and humanitarian organizations are located. They are also connected commercially, as a trade network for farm products (from Kalacha to North Horr) has existed since the late seventies, and more recent networks move *khat* between Marsabit and North Horr. People from different backgrounds congregate around these centres.

Table 1: Population per location in North Horr District in 2009

Location	Male	Female	Total
Balesa Ririba	3471	2810	6281
Balesa Saru	2953	1387	4340
Dukana	4152	3845	7997
Hurri Hills	2132	1876	4008
Kalacha	4181	3783	7964
Maikona	3844	3409	7253
Galas	3139	1921	5060
Illeret	5255	4535	9790
North Horr	6597	5560	12157
Turbi	2362	1959	4321
Bubisa	3232	2783	6015
Total	41318	33878	75196

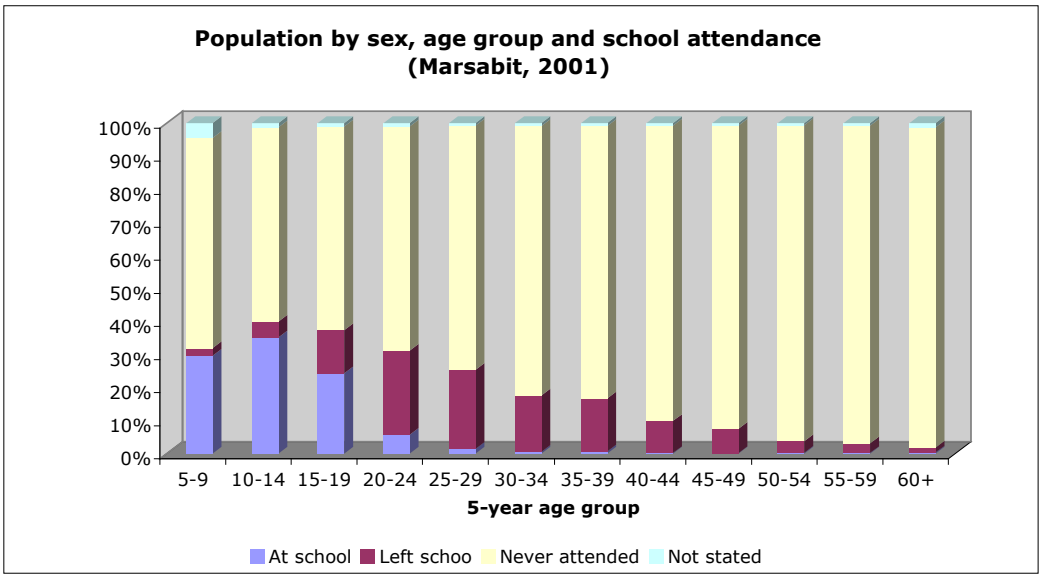
Source : Census 2009

Table 2: Population by sub-location - North Horr District 2009

Population per sub-location - 2009 Census			
Sub-location	**Male**	**Female**	**Total**
Illeret	5255	4535	4535
North Horr	4179	4226	8405
Dukana	4152	3845	7997
Maikona	3368	2956	6324
Kalacha	3160	2832	5992
Galas/Chari-Gollo	3139	1921	5060
Bubisa	2536	2275	4811
Sabarei/balesa Saru	2953	1397	4350
Balesa	1922	1874	3796
El Hadi	1549	936	2485
Hurri Hills	1229	1192	2421
Burgabo	1256	1031	2287
Torbi	1106	928	2034
Darade	1476	519	1995
El-Gade	1021	951	1972
Malabot	942	815	1757
Forole/Elle Borr	903	684	1587
Shura	696	508	1204
Medate - Kuro	476	453	929
TOTAL	41318	33878	75196

For pastoralists, the centres are most often seen through the prism of education and health. Education and health are, in our respondents' views, the symbols of settlement (see Figure 3). For the pastoralists, the main reasons for the growth of these areas are related to education. As shown on Figure 3, the number of individuals enrolled in school continually grows over the past 40 years: less than 2% of the population at the age of 5 years were educated in 1971 to over 30 % today. In addition, the diagram of children present at school at the age of 5 years clearly shows that adults in the age group 20-25 years were the first to be educated, which was early in the process of settling pastoralists.

Figure 3: Percentage of people school attendance by age and sex



Source: Census 2009

The varied status and positions occupied by Gabra pastoralists lead us, however, to introduce more heterogeneity into the perception of the links between these centres and institutions representing the state. Thus, an informant from El Boru Magado said he sees the City of North Horr as a constraint to his pastoral way of life because, as he says: "the education of children affects pastoral mobility and the well-being of the livestock". However, for others (urban widows, families whose livestock are decimated by a severe drought), North Horr or Kalacha represents a refuge where they can receive relief food. The creation of settlement centres near North Horr and Kalacha is also linked to episodes of severe drought.

At the same time, the distribution of the population in divisions should not overshadow the fact that mobility structures the daily lives of these spaces. Indeed, the geographical distribution of the population fluctuates and cannot be reduce to one form of housing that is settled in the Chalbi desert. Beyond the phenomenon of urban densification mentioned above, the size of population of the main localities can vary throughout the year as is suggested by an observation related to the severe drought of 2011 and recorded in our of field notes:

"*In the south of Dabandable (north of the city), many spontaneous settlements composed by families that had lost their livestock appeared. Questioned about these pastoralists, our informants indicate that at certain period of the year many manyattas come close to North Horr in order to benefit from greater food security. More broadly, they point out that during the long dry season (May-October), a number of families settled in the peripheral areas of North Horr and, thus, the population of the city fluctuates with the seasons*".

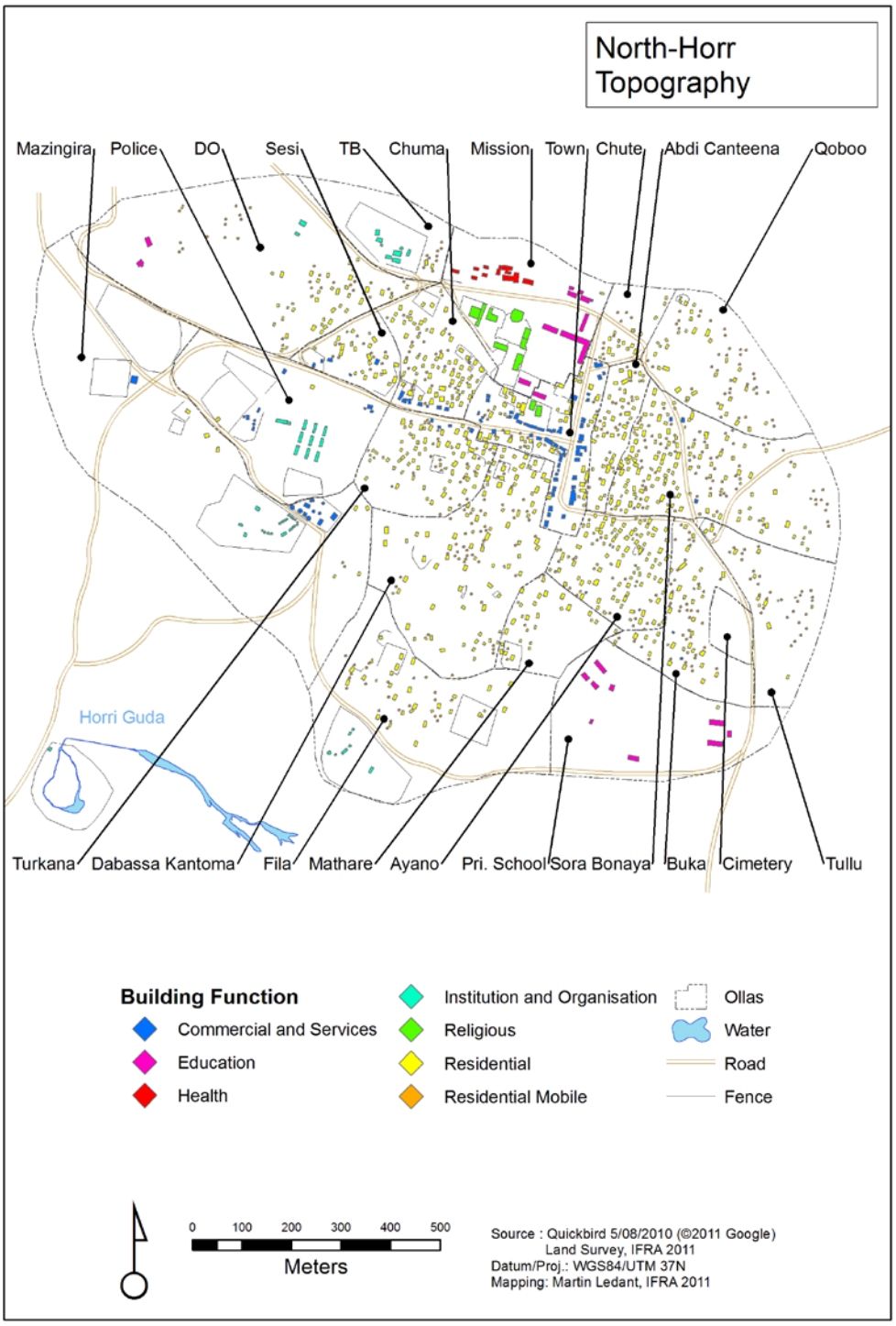
Centres such as North Horr, Dukana, and Kalacha are potential refuge areas for pastoralists who meet difficulties and who can find relief food there. The example of Ali (see frame) shows that North Horr, like other "centres" (Kalacha, Dukana, Maikona, Hurri Hills), reflects the movement of pastoralists towards more settled centres when facing a particularly vulnerable situation.

The experience of mobility of Ali, head of the household, met in El Isako Mala (south of North Horr), reflects the dynamics of settlement of the city of North Horr. Asked about the history of his mobility, Ali said that in 2008, he was in a rural area between North Horr and Balesa when severe drought occurred and decimated his entire herd. With his household, Ali went to North Horr where he settled in the district of Buka until 2010. He explains this choice by the presence of NGOs that distribute relief food that allowed him to support his household. After a few months in North Horr, he managed to gather cattle and decided to go and settle in El Isako Mala. Asked about the motives of this move towards a rural area, he replied that he did not intend to stay in Buka because his lifestyle is that of a pastoralist. For him, the move to North Horr was part of a strategy to rebuild a herd. Once he had the opportunity, he relocated in rural areas for the welfare of livestock but stayed close to North Horr to ensure the education of his children.

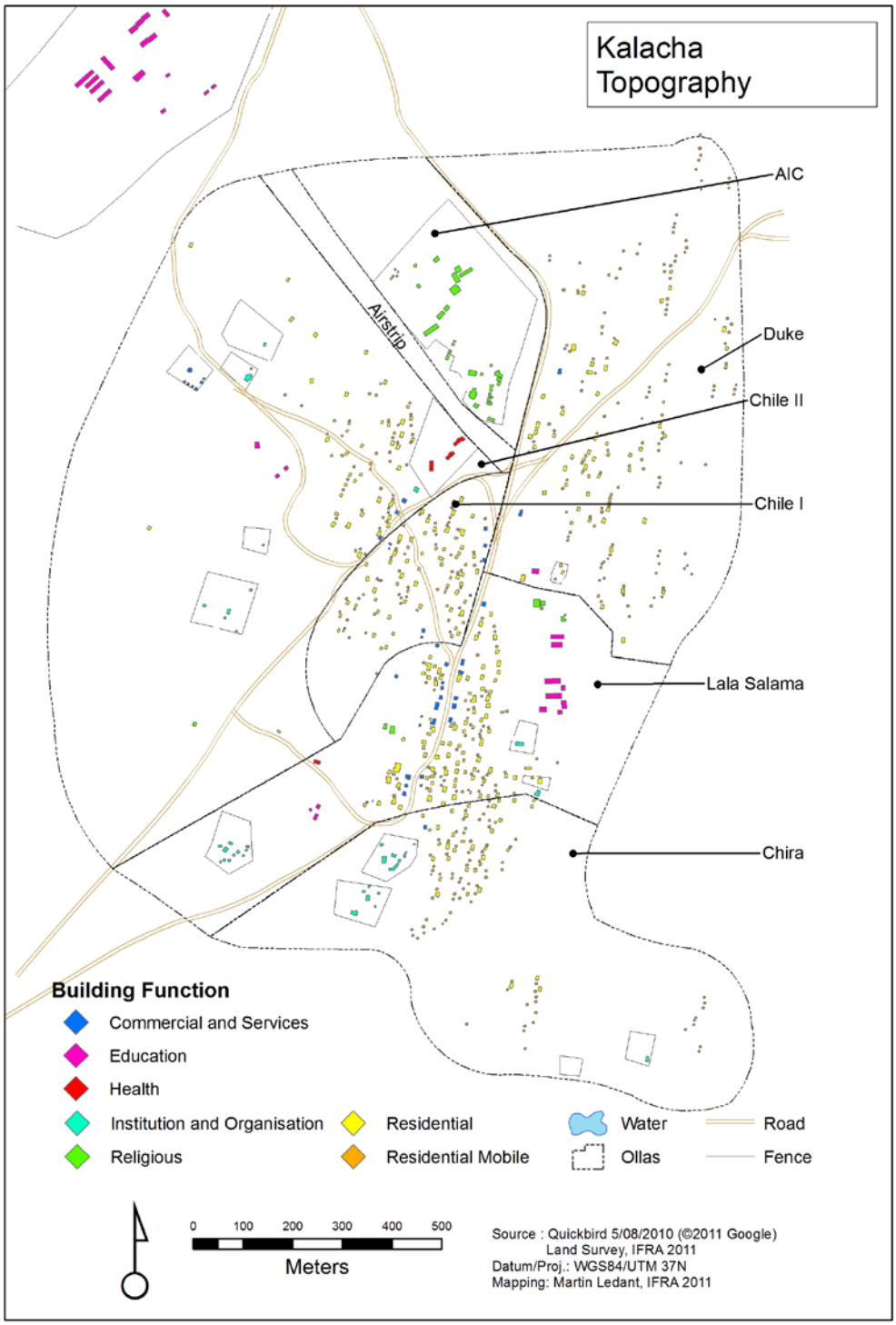
The presence of NGOs in the 'urban' centres allows pastoralists the ability to adapt to a more settled livelihood on a temporary or more permanent basis. It allows pastoralists refuge in the face of dire climate or environmental situations and affords pastoralists opportunities to bounce back into the pastoral economy that is to say to a livelihood which depends on livestock and a lifestyle characterized by temporary housing and semi-nomadism.

1.5. Physical Map of North Horr and Kalacha Trading Centres

Map 2: North Horr town general map



Map 3: Kalacha centre general map



1.6. Sources of Data

Solidarites (SI) has commissioned this study with the main objective of providing a better understanding of the livelihoods and natural resource management strategies of the pastoral communities in the North Horr area in northern Kenya. To meet this objective, a wide range of data collection techniques and information from various sources were required. The team collected both secondary (including so-called grey data) and primary data from various sources including organizations, agencies, and government departments. The main sources of the secondary data included government reports, national population censuses, district socio-economic profiles and annual reports, and data from organizations such as the Regional Centre for Resource Mapping for Development, the Ministry of Mines and Geology, the Survey of Kenya, Kenya Meteorological Department, Oxfam, and many others. The secondary data from these sources were reviewed and the relevant data extracted.

The primary data for the study was collected from focus group discussions, individual interviews, and survey questionnaires. The primary data was mostly collected during two months of fieldwork (June and July 2011) in the North Horr area. The consultancy team conducted several visits to different localities and individual and group interviews during the fieldwork period. A household survey was designed and administered to sample households during the same period. More details of methods used and the specific types of data collected during the fieldwork period are described in the following section.

1.7. Methodology of the Fieldwork

The data collection and the fieldwork period for the study proceeded in four successive phases.

1.7.1. Phase 1: Acquisition of data

The first phase was dedicated to gathering data on the North Horr district in order to better contextualize the study. The data collected was considered from an interdisciplinary perspective to cross the geological, demographical, socio-anthropological, and environmental knowledge. Data collected are:

• Second-hand data (monographs, previous work)

• Cartographic data (maps, topological data, and Landsat photography) used to produce the various map of the report

• Demographic, geological, and climatic data. Each category of data has been organized in series before being analysed using a retrospective approach.

This first phase clearly demonstrated the lack of data on the district of North Horr and the extreme dispersion of existing data across different organizations and departments. If this dispersion is a problem for research, it is also a problem for those making choices for the development of the territories of northern Kenya. That is precisely why one goal of the survey has been to collect new, basic data on the ground whenever possible.

1.7.2. Phase 2: Territorial Diagnosis

This first phase was territorial diagnosis through a checklist of issues as directly informed by the ToR of the study. This second phase included visits to the various sites and areas with a checklist of issues, and interviews were conducted on diverse aspects of past and present pastoral livelihoods. The checklist covered specific questions regarding the presence of and distance to water points for human, livestock, and domestic uses, quantity of water used, changes in ownership and use of water sources in the area; perception of sanitation facilities (where present); individual observations and perceptions of climatic (rainfall) patterns; history of settlement and frequency of movement of households and herds, and changes in the pattern of movement in the recent years, effects of recent changes in mobility for herds and human welfare, and the factors that influence mobility of herds and households in the past and more recently. Mapping of natural resources and WASH facilities in North Horr district and its surrounding areas was also done during this phase of the study.

1.7.3. Phase 3: Focus Groups and Questionnaires

This phase included data collection from focus group discussions and the survey questionnaire. Focus group discussions and interviews on pastoral mobility and settlement processes, water resources, management structures and rules of access, and sanitation and hygiene, were dealt with during this phase. During this phase considerable information was collected from North Horr, Dukana, Hurri Hills and Kalacha. The study also designed and used a comprehensive household survey questionnaire to collect household-level information.

The survey questionnaire was designed to collect both qualitative and quantitative data sets covering the main aspects of pastoralism: livestock, mobility, pastoral livelihoods, ownership, the use and management of water resources, and sanitation and hygiene. The questionnaire was designed and pilot-tested with the help of the enumerators in the Kalacha and North Horr areas. The questionnaires filled in during the pilot-test stage were discussed with the enumerators to clarify issues and refine questions. Attempts were also made to minimize non-responses in the final household questionnaire. In North Horr and Kalacha the final household questionnaire survey was administered to households considered to be good sample units and whose female or male head was the main respondent. The semi-settled *Ollas* in the vicinity of North Horr were also sampled in the final survey but no GPS coordinates of the households were recorded because water sources were widely dispersed from them or sanitation and hygiene facilities were largely non-existent. The questionnaire covered a wide range of issues and the types of data sets collected included basic data on the respondent, household and its composition; household assets, sources of income and mobility patterns; detailed data on social services (water sources, ownership rights, distances, accessibility, and rules of access); sanitation and health data; and data relating to individual's perceptions of and observed changes in climate variables in the recent years. Attempt was made in the questionnaire to get an understanding of notion of normality as relates to weather patterns, and human interpretations of signs (indicators) of change in the weather pattern, or any signs that foretell future (desirable or adverse) events (early warning signs based on plant, animal, or human behaviour).

1.7.4. Phase 4: Individual interviews

In the final stage, 30 individual interviews, 8 focus group discussions (2 in North Horr, 3 in Kalacha, 1 in Balesa, 1 in Dukana, and 1 in Sarimo) and a total of 263 household questionnaires (111 in and around North Horr, 68 in the North Horr outskirts, and 84 at Kalacha) were administered. The household survey data was entered into an excel spreadsheet and analysed using various options for illustrations, and summary presentations such as graphs and tables (see the next section for details of variables collected).
If the sample size seems too small and insufficient to allow for extrapolations, the team has chosen to build a comprehensive questionnaire that mixed qualitative and quantitative information and covers the different specific objectives of the study. The size of the survey is small, but it covers the broad objectives assigned for the study. Moreover, this choice can be justified by the following reasons:

• The study was led in a context (northern Kenya) where socio-demographic studies are "underdeveloped" for historical and political reasons. The objective of the Household Survey is to provide information on many basic but important aspects of pastoral livelihood today in an area where the demography and socio-political organization of societies have been rarely studied, among the Gabra of the Chalbi desert. Some *manyattas* we visited had never been included in a census.
•In a comprehensive perspective, the team wanted to implement a survey that reflects as closely as possible the voice of the Gabra people.

1.7.5. Methodology for the Analysis of Household Survey Data

The household questionnaire provided several different ways of analysing the information, especially at the household level, for each site. The variables were analysed in this report in line with the objectives of the study. In the following section we summarize the key variables collected using the household survey tool based on the broad components of the study:

I. Pastoralism, mobility, and components of livelihoods
- ✓ Duration of settlement at the present location
- ✓ Ownership of livestock, numbers owned and their ranking
- ✓ Animals owned when settled and present (2011), and the reason for the difference
- ✓ Composition of livestock according to ownership rights
- ✓ Evidence of herd splitting between satellite and homestead camps
- ✓ Reasons for herd mobility
- ✓ Perception about possibility to go back to the mobile life
- ✓ Livestock exchange (gifting and receiving), and social relations involved
- ✓ Estimates of household income by their respective sources during the dry and wet season

II. WASH and access to related structures:

II.I Water
- ✓ Water resource availability within the locality (%)
- ✓ Water sources used in North Horr, Kalacha, outskirts, other visited areas
- ✓ Average distance, time taken to the sources and average quantity per trip
- ✓ Average number of trips
- ✓ Average quantity each household fetches daily
- ✓ Perception of water quality
- ✓ Uses of water and different modes of transport (%)

- ✓ Water charges and payment for transportation (%)
- ✓ Regulated water sources (%)
- ✓ Water sources used in dry season and in wet season
- ✓ Average cost of water: North Horr and Kalacha
- ✓ Responsibility of the person fetching water in the household (%)
- ✓ Average number of individuals per household: determine the burden
- ✓ Average water dedicated for various uses: get average for each use
- ✓ Different responses to coping with water scarcity (%)

II.II Sanitation and hygiene

- ✓ Accessible sanitation structures and waste disposal facility (%)
- ✓ Use of soap (%): pie chart of various uses, and responses to availability of soap (%)
- ✓ Graph of sanitation structures vs. % respondent having them: pie chart
- ✓ Common types of sanitation structures (%): graph
- ✓ Average distance to the structures: all structures
- ✓ Owning sanitation structures (%)
- ✓ Impacts of structures: sample responses
- ✓ Disposal methods: % of each responses

II.III Health

- ✓ Availability of health centre in the locality (%)
- ✓ Average distance to nearest health facility: North Horr, Kalacha, and outskirts: compare
- ✓ Average time taken to the health facility: North Horr, Kalacha, and outskirts
- ✓ Diseases in wet season: % of each: compare the areas
- ✓ Diseases in dry season: % of each: compare the area
- ✓ Undergone health training in the past one year (%)
- ✓ Sample answers for how knowledge of training benefitted them.
- ✓ Sample list of contaminants: perception: pie, chart, graph
- ✓ Relief situation: % in North Horr, outskirts, etc.
- ✓ Average types, quantity and frequency of visit to the health centre
- ✓ Households treating water (%)
- ✓ Common treatment methods used: % of answers
- ✓ Washing hands from latrine in areas (%): compare with prevalent diseases

1.7.6. Method used to map structures relevant to the study

For the most part, the mapping exercise was limited to Kalacha and North Horr trading centres. In addition to Kalacha and North Horr, water and sanitation facilities (including health centres), schools, and important social structures such as mosques and churches were mapped in Hurri Hills, Dukana, Balesa, and El Beso. The most comprehensive and systematic mapping was carried out in Kalacha, North Horr, and surrounding areas. First, each centre was divided into clusters of *Ollas* (each *Olla* bears a name) with the help of field assistants, enumerators, and local chiefs. The cluster of *Ollas* in each centre was then sketchily delineated on a print out of a Google Earth map. The mapping exercise proceeded in an orderly manner by choosing one cluster of *Ollas* at a time, until all the structures of interest in each Olla, and then all the *Ollas* (and therefore the entire trading centre) were mapped. The mapping exercise started from one end of each *Olla* and preceded to the other end of the same the *Olla*. The exercise was repeated until all the village clusters of each centre were mapped. Each time and for each *Olla* in a trading centre, the specific location of water points (and their respective name where available), pit latrine, waste disposable site (where available), a health centre, schools, a mosque, a church and a bathing structure were mapped

using hand-held Geographical Position System (GPS). The specific coordinates of each structure was read and recorded accordingly.

In addition to the general mapping described earlier, the households sampled for administering the questionnaire survey were also mapped in Kalacha and North Horr area. The enumerators did this mapping, either before or after the interviews with each respondent of the households. The mapping of the household selected for the survey helped by linking responses to relevant WASH structures, and also aided in the illustration of distributions and densities of structures (especially water points and pit latrines) across the settlements.

2. FROM NOMADIC SYSTEM TO POVERTY: CHANGES IN PASTORAL LIVELIHOODS

In this section, the notion of « pastoralist livelihood » will be developed through the description of the past and contemporary pastoral system in North Horr district.

2.1. Definition of « pastoral system » and « agropastoral system ».

The arid and semi-arid land in northern Kenya is home to communities whose primary form of land use and production is pastoralism. They depend on raising livestock (consisting mainly of cattle, goats, sheep and camels) to meet large part of their livelihood needs. As a broader definition, pastoralists include those people who for at least 50% of their livelihood needs depend on livestock or livestock-related activities. Ownership of sufficiently large herds is therefore important to the herders to provide livestock produce, obtain material goods through sale of animals and to satisfy social obligations such as marriage payments, or invest in social security against risks. For instance, pastoral households often exchange animals on a gift or loan basis with others who in return are expected to reciprocate in the event of hardship or stress. Pastoral communities require intensive labour and a significant labour force to provide pasture, water and security to their herds.

In arid and semi-arid lands, arable agriculture is generally limited but for a few areas. In Kenya, pastoralist communities occupy over 70% of the total land surface. However, these communities constitute less than 3 million of the total population of nearly 40 million people (KCBS, 2009)[3]. One distinguishing feature of a pastoral way of life is livestock mobility over wide territorial space to exploit dispersed pasture and water resources following seasonal and temporal variability and distribution of rainfall. This they manage by making use of communally shared range land resources.

In the last 40 years, pastoralists in East Africa have settled[4] in response to a range of factors, including destitution caused by recurring droughts, shrinking rangelands as a result of the expansion of arable agriculture into former pastoral grazing areas and establishment of protected (or conservation) areas (Fratkin 1997; Fratkin and Roth, 20005)[5]. These events have led to loss of dry season fall-back areas important for pastoral production. If we view pastoralism as a spectrum, at on one extreme end pastoralism is a system of production where livestock, people and households move from place to place in search of good pasture and water. The other extreme is where people and households are permanently settled in one place throughout the year, but practice transhumance. In between there are a wide continuum of settlement forms where people, animals and households move from place to place. In agro-pastoral systems of production (in few places, e.g. around Marsabit Mountain and Hurri Hills), people combine livestock rearing (to meet livelihood needs, cultivation of land using animal power) with farming and production of agricultural crops as part of their livelihood strategies. Today, there is hardly such a

[3] Kenya Central Bureau of Statistics (2009). '2009 Kenya Population Census: Preliminary results, 2010'.

[4] According to Fratkin and Roth, sedentarization is the process of individuals, households or entire communities of former pastoral populations settling in one place in permanent communities. Elliott Fratkin and Eric Roth (2005) *As Pastoralists Settle: Social, Health and Economic Consequences of Pastoral Sedentarisation in Marsabit District, Kenya* (p. 8).

[5] Fratkin(1997) 'Pastoralism: Governance and development issues' , pp. 235-61; Fratkin, and Roth, (2005) *As Pastoralists Settle.*

thing as *pure pastoralism* in East Africa (see Dietz and Salih, 1997), where people live and entirely derive their livelihoods (100%) from what their animals provide them in food supply or material needs.

The inhabitants of North Horr area in Northern Marsabit are largely settled and thus do not move for extended periods of time, or are semi-settled, where households less frequently move with their animals. Permanent settlement of former pastoralists is a relatively recent phenomenon in the drylands of northern Kenya, which has been driven by several factors including attraction to social amenities such as schools and healthcare, and a general lack of water, sanitation and hygiene facilities in the rural hinterlands for nomadic populations. The following analysis is based on information gathered over two months' fieldwork in North Horr area.

2.2. « Social and economic profile of pastoral livelihood »

Background

Nomadism « a system of livestock production defined by the mobility of herd and household, is a cultural system » (Schlee, 1991: 130).[6] As a system of production, pastoralists rear diverse livestock species, preferably a combination, of cattle, sheep, goats and camels. The number of livestock owned must be sufficient to provide the income necessary for the family to survive in terms of milk, meat and live animals for consumption or sale. The type of animals raised in a particular place is largely determined by a combination of factors including climate, soil type and vegetation cover (Dietz and Salih, 1997).[7] Livestock, as a principal asset for the pastoral groups, doubles as a natural resources and a source of economic wealth. While livestock perform various functions for pastoralist populations there is no single pastoral group that entirely relies on animals to meet their livelihood requirements. Individual members of pastoral households participate in various production systems at different times, and in different seasons. The income earned from households'[8]productive capital (such as land, livestock or cash income from wage employment) fluctuates between seasons and over time. The various household sources of income constitute livelihood assets and activities. For the purpose of this report, a pastoral livelihood comprises capabilities, assets (including both material and social resources) and activities required for a means of living (Chambers and Conway, 1991).[9] This subsection of the report examines the social and economic livelihood profiles of the study populations, along with their coping strategies in the face of risks.

Survey results

2.2.1. Component of pastoralist livelihoods

In the recent past pastoralists are increasingly embracing market opportunities by shifting their economic activities from subsistence production to commercial (market-oriented) production. Livestock trade is not new in northern Kenya, as pastoralists traded livestock for grains from southern Ethiopia since the 19th

[6] Gunther Schlee(1991) *Identities on the move. Clanship and pastoralism in northern Kenya*.
[7] Ton Dietz, and M. A. Mohamed Salih (1997) 'Pastoral Development in Eastern Africa: Policy Review, Options and Alternatives'.
[8] A basic unit of production and consumption
[9] Robert Chambersand Gordon Conway (1991), 'Sustainable Rural Livelihoods: practical concepts for the 21st century'.

century. However, trade in livestock produce (e.g. milk as well as natural resources such as firewood and saltlick) is a relatively recent phenomenon among pastoralists in northern Kenya. Thus trade among pastoralists has generally expanded and become more integrated into the cash economy over recent decades (Dietz et al., 2001).

Table 3: Wet and dry seasons households' sources of cash income (in KSh.)

Income Source	Dry season		Wet season	
	Sample size	Average income	Sample size	Average income
Formal employment	30	16,530.00	29	18,825.00
Casual labour	58	3200.00	57	3384.21
Animal produce	42	1644.04	101	2658.42
Sale of livestock	177	9478.28	111	14139.64
Farm produce	7	3414.29	5	2700.00
Wood products	10	1810.00	9	1555.67
Trade	21	16,250.00	21	21,292.86

Source: survey data, 2011

The sample households (263 households) obtain income from different sources (Table 3). A diversified income sources is beneficial for the households given the risky nature of a single income source in an area subject to climatic shocks and other risks such as conflict, inflation, and so on. Formal employment and casual labour provide income for a moderate number of households with comparable income levels between wet and dry seasons. These types of work include civil service (i.e. wage labour), casual labour of cleaning wells and springs, and digging pit latrines. Farm produce, natural resources (wood products) and trade are income sources for only a few households (about 4%) but may play an important complementary role to other sources of income in the region. The majority (about 90%) of the households own at least one of the livestock species; cattle, camels or small stock. Table 3 shows livestock produce and sale of livestock as clearly significant sources of income for more than 50% of the households, both in dry and wet seasons. The high livestock income is used to purchase a range of commodities like maize flour, tea leaves and sugar. However, a high livestock income in the wet season may result from relatively better market prices rather than increased marketed livestock off-take. In other words, increased livestock off-takes do not necessarily raise household income during the dry season as increased sales in response to hardship usually lower animal prices.

These results highlight the importance of livestock assets to livelihoods and welfare of the households in the area. In this regard, mobility is an essential practice for the livestock keepers to respond to environmental variability and adjust coping mechanisms to changing livelihood needs. Herders move from time to time in order to exploit variability in the rangeland resources while at the same time respond to the different resource needs of the livestock species, through herd-splitting between *fora* and *awicha* herds (i.e. mobile satellite and homestead herds, respectively). The lactating animals are often kept in the *awicha* herds to provide milk to the residents. Because of herd-splitting and the task of watering animals from labour intensive wells such as Dukana and Balessa, household labour demand among the pastoral communities is usually higher in the dry season than in the wet season.

2.2.2. Access to pasture and water

Livestock is the backbone of the pastoral society and economy. The resilience of the herds is intricately linked to the availability of rangeland resources, especially water and pasture, which are best exploited via a nomadic lifestyle. . Herd or household mobility is more constrained during the dry season when fodder is limited and water points are widely dispersed. On balance, access to water and pasture within reasonable distance for herds and households allows for a more efficient form of livestock management in the dry lands. The distance between forage area and water source is influenced by the watering intervals for livestock types. Camels are watered every 14 days, small stock every 3 to 5 days, and cattle every 3 or 4 days. These watering schedules enable livestock to graze in different areas of the range units.

Decisions around livestock watering intervals are the responsibility of *Abba herega* (appointed by elders of a group), which are critical during the dry seasons (see Water Management section of this report). In principle the *Abba herega* oversees the peaceful and orderly allocation of water to its various uses, and resolves numerous conflict situations around water holes with regard to water use. Camels' long watering intervals make them appropriate livestock for the arid lands. Watering intervals for the same animal type may vary from place to place, and season to season, depending on the availability of fodder around water sources. This makes dry season access to water and pasture a critical factor in herd survival and human livelihood strategies in the dry lands. Water sources tend to be clustered together yet widely dispersed, and thus herding systems regulate access to water points rather than pasture, since access to water sources naturally means access and rights to rangelands surrounding water sources; rights to pasture lands in the pastoral areas are typically defined in terms of rights to water sources. Yet according to some informants it is lack of or long distance to *pasture,* not water, that causes death of high numbers of livestock during extended periods of drought.

2.2.3. Aspect of pastoral change

In the North Horr area, it is only at Kalacha and Hurri hills where limited arable farming using privatized land parcels is practiced (see later sections of the report for detailed descriptions). Farming on the Hurri hills is entirely sustained by rainfall and water is a chronically scarce commodity. Water shortages are severe to the extent that public institutions are sometimes forced to close down (such as schools due to lack of water for cooking, and the dispensary for fear of outbreak of diseases due to shortages – also called water borne diseases).

Farming activities at Kalacha are carried out throughout the year, thanks to abundant water supply from Kalacha Goda. In these places, individuals have excised and fenced off land parcels out of the *local commons*. The practice of fencing off of the former grazing areas is a recent development in the region, and represents an attempt to privatize pasture resources by withdrawing individual plots from common use (see sections of Environmental Management Committee - EMC). The introduction of such a committee represents a departure from the traditional pastoralist tenure land and access rights to rangeland resources. The cultivated areas are no longer part of the common pool resource or subject to traditional use right regimes, and may be read as evidence of the decaying authority of the pastoral customs that govern access and rights to common resources, which are free to all members of a specific community.

2.2.4. Livestock wealth, drougth and poverty

Drought is a regular climatic feature in the drylands of northern Kenya. Drought has occurred with greater frequency in the recent past as compared to the distant past (Fratkin and Roth 1996, 2005).[10].For example, in East Africa region droughts were reported in 1960-61, 1968-69, 1974-76, 1979-81, 1991-93, 1996 and 2000. Severe famine (i.e. the widespread disruption of the food supply leading to starvation and emigration) occurred in 1982-84, and affected the northern region of Kenya. Historically, pastoralists have adapted to conditions of erratic and unpredictable rainfall in the drylands through herd and household mobility, multi-species herding and herd-splitting strategies. Settling around water sources or trading centres is a relatively recent mode of adaptation in response to the declining production of the pastoral system.

The study groups are former pastoralists who have settled around water points in Kalacha and North Horr over the years. The sample households had on average been settled in these areas for almost 20 years. People settled in or around permanent water sources for a variety of reasons prompted by specific events. They settled due to loss of livestock (including loading camels), drought, raiding and insecurity from neighbouring communities, and to take up government employment or move to town in search of employment. Some families first settled around settlements such as North Horr for traditional ceremonies (e.g. marriage) and thereafter stayed on for years, while some settled due to life cycle crisis (divorce). Today, some respondents know little about the mobile pastoral lifestyle as second or even third generation settlers. Given that water is a severely scarce resource in northern Marsabit, all year round availability of water significantly influences settling around permanent sources in order to reduce vulnerability to water shortages.

Table 4: Average livestock owned by households when settled and today (2011)

Animal type	When settled		Today (2011)		Absolute change in herd size (%)
	Sample size	Average herd owned	Sample size	Average herd owned	
Camel	177	9.51	181	8.44	(-) 11.25
Cattle	95	13.79	73	4.64	(-) 66.35
Small stock	241	88.32	251	55.69	(-) 36.95
Donkey	106	3.19	133	2.38	(-) 25.39

Source: survey data, 2011

Comparing average herd sizes for the sample population at the time of settling (on average about 17 years ago) and today reveals a striking decline in livestock wealth (Table 4).[11]The average herd holding per household considerably declined for all livestock species. Cattle experienced the highest decline (about 66%) while camels show least decline (about 25%). This finding is consistent with the well-established fact that camels are hardy and the most adapted of livestock species to arid and semi-arid conditions. The

[10] Elliot Fratkin, and Eric Roth, (1996). 'Who survives Drought? Measuring winners and losers among the Ariaal Rendille Pastoralists of Kenya'; Fratkin and Roth (2005) *As Pastoralists Settle.*

[11] Previous studies have also shown a similar decline trend in livestock holding of the mobile and settled households in the region (Adano and Witsenburg 2004; McPeak 1999), especially when measured in the tropical livestock units (TLU). Thus, this result too confirms vulnerability of the pastoralist households to livelihood insecurity assessed in livestock assets and production.

question begs whether households and individuals have simply become worse-off after settling in terms of livestock wealth, or whether they have managed to tap into complementary alternative sources of livelihood. The level of animal holdings suggests that households either attempt to diversify outside the livestock sector or remain unable to restock via any available options to escape out of herd poverty. Since households have relatively recently become dependent upon emergency food relief, trends towards low livestock holding may endure.

Respondents state two strands of reasons for the difference in animals owned by the households when settling and today. First, the barter trading of loading camels for food, less rainfall and lack of pasture in the recent past, implying reduced livestock wealth. That is, people stated, "*several number of livestock died in the recent drought, or long and frequent drought make animals very weak and some animals died because of starvation"* or herd growth to account for the difference in number of animals owned at the time of settling and in 2011 (see Table 4). Other respondents attributed the fact that they used to have more animals than they do today to livestock raiding from neighbouring pastoral groups, like the Turkana and Dassanetch. Second, discussions with key informants and focus group sessions revealed that there are practical difficulties with balancing the needs of both the herds (which require mobility) and the now settled households. There was consensus that settlement is not good for livestock management, and thus herd growth, for a number of reasons:

- The necessity to be mobile in order to make use of patchy rangeland resources separates herds and pastoral households. Reduced household mobility constrains herd mobility and household access to livestock produce.
- Reduced herd mobility as a result of sedentarisation tends to enable the spread of a disease causing vector (ticks), among the calves and increases livestock mortality.
- Some informants pointed out that more and more human security and ease of access to town-based amenities tends to override livestock health and condition as a consequence of reduced mobility, to the detriment of both human and animal welfare in the end.
- Families increasingly send their children to school making it difficult to take them out to herd livestock, leading to the tendency to settle in one place for a long period of time. This argument was also supported by some Gabra who stated that those who attended formal schooling dislike returning to mobile lifestyle of herd management, unlike their contemporaries among the neighbouring Rendille, Samburu and Dassanetch.
- As elders stay with the settled households there is lack of basic knowledge about ecology and guidance about herd management for young *fora* herders, hence negligence is prevalent and a concern for herd management and growth.

The current challenge of herd mobility that affects livestock condition, health and herd growth, not to mentions human welfare in the region, is further worsened by the frequent droughts. Thus, overall livestock wealth of the sample population shows considerable decline over time. Livestock loss is somewhat idiosyncratic to specific households as some households did manage to rebuild their herds. This is affirmed by responses like, 'we *received some animals from relatives; did not own any animals when settled but today own a number of camels; when settled we did not own any animals, mostly small stock, or stay the same – no difference with or without animals at both times*. Lack of livestock ownership in pastoral contexts demonstrates the necessity for future intervention efforts (both internal and external) in order to enable settled pastoralists to mitigate exposure to risk.

Another argument given by informants for reduction in livestock wealth was that planning the mobility of the households when animals are away is an arduous undertaking. Informants contended that household mobility is of concern to recently married young women without know-how of loading pack animals. Lack of sufficient herd size and enough loading camels for the necessary mobility to maintain livestock forces households to settle. Settled households also sell off loading camels during times of hardship. It is not clear whether reduced household mobility is more restricted by lack of skills around loading pack camels among young women, or whether it is less frequent household mobility that denies young women the experience of loading animals in the first place.

On the whole, in addressing the root causes of vulnerability and development in the drylands, there is need for concerted efforts and attempts to strike a delicate balance between pastoral mobility and ongoing processes of sedentarization in order to enhance pastoral livelihoods.

Table 5: Number of milk animals

Animal	Sample size	Milk animals (average)
Camel	113 (50.6%)	2.35
Cattle	7 (2.7%)	1.7
Small stock	41 (16.6%)	5.22

Source: survey data, 2011

Livestock provide a measure of wealth and social status among pastoralists. They also directly contribute to household and community consumption through milk produce (Table 5). The average number of lactating animals is, by any standard, too low to provide sufficient produce (milk) for the household members; households have an average about 2 cattle or camels, and about 5 small stocks. These low figures of milking animals indicate a serious household food situation. At the time of the study, there was a severe food shortage, and a significant proportion of the population were relying on relief food from the government and various NGOs (Kenya Red Cross, Food for the Hungry and World Food Programme) operating in the area.

Traditional mechanisms for redistribution and resource (food) sharing exist among the local populations. One such option is gifting and receiving animals. These exchanges can take form of loaning milking animals to reduce temporal food shortage, short-term loan of a female animal, or gifting an animal for the purpose of sale (Table 6).

Table 6: Livestock exchanges among the sample households (value in KSh)

	Camel		Cattle		Small stock	
	Give	Receive	Give	Receive	Give	Receive
Sample	44	40	7	16	102	100
Value	26416.66	29907.50	14000	15775	5613.40	4906.06
Period*	3	4	1	3	4	3

Note: * Period in year, and value (KSh.) refers to average estimate of animal given out or received in.
Source: survey data, 2011

There is no reference point against which to assess whether the reported livestock exchanges are high or low. Neither is there any way of assessing whether the exchange of animals fulfils its social purpose. Nevertheless, the reported number of inter-household livestock exchanges seems low vis-à-vis the time period and low livestock wealth holdings of the household. However, we can assume that such exchanges would provide short term relief to households in need, which surely fulfils at least one aspect of the social objectives around livestock exchange.

The reasons and circumstances of livestock exchange widely differ, giving rise to a complex form of ownership rights over animals. The social context and the reason for exchange may determine type of animal exchanged and the recipient's ownership rights over that animal (Table 7). Such exchanges give rise to different livestock ownership rights in one's kraal among family herd of pastoral households (Sato 1992).[12] The livestock exchanges primarily function to spread and pool risk in the dry lands. Animals donated from one household's herds reduce risks to other households, (social risk) while animals received from others contribute towards reducing household's own exposure to risk (private risk - risk experienced by a household). At the core of such exchanges is the social mechanism for sharing livestock-based resources and helping out households in temporary or medium term to meet their own needs.

Table 7: Livestock ownership rights of the sample households

	Alal		*Kalasime*		*Dabare*		*Daran*	
	Size	%	Size	%	Size	%	Size	%
Camel	516	33.06	162	10.38	736	47.15	17	1.09
Cattle	54	68.33	27	6.15		25.52	--	--
Small stock	230	99.39	69	0.05	--	--	--	--

Source: survey data, 2011

Different livestock ownership rights can be exercised over the animal exchanged as determined by the circumstances and conditions at the time of exchange. *Alal* is the most dominant ownership for cattle (68%) and small stock (99%). This ownership type entitles the holder full rights of his/her actions and decisions over the animal. Such decisions may include rights to give-out, slaughter or sell the animal at holder's own discretion. *Kalasime* refers to short-term loan for access to milk from a lactating animal (may be returned at end of lactation period). *Dabare* describes the second-most important ownership rights for camels (47%) and cattle (26%), but not for the small stock. It refers to ownership conditions where the holder possesses the animal for a relatively long period of time, and has the full ownership rights of all male offsprings of the mature females on loan which are born during the time of the loan. D*aran* describes the caretaking of a male animal until the rightful owner has a female animal to give in return for the said male. The most significant result from this study's research is the relatively high proportions of *dabare* animals in family herds, of animals which are not rightfully owned by the holder. This system of livestock exchange (also called animal trust system) works on a basis of mutual trust and has the overarching goal of inter-households' sharing of herds, livestock-based resources and spreading and pooling risk via animals in a highly risk=prone environment.

[12] Shun Sato (1992) 'The camel trust system in Rendille Society of Northern Kenya', pp. 69 – 89.

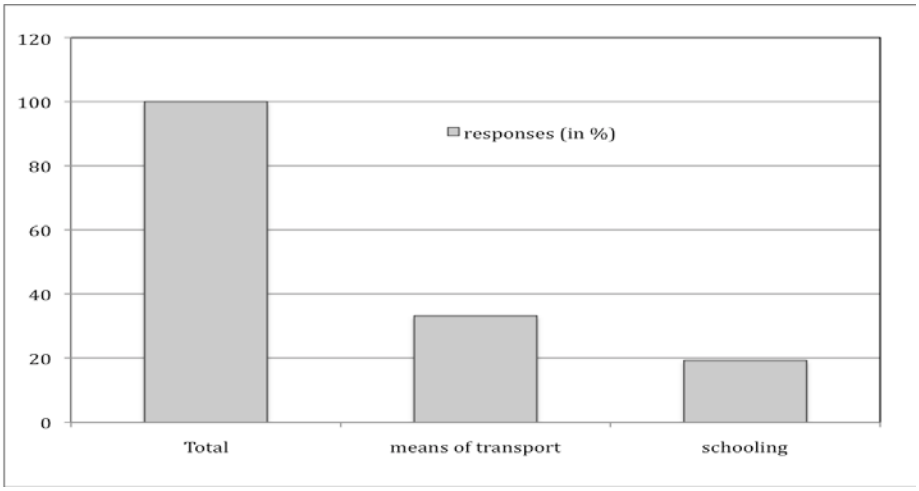
As the results in Table 7 show, the family herd may contain a number of animals which have been temporarily borrowed to overcome a crisis at some stage in the family's history, or have been placed in the herd by friends or relatives for reasons of security, or because the owner lacks herding labour. Some livestock transfers are ritually prescribed and occur at occasions like marriage and *Sorio* (traditional ceremony of slaughtering and sharing of meat in the camel enclosure – *moona gaala*). Such 'ownership rights' affect the circumstances of animal transfer from the herd, or even transfers between individuals or households. In all bundles of livestock ownership rights, the head of the household holds full rights to dispose of animals in the family herd as he sees fit. That person is also accountable for his decisions to everybody who holds an interest in the family herd. In that sense he is the custodian (according to *aada* - traditional customs in line with the pastoral way of life) rather than the owner or manager of the family herd.

The Gabra pastoralists rely on a complex system of livestock exchange as a basis for sharing livestock-based resources and spreading risks. Human interpersonal social relations are based on the exchange of livestock, exchange of girls (affinal links), friendship ties and ties of membership in an age-set which create cross-cutting networks of mutual support and solidarity.

2.3. Is exiting pastoral mobility a permanent decision?

As indicated earlier, about 10% of the sample households stated owning no livestock at all. Further, casual observations show that household's livestock wealth (assessed in absolute terms) has declined over time and that sedentarization is an ongoing process. We asked the question: "*Does your household intend to go back to mobile life in future*" in the survey questionnaire. 'No" responses were given for various reasons (see Figure 4), including lack of sufficient loading camels or lack of means of transport (i.e. camels), as well as children's education (i.e. the need to be settled in order for children to attend school), or old age (considered not compatible with nomadic life). For the 10% sample households with no animals at all, and those households with few loading camels, a mobile pastoral lifestyle is a not an option. Households with casual or government employment or with town-based business enterprises usually opt not to become mobile anymore out of their own volition. Owning no animals or insufficient herds diminish prospects of households becoming mobile since ownership of enough loading animals is positive correlate of livestock wealth. Generally, the responses to the question of return to nomadism speak of the ongoing process of sedentarization. Subsequently, the demand for more or improved provisioning of social services such as schools, water supply and sanitation facilities will likely grow in future. Thus in future both supports to enable willing households to become mobile and self-reliant in pastoral lifestyle, and to improve provisioning of largely neglected social services, are more urgent than ever. While settling might be a permanent decision for a household and their livestock in pastoral areas, the settled population continue to crowd around permanent water points with unequalled provisioning of social services, such as WASH structures and facilities. The situation is only slightly improved in terms of publicly-provided facilities such as schools and healthcare services.

Figure 4: Schooling and lack of means of transport are main reasons as to why families reject the option of a return to nomadism



Source: survey data, 2011

2.4. Mechanisms for coping with pastoralist risks

Today, there are few pastoral families who only subsist throughout the year on livestock products. Purchased foods are increasingly important for pastoralists, and many depend on the cash market to maintain food security. This is why involvement in alternative livelihood sources, and thus diversification of economic activities, become central to the livelihoods of the households. The residents of trading centres seem to engage in a number of activities, even though in these cases diversification out of the pastoral system seem to be induced by livestock poverty rather than motivated by a risk reduction effort.

There are several reasons for apparent decline in livestock numbers in the region, and increasing settlement in the dry lands. However, drought has undoubtedly, and continues to, be a major factor and has contributed to depressing livestock population growth rates, by pushing up mortality rates of the young and suppressing birthing rates in the year following a drought. Owning too few or no livestock assets at all also has an impact on the nutrition of a household. Nathan et al. (2005) show that children of settled former pastoral communities suffer from malnutrition as a result of the loss of animal protein in their diets.[13] Although towns offer greater access to modern social services there is a high occurrence of water borne diseases (for example respiratory and diarrheal diseases) as shown by records at healthcare centres in North Horr, Balessa and Kalacha. The prevailing disease conditions coupled with chronic food shortages in settlement areas clearly increase the vulnerability of the populations. The disease-related problem may be compounded by the unfamiliarity of the former pastoral (mobile) households with a 'fixed-point' system of waste disposal, as opposed to the traditional open-air disposal system. Therefore, the occurrence of diseases common around settled populations in the dry lands is usually a neglected phenomenon that poses particular challenges for household vulnerability. This problem needs particular attention.

[13] REFERENCE for Nathan et al (2005).

Labour pooling for herding purposes is a common practice among the pastoral households. Former pastoralists living within or around trading centres such as North Horr, Dukana, Balesa and Kalacha in the dry lands often own livestock which is herded by kin, friends or members of their own household and serve to maintain important links to the pastoral system. Traditional labour pooling and herding arrangements are associated with gifting of animals in return for herding. Today, herders are rewarded with cash or are engaged on a casual labour basis. Absentee herder owners' (see Little, 1985)[14] use of paid labour for herding their animals enables them to maintain a settled household and send their children to school..

The relatively recent increased commercialization of the livestock sector has benefitted those with large herds (mostly the absentee livestock owners) while those without sufficient herds to keep them mobile are hived-off the pastoral system. They settle and seek alternative form of livelihoods such as jobs in town and on-farm casual employment. Settling usually forgoes a return to nomadism, and is more and more becoming a constraining factor for mobility of households settled around trading centres. In addition, the education for children is seen as a long-term investment in creating wage earners. The possibility of gaining formal schooling families is a motivating factor for pastoral sedentarization and an incentive to remain settled in and around trading centres.

Northern Kenya experiences violent conflicts from time to time, mainly from banditry and inter-ethnic livestock raiding. The region is less policed and people here are often vulnerable to armed pastoral communities from neighbouring countries. During the colonial era, the British administration established tribal grazing areas, which attempted to reduce inter-ethnic conflicts at the grazing border fronts between warring pastoralist groups. After independence in 1963, drought and consequent heavy livestock losses, along with increasingly violent and armed livestock raiding through weapons channelled into the region via its borders with Somalia, Uganda and Sudan, have increased general levels of insecurity and (livestock) poverty. The link between natural resources management, with particular reference to the rangelands, and conflict is often made. The state of insecurity may prevent appropriate use and management of natural resources for sustainable production.

The Gabra simultaneously face frequent conflict with neighboring pastoralist groups that involve loss of life, property and livestock. The relationship among the groups however oscillates between periodic alliances and fighting. During the fieldwork period (June - July 2011) Turkana and Gabra around the Sarimo area (south-west of North Horr), for example, were allied as a drought-coping mechanism. The groups were sharing water points and buying commodities from each other's trading centres. The forging of a rare alliance between the Gabra of northern Kenya and the Hamar of southern Ethiopia during the same period is also telling. This alliance allowed the Gabra herders (especially those from around Dukana) to access seasonal grazing areas in southern Ethiopia following almost two years of near or complete fail of rainfall on the Kenyan side.

[14] Peter D. Little, (1985), 'Absentee Herd Owners and Part-Time Pastoralists: The Political Economy of Resource Use'.
In Northern Kenya. *Human Ecology, VoL 13, No. 2, pp. 131 – 151.*

2.5. Traditional institutions and customary structures

The pastoral production system and human livelihoods are intricately dependent on herd mobility and the availability of environmental resources. These two aspects are extremely important for the survival of pastoralists and the sustainability of pastoralism. The availability of and access to environmental resources governed by 'dos' and 'don'ts' of a specific group that tend to exclude 'ethnic others' or non-allied groups. More broadly, the rule of access and use of natural resources fall within the framework of the traditional institutions and customary structures of a specific group. These traditional structures provide a benchmark for assessing their relevance in managing (or even abusing) different communities' natural resources.

The report, in this regard, makes specific suggestions to the SI for future interventions. It will also identify and describe specific traditional institutional and customary structures in terms of how they ought to operate and work in practice as applied to the key natural resources of the Gabra. Our better understanding of the traditional institutions and customary structures governing natural resources is crucial for human livelihoods in the dry lands. Therefore, accurate description of community rules governing resource use and management strategies in crucial and may serve as an important reference point and basis for interventions. This is especially the case in instances where the community resource capacity partially or completely fails to respond to adverse changes in the supply of resources.

The Gabra are divided into five main phratries[15] (locally called *dibbe shanan* – 'five drums') (Schlee, 1991, Tablino, 1999)[16]. Their socio-political structure is based on the generation-set system (*luba*), which slightly varies from one phratry to another. The Gabra generation-set is a variant of the *Gada* system which is common to all the Oromo-speaking people (Legesse, 1973). This system defines a group of (circumcised) men of the same phratry who assume their social responsibilities and status in a transition ceremony together (Tablino, 1999). In other words, the group proceed gradually to assume different responsibilities and social status, grade by grade[17] in the successive transition ceremonies, the most important being the *Jilla Galani*. The concept of grade also refers to a level of social responsibility and status in the community, including with regard to the management of natural resources. However, individual membership in any grade system – a gradual transition from one grade to the next – is temporary.

Social responsibilities and status are informed by and embedded in the Gabra traditional institutional and customary structures, which place emphasis on the social grade system. For instance, the *Yuuba* among the Galbo subsection consist of mature men with political roles and responsibilities for the general welfare and harmony in the community. The *D'abeela* grade is made up of elders who take on an essentially ritual role and lead the prayers and give blessings in the many traditional ceremonies such as the *Sorio* sacrificial ceremony, *Almado*, marriage, etc. The Jarsa grade consists of old, retired elders who play no active role in social affairs but remain respected member of the society.

[15] These subsections are: Gaara, Galbo, Odoola, Shaarbana and Algaana (Paolo Tablino (1999) *The Gabra: Camel Nomads of Northern Kenya* p. 59 ; Gunther Schlee (1989) TITLE p.14).

[16] Tablino(1999), *The Gabra*; Schlee (1989) - ???

[17] The social system of age grades among the different Gabra phratries include Q*omicha*, *Yuuba*, *D'abeela* and *Jarsa* (*loota*) for the Galbo subsection; *Afat*, *Dadac* and *Merkush* for the Shaarbana, and *Wakora* and *Damballa* for the Gaara and Algaana subsections.

With these roles in mind, the Gabra political, social, economic and ecological systems are adapted to meet the livelihood needs of their community, as well as deal with shocks and stresses such as drought (Tory, 1973; Robinson, 1985; Livingstone, 1991)[18]. The traditional institutions that govern these systems are extremely important to community structures and processes to adapt to changing circumstances and their environmental conditions, and are potential avenues for intervention around collective capacity building to changes happening over ownership and management of natural resources. In this regard, the different generation-sets not only highlight the functions along the grade system but also provide an indicator of entry points for future interventions, and engagement of the local institutional structures. Several institutions exist that govern the management of the local commons such as trees, wildlife, pasture and water. There are rules about cutting landmark (or sacred) trees or cutting down tree branches in the vicinity of water points. The permanent settlement around water points challenge such rules, and the formation of Environmental Management Committees (EMC) was indeed in response to breaking down of the traditional rules around resource management. Similarly, there are rules around shifting *fora* herds at a reasonable distance away from water points and thus permanent settlements, especially during the wet season. Besides such localized restrictions on herd mobility, natural resources (e.g. water and pasture) are owned and accessed collectively as a community within the wider group territory.

Settlement of pastoral populations is usually accompanied by social and cultural changes. The settled people often undergo gradual changes in customs, social ties and kinship relationships. It is important to point out here that traditional institutions and customary tenures governing changes in ownership and pricing of traditionally 'free-for-all' water resources and sanitation structures amongst settled former pastoral communities do not exist. Therefore, the introduction of new institutions such as those charged with ensuring payment for water in fitting with the settled context pose challenges to the study population. One particularly striking challenge is the de-commissioning of pit latrines. The settled life also entails a shift from communal and kin relations in the pastoral communities to individualized identities, including adoption of the concept of private property (a well) and private gains (charges for water) from a resource. Such changes also show up through limited use of the 'moral economy' of indigenous herd sharing practices and redistribution through social security systems, such as livestock exchanges and gifting. Today, more people sell animals and animal products when in need of cash than in the past when social relations provided a buffer. The on-going social transformation accompanying the pastoral settlement processes has potential consequences in terms of the redistribution of (economic) resources across wealth categories and in responding to risk reduction and mitigation strategies.

The most important institutions involved in the livelihoods of the Gabra community are the traditional institutions and customary structures which define norms, culture and the value system. Thus, it can be envisaged that many aspects of resource ownership and management practices are intricately connected to the traditional Gabra institutions. In this regard, new opportunities in the market economy and external assistance, including NGOs, can compensate to some extent for eroded moral economy of the pastoralist populations, but cannot fully replace it. Therefore, understanding the functions and decision-making

[18] Torry, W. (1973). Subsistence Ecology among the Gabra: Nomads of the Kenya/Ethiopia Frontier. PhD thesis, Columbia University, 1973); Robinson. P. (1985). Gabra Nomadic Pastoralism in nineteenth and twentieth century northern Kenya: Strategies for survival in a marginal environment (PhD dissertation, Northwestern University, 1985); Livingstone. I. (1991). Livestock Management and 'Overgrazing' among Pastoralists. *Ambio*, Vol. 20, No. 2, pp. 80 – 85.

processes within the traditional institutions and social structures are appropriate avenues for future intervention efforts, if such efforts are to gain local acceptance.

3. CLIMATE CHANGE AS A COMPONENT OF PASTORAL LIVELIHOODS

In academic literature, mobile pastoralism represents a response to the variability of rainfall and pasture resources in dry lands. This idea, which is both ecologically and economically rational, represents the mainstream argument that frames questions of policy and development for pastoralist systems (Robinson and Berkes, 2010)[19]. Since the 1990s, this framework has led to the creation of an Early Warning System (EWS) to forewarn of risks facing the pastoralists of northern Kenya. Mainly built on indicators coming from humanitarian information systems, the EWS is expected to factor in the resilience capacity built into a system, or alternatively, loss of resilience.

This chapter focuses on the EWS as it is today in northern Kenya. The first part describes the EWS as elaborated by policy makers and development practitioners for the last 20 years. Next we will note the organizations that are in charge of the EWS and what kind of indicators these organizations produce for the EWS. To understand the dynamics of the EWS as it is on the ground, we identify the actors or organizations who are contributing to this process at the local level. In the second part, we discuss the first set of indicators of the *traditional* early warning system as conceptualized by the Gabra. As Robinson and Berkes suggest: "Policy *makers and development programmers also have the problem of making sense of the complexity of pastoralist system and obtaining information on which to base policy."* (2010: 335). In this way, we propose examining the relevance of traditional knowledge on risks within a wider framework of global early warning systems.

3.1. The Early Warning System in the Context of Climate Change

3.1.1. A Retrospective View of the Early Warning System

Since the mid-1990s, an early warning system has been set up in Kenya's northern territories. Initially linked to the influx of refugees from Somalia, the EWS evolved into a system for prevention of risks associated with episodes of severe drought. The objective of the EWS is to protect livelihoods based on livestock in the event of a drought triggered emergency. Management of this system was officially given in 1996 to the Arid Lands Resources Management Project (ALRMP). They were mandated to conduct early data collection, analysis, and reporting for northern Marsabit and for Northern Kenya in general. Based in Mandera, the World Bank-funded organization is involved in the prevention of humanitarian crises in arid and semi-arid areas of the Horn of Africa. Since 1998, this organization has also managed World Bank funds allocated for prevention of humanitarian crises through the management of water resources. These programs allow for the building of new water infrastructure to increase local capacity for water management and protect water as a source of incomes.

Until 2008, two agencies were collecting regular information on early warnings and weekly data on the cattle market (Abdinoor & Eshete, 2008). These agencies are:

- Arid Lands Resource Management Project (see before)

[19] Lance W. Robinson, & Fikret Berkes (2010) « Applying Resilience Thinking to question of Policy for Pastoralist Systems: Lessons from the Gabra of Northern Kenya », *Human Ecology*, 38, pp. 335-350.

- The Ministry of Livestock in conjunction with ASAL-based Livestock and Rural Livelihoods Support (ALLPRO).

For these agencies, the development of a warning system is based on a format that takes account of early warning indicators such as rainfall, water availability, pasture, and livestock market information. Most relevant drought monitoring and famine early warning systems information is available from NGOs, from organisations on the ground, and from the various periodic assessments lead by governmental organisations such as KARI in Marsabit. In the case of North Horr, organisations such as Solidarités International (SI) and VSF or the Catholic Mission play key roles in collecting relevant information. Most of the time, data are produced in relation to a local emergency situation and there is a need to identify field-level actors. In North Horr district, there is no single actor responsible for the collection of EW information, nor a systematized, standard format for collecting information.

The actual early warning system as presented by IRIN and OCHA is mainly built with indicators from Humanitarian Information Systems (HIS) and is incomplete. The main problem is the lack of a standard approach in data collection and the heterogeneity of actors involved in data collection. Problems also stem from the fact that the warning system focuses on certain variables such as measures of impacts and hazards divorced from chains of causation. Beginning in the late 1990s, the Early Warning System was realized through the implementation of the following:

* Livestock destocking programs are initiated from the start of a drought. This is the takeover by the Kenyan government and NGOs of threatened livestock.

* Food assistance and relief food programs attempt to mitigate the risks of malnutrition.

* Programs to provide water to areas where there is projected to be a lack.

Since January 2010, the range of interventions has expanded with the establishment under ILRI of an insurance index system for livestock losses caused by chronic drought. This insurance system is run by the insurance companies UAP and Equity Insurance Agency. It aims to compensate for losses of livestock from an assessment of the impacts of drought done with satellite imagery.

Gradually, the Early Warning System promulgated a method of managing environmental risks which drastically differs from the traditional warning systems of the Gabra. Indeed, the Early Warning System linked to emergency is based, like the livestock insurance scheme, on the logic of foresight; it is a system of compensation for losses caused by environmental hazards. In this sense, the system constructs risk as a normal component of pastoralists' livelihood and assumes that societies are not resilient, or lack the capacity to respond to environmental hazards. Therefore, the ability to anticipate crises is based on an actuarial logic which does not sufficiently measure the effects of adverse factors on societies. This system stands in contrast to the traditional warning system of Gabra which, as the following sub section indicates, is based on the logic of risk prediction rather than compensation following a climatic shock. This traditional system was usefully predictive and, until the past 30 years or so, the foundation of resilient pastoral strategies in response to environmental hazards. Therefore, we suggest that the failure to take into account the traditional EWS in the

development of the EWS may contribute to the social construction of greater vulnerability and loss of resilience.

3.1.2. The Traditional EWS Used by the Gabra

In the precarious environment of Chalbi and the surrounding mountains, the pastoral peoples of North Horr have developed pastoral mobility to maximize the utility of natural resources to allow their animals to survive in all seasons in a sustainable manner. These practices draw on seasonal patterns, as they are essentially a series of movements that are spatially ordered and based on strategic access to natural resources. This cycle fluctuates in relation to climatic and ecological indicators recorded in the Gabra calendar and system of alerts. Using spatial mobility to manage the available natural resources within a cyclical understanding of climate and time, the Gabra system is based on the prediction of unusual weather events. This highlights the resilience of the traditional Gabra pastoral system. However, in contemporary context, for a variety of reasons, the traditional warning system, based solely on local knowledge, seems to be impracticable. From the description of a typical year viewed with aspects of the traditional warning system, we propose to examine the causes of the current functional problems with the traditional EWS and suggest ways to incorporate valuable traditional knowledge in a warning system that would combine indicators from the conventional EWS (humanitarian or experts' information systems) and indigenous Gabra knowledge.

3.1.3. Normal Seasonal Movement Patterns for a Normal Year

A normal year or season is defined with reference to some deviation above or below average rainfall of a specified period. This definition describes the approach for arriving at what is 'normal' rather than defining the concept itself. Of particular interest is what the Gabra consider a 'normal' period of the year in relation to the weather patterns. Whether these periods are considered normal or not differ between people. In the Gabra language, the word *gaana* means both the 'long rain period' and 'a whole year,' and *agaya* means the 'short rain period'. People variously define normality: '*a normal year is when there is enough water and pasture in close proximity to water sources*'; '*a year with ample rainfall and enough pasture throughout the year*'; '*times when there are plenty of water and pasture available during and between seasons of the year*'; and "*When Ganna/ Agaya there is a plenty of rain, it is a normal year* ".[20] These voices sum up the way the Gabra conceptualize a 'normal' year: a year during which climatic variations will guide seasonal movements from the desert plains and water points to areas of pasture. In this sense, a normal year results from a combination of climatic variation, ecological requirements, and seasonal movement.

Some Gabra use the notion of *fin* to define normality. *Fin* is a complex concept that refers to times of ample rain, of plenty and diverse pasture of high nutritional value for livestock, and of human health which follows resulting from having healthy livestock and lack of disease. Thus 'normal' seasons or years include healthy environmental conditions, a yearlong adequate supply of the natural resources, and in general a situation where life is harmonious with a stable environment.

[20] Citation recorded in Household survey, 2011.

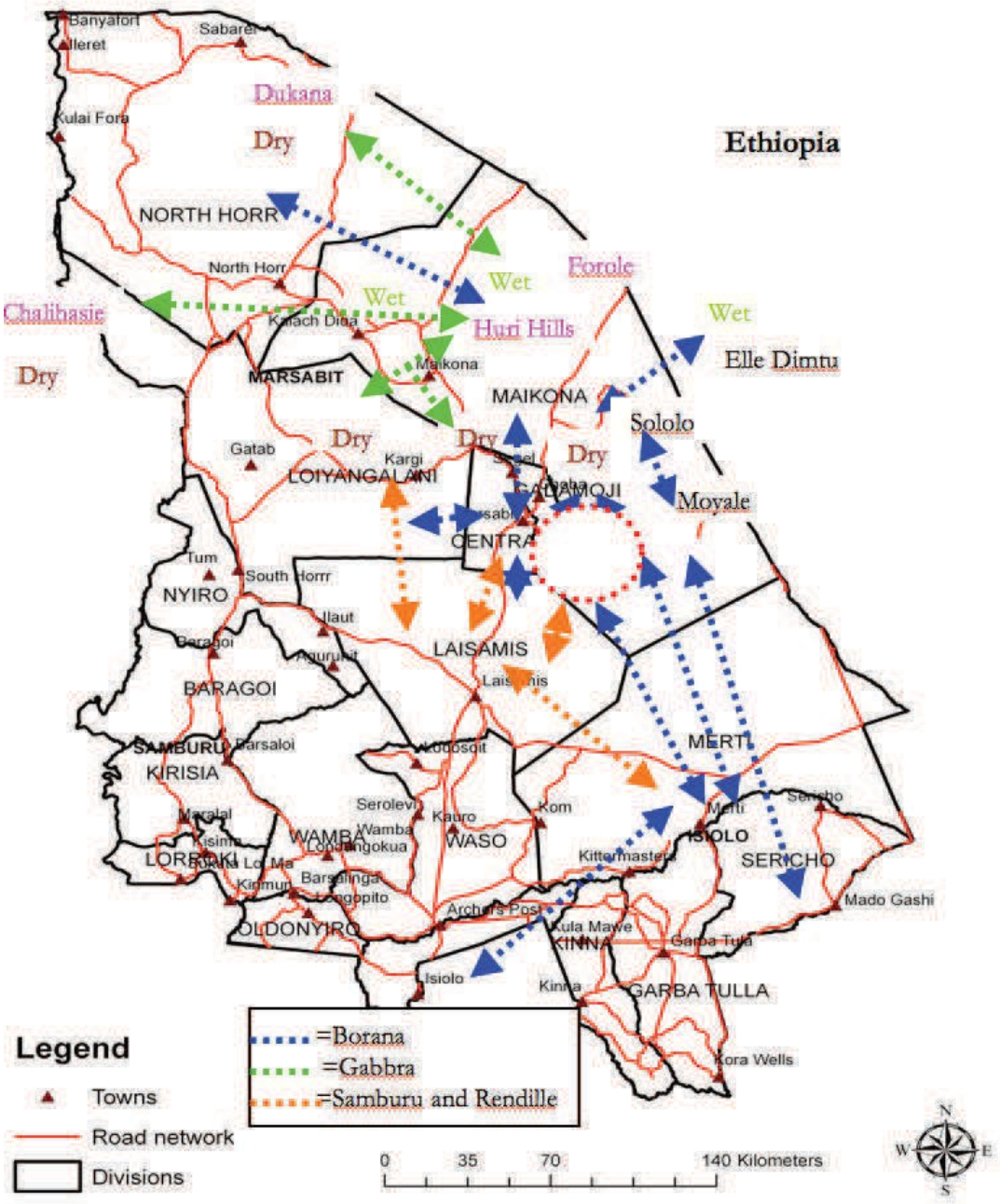
A normal year is defined with reference to the Gabra calendar. Like many pastoralists the Gabra conceptualize a cyclical pattern of climatic variation over the year (12 months) with two dry seasons (*Bon Agaya*, *Adolessa*) and two wet seasons (*Agaya*, *Ganna*) (Table 8).

Table 8: Gabra seasonal calendar

Bon Agaya	**Ganna**	**Adolessa**	**Agaya**
December – January - February	March – April - May	June - July	September – October - November

Following this calendar, pastoralists' migratory grazing strategy reflects the attempt to make the most of rainfall and rangeland conditions. This combination is expressed in the rangeland management or transhumance system of the Gabra. During the rainy season, people move far away from permanent water points to areas such as the pastures of Hurri Hills (Badha) and Chalbiasie, Dukana and Forole, and Hurran Hura and Sarimo. At the start of the dry seasons people return closer to permanent water points such as North Horr, Kancharo, and Wormo (see map of seasonal movement patterns). Seasonal movement is influenced by the unpredictable spatial distribution of rainfall rather than by a rigid system of annual or cyclical patterns.

Map 4: Seasonal Movement Patterns



Source: Ministry of Forestry & Wildlife, *Northern Kenya Wildlife Conservation Project* (vol.II), 2011.

This practice is designed to allow the regeneration of natural resources by maintaining grazing land for use during the dry season and conserving water resources during the rainy season. As noted in a 1964 report, until recently the system formed a way of dealing with scarcity:

> "*Thus, for example, the Gabra make use of the upper slopes of the Hurri hills (which have no permanent water within forty kilometer of the top plateaus) during the rains when they are too cold, damp and pest-infested to be ideal for livestock utilization, but where there is sufficient moisture for the herds".*

Until sedentarization, this seasonal movement represented the main strategy for coping with climatic risks. Based on ecological conditions, the pastoralists' knowledge of climate, vegetation, and water availability provided the ecological parameters that determined seasonal movement patterns. In this context, the Gabra calendar was an important tool that served as a traditional early warning system based on the prediction of environmental and societal hazards, and thus an important strategy for coping with risks.

3.1.4. The Gabra Calendar as an Early Warning System

Designed as a system for recording past events, the Gabra calendar allows easy recall of the name of a year, the weather patterns of that year, and often also the resulting seasonal movements undertaken that year. This knowledge system associates the names of people or events with drought or significant events in a year. During the survey, we recorded more than twenty mnemonic phrases such as *Talasa Yashere* (1948; Tuesday year of Yashere), *Olla Qullaji* (1983-1984; Drought year of yellow maize that was issued as relief food), and *Adolessa Gali* and *Olla Asiima Jajabthu* which both refer to difficult years of drought in the memory of the Gabra.

Within a cyclical conceptualization of time, the Gabra calendar system represents a method used to record and manage data on climate and grazing strategies with the help of the oral historians. Indeed, the Gabra believe that all events return through cyclical patterns, albeit with some irregularity over time. The cyclical nature of weather patterns was the basis of Gabra rangeland management strategies to cope with drought situations. This conception of the calendar provided the basis for prediction of events by considering the possibility of repetition of a past event in the present or the future. Thus, the calendar organizes a system of risk management and climatic hazards as evidenced by these quotes: "*When a normal weather year is following the previous pattern*," and "*Year is a normal season happens as it has been predicted*". Then, the Gabra calendar is a way of understanding climate variation, and is used to anticipate the coming of a severe drought, or a period of hardship.

Though potentially a poignant testimony to a balanced relationship between societies and their environment, the calendar is partially invalid for several reasons. Firstly, climate change of the last two decades seems to have affected the predictive quality of the system. As suggested by a retrospective view of rainfall over the period 1970-2009, the annual amount of rainfall before 1990 was considerably lower than during the year 1970. Comparing the period 1970-1989 and the period 1990-2009, we find that during the 1990-2009 period the amount of annual rainfall has halved. Moreover, this phenomenon was accompanied by a reduction in the duration of the rainy season. During the first period (1970-1989) the rainy season extended from February to June, while during the second period (1990-2009) the rainy season tended to be reduced to two or three months (March-May). This reduction in the duration of the rainy season is the main reason pastoralists cited to explain their current difficulties in predicting climatic anomalies.

Figure 5: Rainfall in mm 1970-1979

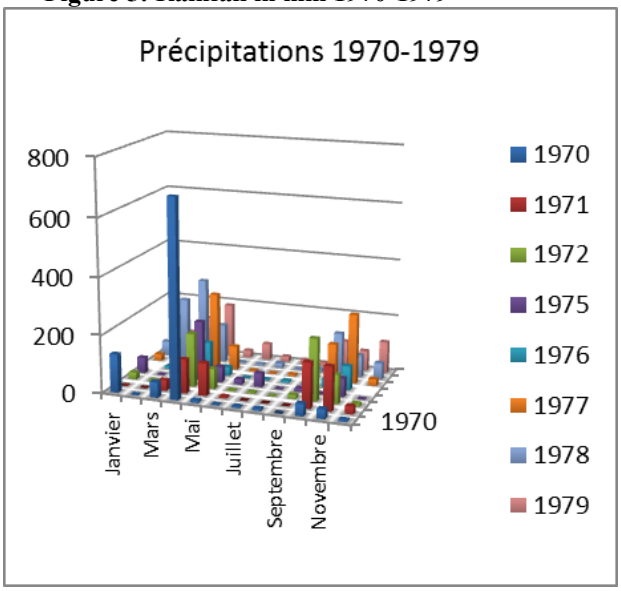


Figure 6: Rainfall in mm 1980-1989

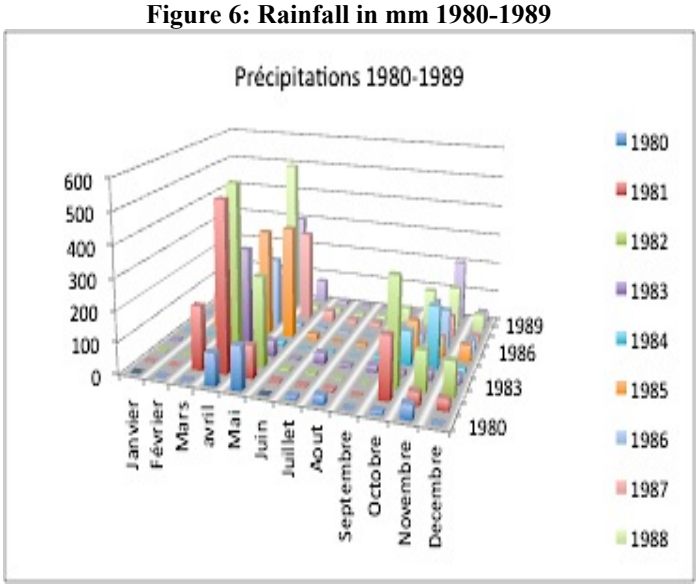


Figure 7: Rainfall in mm 1990-1999

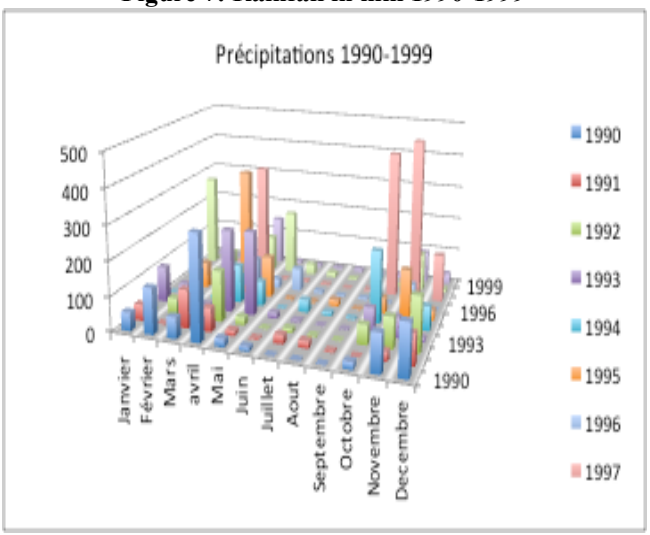
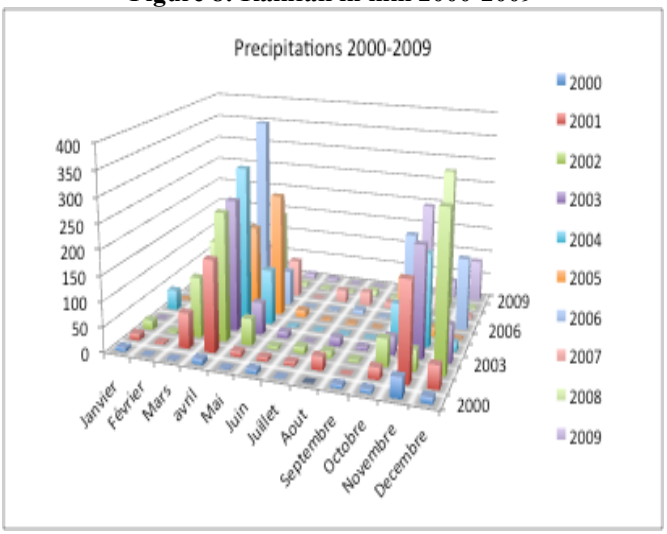


Figure 8: Rainfall in mm 2000-2009



Beyond climate, other factors have impacted upon the ability to predict weather patterns through traditional knowledge the Gabra maintain about their environment:

• Settlement has resulted in an intensive use of natural resources and has profoundly affected the former system of rangeland management. In addition, it was accompanied by the introduction of invasive plant species such as *Prosopis juliflora (alga roba*) that has contributed to the degradation of the pasture areas around North Horr.

• The recurrence of severe droughts in the last 30 years pushed pastoralists to seek new alternatives. In cases of severe drought, mobility is no longer an appropriate strategy to mitigate risks to livestock and people.

• The development of new risk management strategies such as livestock insurance, and livestock destocking programs tend to drive pastoral societies away from the problem of maintenance of natural resources. The objective of these strategies is not only the maintenance of natural resources but compensation for loss of livestock through monetary reimbursements, as evidenced by the recent controversies surrounding livestock insurance programs (Kalacha).

If the strategies of diversification noted above are intended to anticipate risks and extend the resilience of societies, we must note that they also reconfigure the traditional risk management approach based on the Gabra calendar. The difficulty in predicting and managing risk is evident in how Gabra now define a normal year and how they are now unable to predict weather patterns. In this regard, the responses by the households to the question "*what would you consider a normal year*?" tend to show a loss of knowledge based on the Gabra calendar. Only 2.65% of respondents define a normal year by referring to the traditional Gabra calendar. For 32% of the respondents, the rainfall and the availability of pasture is the primary criterion used to define a normal year. This shift reflects the emergence of new strategies for natural resource management. Faced with the inability to mobilize their ancient knowledge to develop resilient strategies, the Gabra now manage scarce natural resources available in an unsustainable manner. As one informant ironically said: "*A normal year is a year with no rain, there is not enough pasture for livestock*".

3.1.5. Customary Warning Indicators

Like many camel keeping communities such as the Rendille and the Somali, Gabra coping strategies for severe drought or crisis are based on customary indigenous early warning indicators such as the greening of certain trees and observable livestock behaviours (Table 9). In the past, these indicators could form a system. However, as we found them on the ground such indicators no longer seem to form a robust indigenous and integral early warning system. These traces of an early warning system exhibit the close ties that once bound the Gabra to their environment as the signs of impending crisis are the result of a meticulous and constant observation of nature (the animal world, sky, wind, etc.). Some of the early warning indicators we collected are the following:

Table 9: Gabra Early Warning Indicators

The camel evening sign -Posture: crossing hind legs and waving tail-indicator of good season /rains
The bull sign: deserting the herd and refusing to mate-bad sign
The sheep staring up the sky – bad sign
Astronomical interpretations (stars)
The direction of the wind
At the start of the dry season; too many Ants (*quranja*) and big houseflies are spotted in the homestead

The respondents reported use of these indicators as a sign of forthcoming adverse effects. However, they also expressed the challenges of putting such indicators to practical use to reduce risk. There are difficulties in linking the timing of individual warning events, places where the risky event might occur, and the uncertainty of potential victims of risks such as livestock raiding. Such challenges limit the usefulness of traditional early warning indicators among pastoral communities. Recent climate patterns seem to distort the notion of what is termed a normal, seasonal weather pattern. These challenges, coupled with the uncertainty and unpredictability of rainfall (the single most influential factor in the dry lands), impose further difficulties on developing a coping mechanism that demonstrates households' specific coping strategies based on the intensity of their exposure to risk factors. Such a coping mechanism would chart early warning indicators and human responses to anticipated risk.

3.2. Impact of Climate on Traditionnal EWS and New Movement Patterns

As we have indicated, the people of the camel complex developed traditional warning systems based on a semiotics of their natural environment. That is to say, the interpretation of a set of "signs" predicted events and highlighted potential risks that made sense in an agro-environmental context. However, this system seems to be partially incapacitated by the current configuration of environmental systems. Since 1997, repeated episodes of severe droughts (1999, 2000, 2003, 2006, and 2009) in northern Kenya have profoundly affected the natural resources available, as noted Vircoulon & Lagrange:

> "The rainfall has become weaker and more irregular since 2003; it fell on average per year between 200 and 300 mm, instead of the expected 400 to 500. The low rainfall has prevented the renewal of ground water and reduces the volume of runoff, causing a reduction in the area of pasture area "(2007: 596).

This caused a failure of the natural environment to regenerate and, *ipso facto,* to provide sustainable natural resources, especially grazing, that is necessary to the lifestyle of pastoralist populations. Meanwhile, the imbalance between man and his environment has increased through the development of livestock-related production systems and the demands of social prestige. Since the late 1990s, livestock has become a survival strategy of pastoralists. Faced with increasing climate risks, the accumulation of a *surplus* of livestock has become a guarantee of extra security in case of severe drought or other negative climatic impacts. At the same time, this strategy has weakened the resilience of ecosystems and societies as evidenced by situations in locales such as the Hurri Hills, and the proliferation of conflicts in areas such as the territorial boundaries of Sarimo and Dukana. In this sense, the current configuration of the North Horr District is the result of continuous dynamic interaction between societies and their environment. In the most recent period, this interaction seems to have seriously undermined the resilience of ecosystems and societies that took advantage of new livelihood opportunities in the face of climate change.

This shift can also be described as the process of the acculturation of the environment. A number of Gabra informants claim that knowledge of their environment is no longer sufficient to predict and thus mitigate the effects of climatic shocks. They believe the main cause of the failure of local knowledge comes from the more frequent periods of severe drought that people interpret as "climate change". In this context, the erosion of traditional warning systems based on local knowledge results in the emergence of new strategies based on the urgency of immediate threats and often leading to the adoption of less sustainable livelihoods. This situation creates new risks for the population of northern Marsabit. For example, the recent severe drought has led to new patterns of pastoral mobility far removed from normal seasonal patterns. In fact, many Gabra from northern Kenya crossed border into southern Ethiopia. If these movements are being hampered by local authorities, particularly in Dukana, it may create conflict over access to natural resources, as has been the case around Sarimo.

Interim Conclusions

- Re-think the early warning systems of the Gabra by taking into account the traditional early warning system in the light of presently observed climate change.
- Identify the key actors collecting and analyzing data in places such as North Horr, Dukana and Hurri Hills.
- Trainings are needed to promote a standard format for collecting EWS traditional knowledge and early warning information over time.
- Find innovative ways on how to link conventional EWS and traditional EWS.

4. SOCIAL SERVICES REGARDING WASH

4.1. Introduction

Water is a resource that serves a critical role in long-term economic development – for social welfare and for ensuring environmental sustainability. The insufficient availability and compromised quality of water in most parts of Kenya, especially the North, has a major impact on poverty. With the growing population, demand for water is increasing in Kenya, and in some areas of the country limited availability of water restricts development activities

This survey revealed that although issues around water availability are experienced across the North Horr region, the severity and intensity of water problems vary across its localities. The areas surveyed included North Horr town and its surrounding village: Elbeso, Balesa, Dukana Kalacha, HurranHurra and Hurri Hills. In all these localities, the Social services (WASH) services available depend on the environmental configuration, i.e. of the geology, topology and climate, which determine water drainage, availability and accessibility.

Although water is a "common good", concerns weighing on the natural resources necessary to the survival of pastoralists as well as policies to make this resource more accessible to people (DFID Programmed-EU), reformulate anew the issue of water management in terms of equitable distribution and sustainability. As the explosion of the world population threatens water security, managing water resources depends on several physical variables: demographic, economic and political climate. In sub-Saharan Africa, one third of the population (300millions) faces "severe water stress" – I.e. the threat of water scarcity and inadequate drinking water.

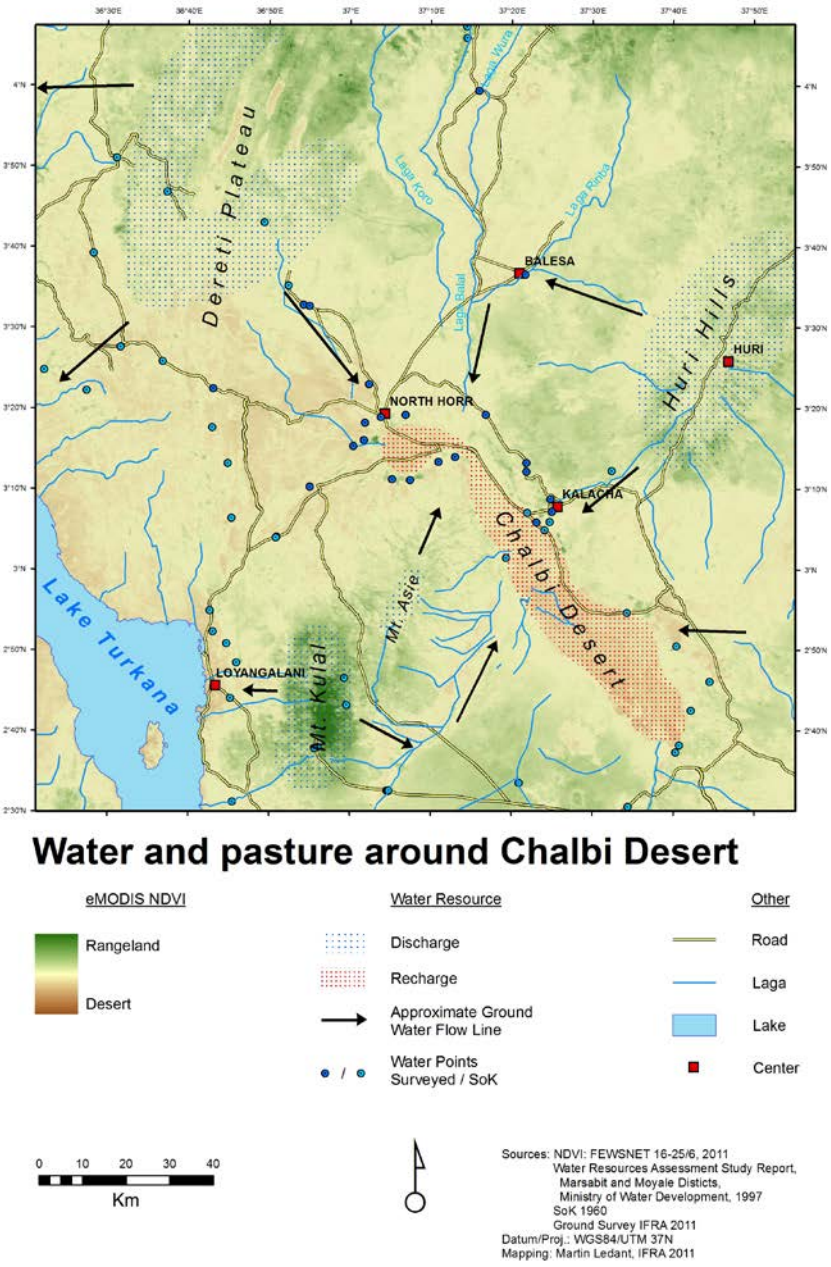
Since the 70s, this stress has been accompanied by incidences of endemic water-borne diseases (malaria, cholera, dysentery) (Merino, 2008). With the liberalization policies of the eighties, states encountered difficulties financing major infrastructure and services. In response, we have seen the emergence of local initiatives, which are sometimes private. In other words, the liberalization of the water sector, the proliferation of local initiatives that emerged in response to contribute to the supply, the different actors involved, the diversity of institutional structures, observed and described by Sylvie Jaglin they lead to the fragmentation or the archipelisation"(Calas, 2008). Today, it is believed that in a system where social mechanisms govern sharing of water resources, also acts to reduce vulnerability in the Horn of Africa. This is hypothesized by the notion that African societies were developed by traditional ties of social reciprocity related to the use of natural resources.

Community ownership and management (COM) has become the leading concept informing rural water and sanitation development projects. The purpose of this study is to assess the main issues around and prospects for community ownership and management of WASH structures in order to inform approaches towards improving sustainable access the North Horr community. The objectives were to identify the issues influencing community ownership and management of water resources; examine how the population adopts and practices management of WASH facilities; determine the impacts of COM on access to WASH services; and to analyze the potential of COM in improving access to water and sanitation services.

According to the WHO (1996), community management means that the beneficiaries of water supply and sanitation services have responsibility, authority and control over the development of their services. 'Responsibility' implies that the community takes ownership of the system, with all its attendant obligations and benefits/liabilities whilst 'authority' indicates that the community has the legitimate right to make decision about the system. 'Control' implies that the community has the power to implement the decisions they make vis-à-vis the system.

4.2. Impact of Environment on Social Organisation

Map 5: Water and pasture around Chalbi Desert



Map 5 above indicates the availability of water and pasture around the Chalbi Desert (inclusive of the area of study). The arrows point to the mobility trends of pastoralists at

times water shortage. It is evident that during periods of water shortage in certain areas, more pressure is exerted on water points elsewhere, i.e. north Horr, Dukana, Sarimo and Kalacha. This map also indicates the distribution of pasture areas and watering areas for livestock. Pasture sites are found most often in close proximity or on highlands such as in Hurri Hills and Mount Kulal whereas the distribution of watering points and concentration of wells occur around the Chalbi Desert: North Horr and Kalacha.

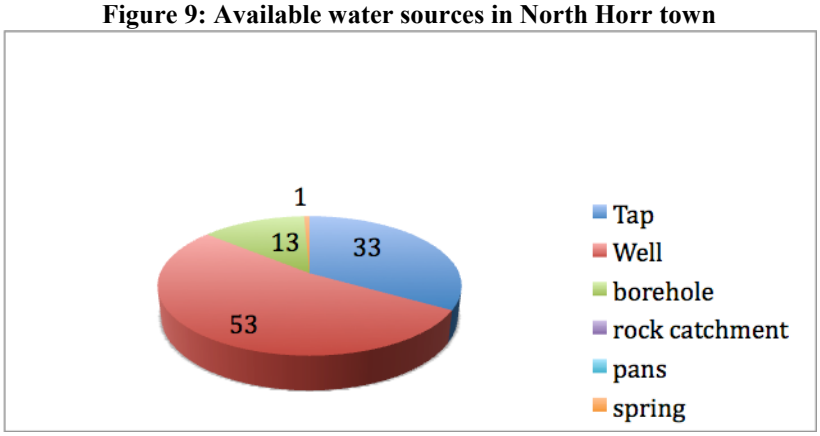
4.3. Urban Water

4.3.1. Availability, quality and localization

Case of North Horr

In North Horr town, 75% of the households access water within their *Ollas* while the remaining 25% move to nearby shallow wells, of which 28% are public, 71% 'private' and 0.7% strictly private. These sources are mainly used for domestic consumption. The other sources include 3 springs which are for domestic and livestock use, these are Horri Guda, (situated about 2km away from the town and the most commonly used both for domestic and livestock), Horri Dika and Renderigudo. Aside from the wells within the North Horr centre, there are others on the outskirts, which are used for watering livestock. There is also a pipe system run by wind power that supplies various sections of the town and, though unreliable, is a preferred source due to its good quality and convenience. 28% of the population has access to and utilizes more than one source of water at a time. Figure 9 below indicates the percentages of the population that access each of the named water sources.

Figure 9: Available water sources in North Horr town



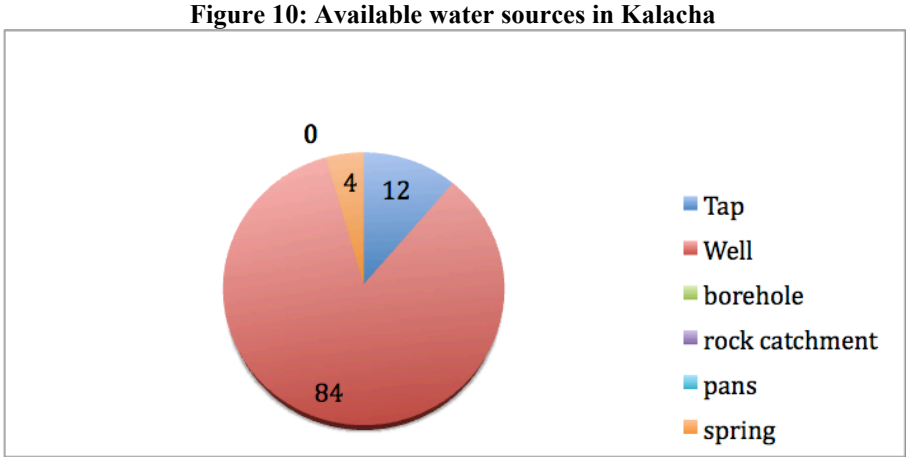
Wells are the major source of water for educational institutions those institutions within North Horr town also benefit from the tap system that is available there. The average distance to water sources for institutions is 0.5 Km. an average of 8,681 litres of water is utilized by the institutions weekly with a monthly expenditure on average of Ksh 3,000 Institutions benefitting from the tap system pay about Ksh 500 monthly as levy for water use.

Case of Kalacha

In Kalacha, the water sources are shallow wells for domestic use within the town centre, and two springs, Kalacha Goda, used mainly to support irrigation farming of hay farms and

livestock use, and Kalacha Dida which is mainly used for livestock. Pastoralists say the water in this spring is good for animals because it contains salt. Kalacha Dida also supports a variety of fauna and flora, especially birds which use it as a watering, feeding and breeding ground. This source thus forms an important yet fragile ecological unit. Although wells are mostly preferred for domestic utilization, including cooking and drinking, the water is often contaminated and of poor quality. No pipe system exists in Kalacha. Figure 10 below shows which water sources are accessible and utilized by the population.

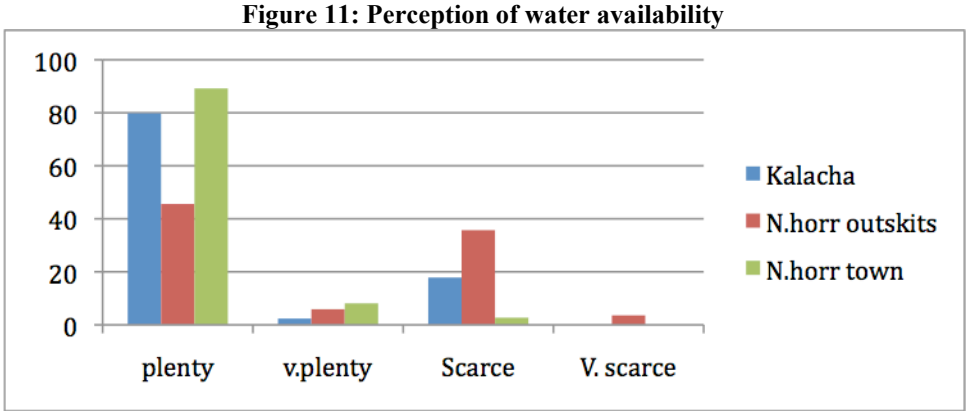
Figure 10: Available water sources in Kalacha



That 11% of households indicated taps as a water source is explained by the existence of reservoirs (tanks), which have been fitted with taps. These are available for the few who have roof catchments tanks and they are mostly used during the wet season. Kalacha's water sources are located on Map 5 (Kalacha access to wells).

In Kalacha, water is plentiful, both for domestic and livestock consumption. The concern thus is not quantity but quality of water. 5% of the water users perceive the water to be contaminated because, though most of the wells are protected, they do not have hand pumps. People therefore use buckets to fetch water, which is one way in which the water becomes polluted. This causes health risks and proliferation of waterborne diseases. One of the springs, Kalacha Goda is protected, and water is relatively clean while Kalacha Dida is unfit for human consumption, not only due to the salty nature of the water but also because livestock and wildlife access water here.

Figure 11: Perception of water availability



Despite the longer distance to water sources, 45% of the respondents still feel that water is abundant in the localities where water is accessed. The general perception of respondents in Kalacha and North Horr town is that water is plenty; only 2% and 17% in North Horr and Kalacha respectively considered the water to be scarce. The level of water in shallow wells, the most commonly used source in these three areas, often fluctuates. Some wells dry out and are no longer utilizable. Residents have thus developed strategies to cope with the fluctuation as well as the ultimate drying up of water sources.

Figure 12: Perception of water quality

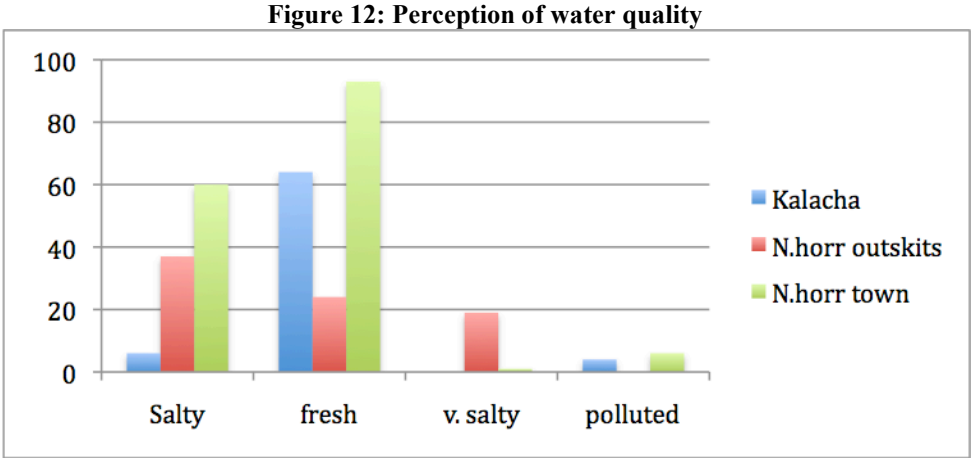


Figure 12, which show the respondents' perception of the quality of water within the different localities gives an indication of the status of the water sources. Kalacha has the most fresh water sources while North Horr outskirts have the least. It is worrisome, that the respondents in the outskirts who access water sources, most of which are unprotected and utilized by humans, wildlife and livestock, do not consider any of these sources to be polluted or contaminated. In order to draw water, people must climb inside the wells, so they also bathe inside the wells. Water from the same wells is also used for drinking.

Figure 13: Mode of transporting water

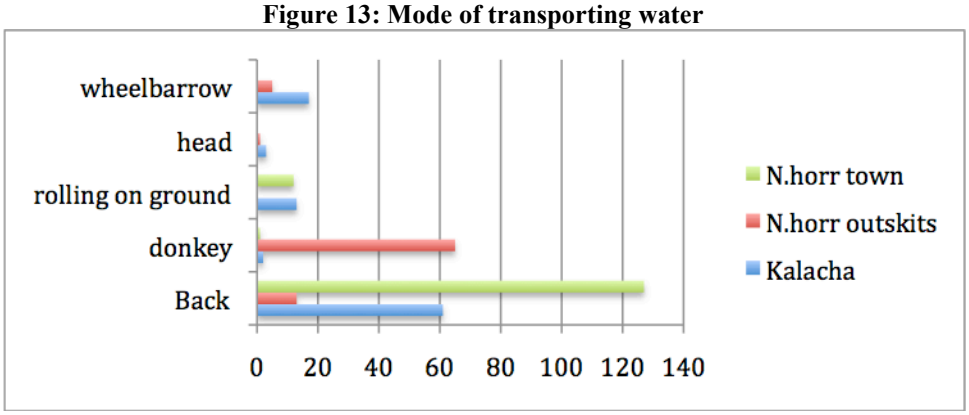


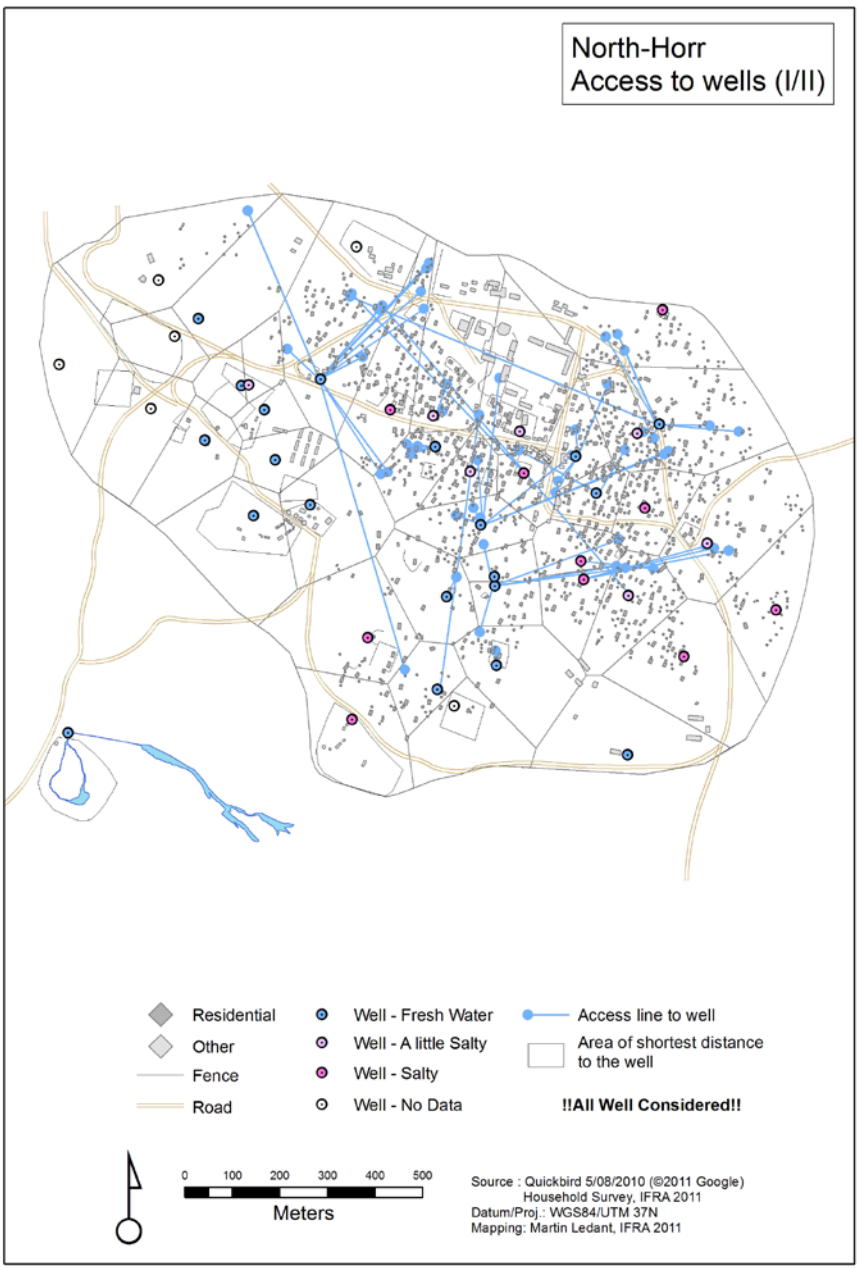
Figure 13 above shows the different modes used for transporting water and the percentage of the population that utilizes them. In North Horr town and Kalacha, the most common method is carrying water on one's, and in the outskirts, donkeys, probably due to the long distance to water sources. None of the respondents in the outskirts roll water jerricans on the ground as observed in North Horr town and Kalacha.

4.3.2. Population Access and Management

The average distance to a water source within North Horr town is 400 metres, while the average roundtrip (i.e. the time it takes from the house to the source, fetching water and back to the point of use) is 21 minutes.

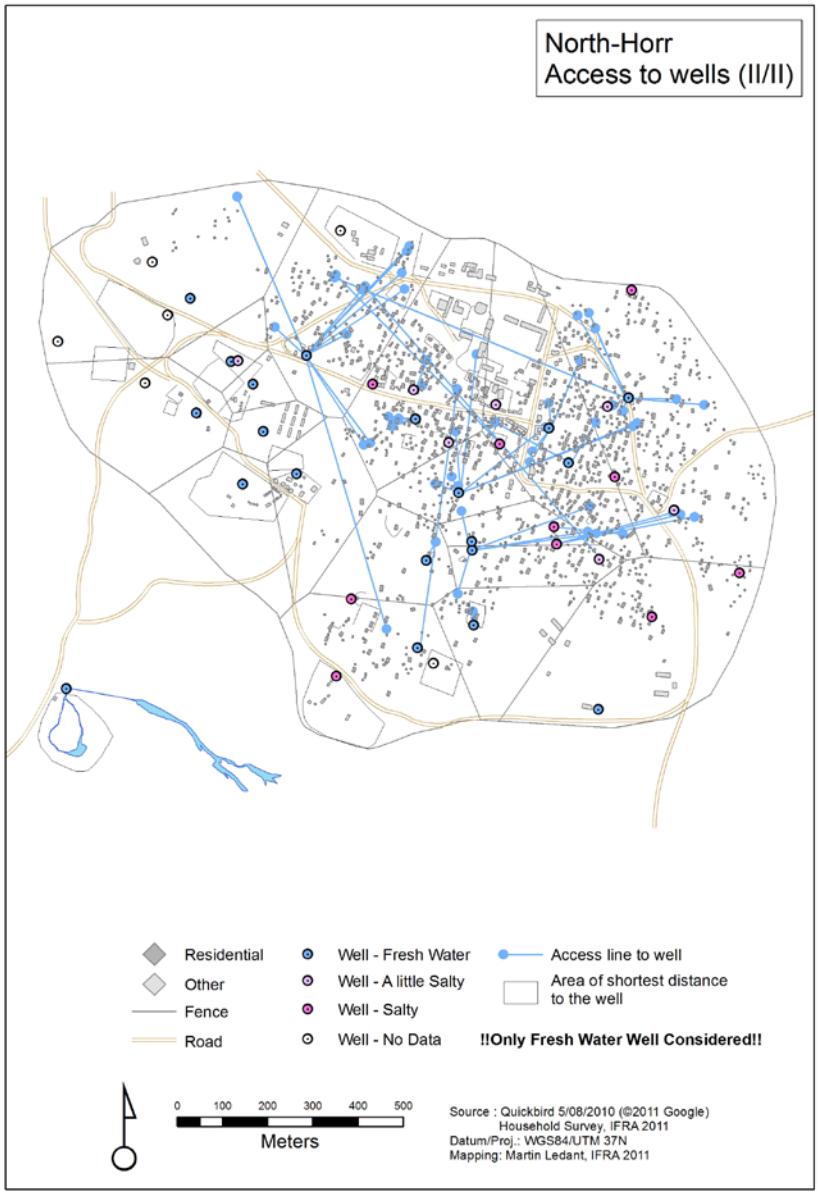
Map 6 (North Horr access to wells I/II) shows all wells surveyed, and Map 7 (North Horr access to wells II/II), indicates only fresh water wells within this locality. Map 8 (North Horr access to taps) indicates where the tap system is available, their layout, distribution and accessibility in relation to the different *ollas* within the town.

Map 6: Access to all wells in North Horr town



Although there are numerous wells in North Horr, the salinity of the water is very unevenly spread; the first map shows that households tend not to go to the closest well. Indeed, it can be observed that access-to-well lines cut across borders between areas of shortest distances to wells. If only the fresh wells are considered (Map II/II), then those lines tend to remain more inside of the polygons. This suggests that households go to the closest fresh-water well. Some households do not rely on the closest fresh-water well and travel much further. Such households must find the advantages overriding the costs of traveling to a more distant well, or are forced to go further because certain reasons prevent them from using a closer source.

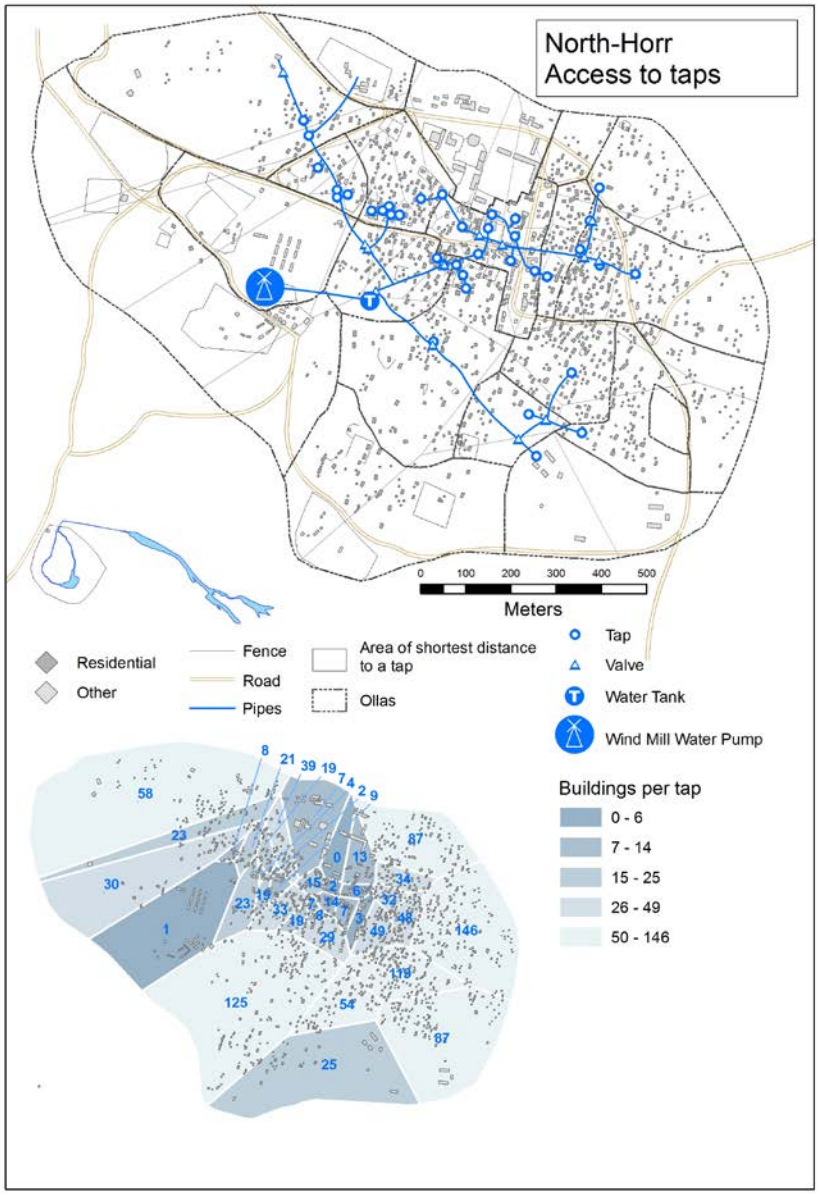
Map 7: Access to fresh water wells in North Horr town



The Piped water system

The piped water system in North Horr is organized in *branches* servicing the households according to the location of their Ollas or a certain geographical partition. Each branch receives a certain amount of water at a certain frequency function of the storage tank capacity and the number of households linked to the branches.

Map 8: Access to piped water in North Horr town



The map clearly shows that taps does not evenly service all the ollas. Indeed, *Town* and other areas in its surrounding such as *Sesi, Chuma,* or *Turkana*, have more taps than more peripheral areas such as *Dabassa Kantoma, Ayano* or *Sora Bonaya*.

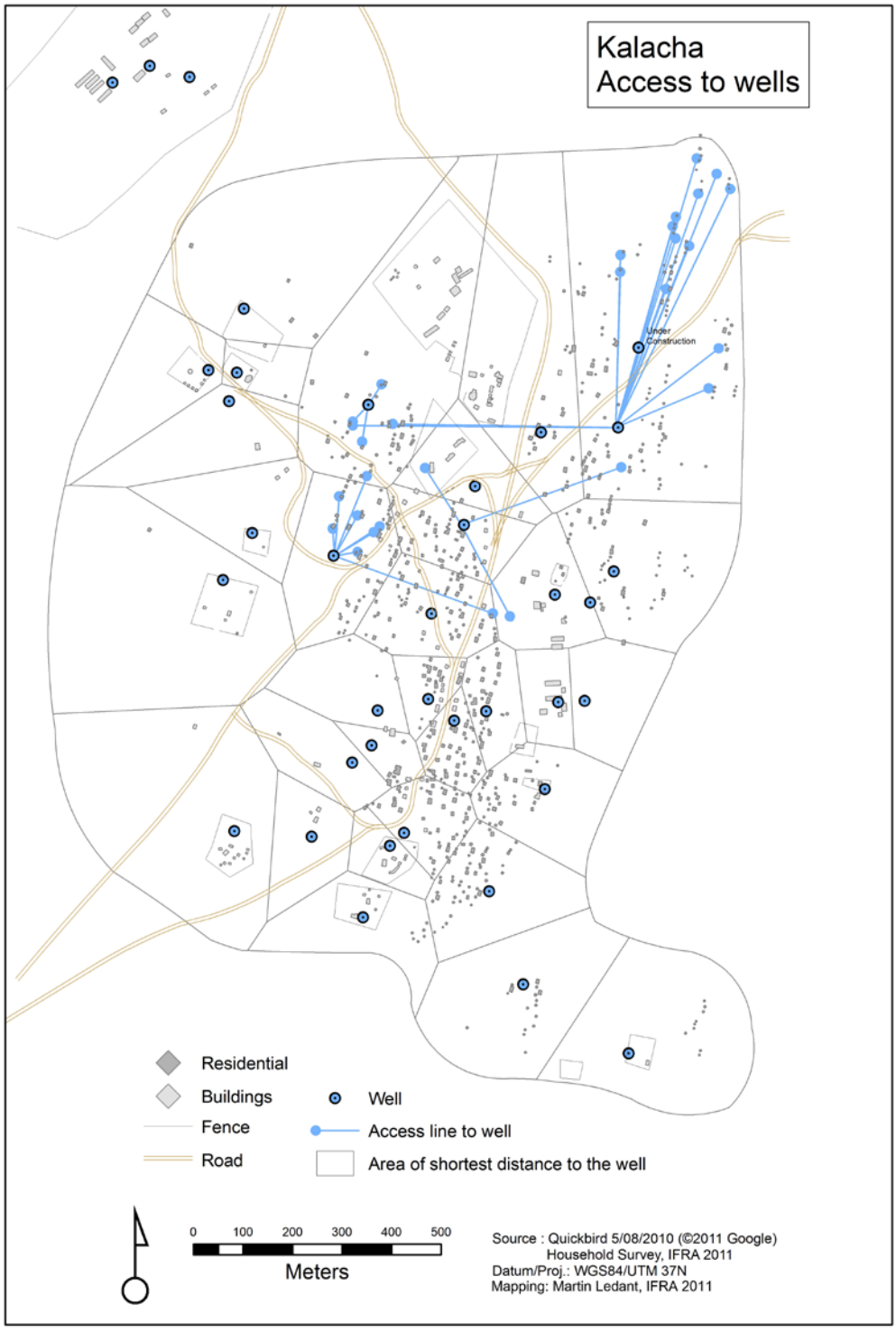
This geographical concentration is demonstrated by the size of the polygons displaying the areas where there are shortest distances to taps. Near the center, taps are always in close proximity, whereas in the periphery, greater distances exist between them.

The number of buildings per tap for each polygon shows large variation. In the center, generally less than 20 buildings are found per tap. This figure can be as low as 2. In the close periphery, the figure is around 20 to 30. When the far periphery is considered, this figure climbs up to between 80 and 150.

The unreliability of the tap system lies in the inadequate capacity of the two tanks available to supply the whole town and the wind energy, which drives pumps. Low/erratic wind energy automatically results in interrupted flow of water to the residents.

In Kalacha, all the wells have fresh water. Even though the data is not exhaustive, it seems that cost and distance are the primary factors, which determine where households fetch water. Fewer households were found to fetch water from a more distant well, highlighting that water is structurally more accessible in Kalacha. Interestingly, there is a well under construction in a location where households must travel long distances to fetch water (in Duke). The average distance to water sources in Kalacha is 290 meters, and a round trip from the house to the source takes an average of 39 minutes.

Map 9: Kalacha access to wells



Although most of the wells are 'private' (71%) in North Horr, the public do have access to them and are required to pay a to cover the costs of their regular cleaning and maintenance. A private well is thus private in the sense that an individual paid for the digging, or dug the well on his piece of land, yet the public contributed to improving the well, cementing it and

protecting it. This well, though on private land, therefore becomes accessible to the public as well. However, cash payment is not mandatory for households that are too poor, and in that case, they pay their dues through contribution of labour in the cleaning and maintenance activities of the wells they access. 61% of households pay this levy, which is on average Ksh 42 per household per month. The levy is collected by the Water Users Committee (WUC), a group of individuals selected by the community to oversee and manage domestic water resources within the town. This WUC also ensures cleanliness of the wells and is responsible for conducting awareness creation campaigns about sanitation and hygiene. Although the water users acknowledge the existence of this committee, most people are ignorant of the functions or roles that it plays. As a result, in case of disputes and issues concerning domestic water resources and sources, the community always goes to the elders and traditional system water managers and not the WUC.

0.7% of wells in North Horr town are purely private. This means that the construction and improvement of the wells have been done by an individual, who, unlike the 'private' wells, does not charge every household monthly but rather charges any individual who wants to access water on a daily basis. Users are strictly those who pay for the commodity. These wells are thus accessible to the public, but only those that can afford to pay Ksh 30 per day have the right to fetch water here.

Kalacha has 87% of the wells classified as public and 66% of households attested to contributing an average of Ksh 21.00 per household per month for their cleaning and maintenance the wells. As well as in North Horr, the wells are closed at night[21]. A water users committee (WUC) exists but is not active. Management of wells is left to an elaborate group: the Environmental Management Committee (EMC), who are mandated only with the protection and prevention of water contamination and as well as ensuring sustainability of water sources but this is as far as their role goes. Their major task in managing domestic water sources is to advise the community on sanitation and hygiene. For example, when people realised that the Kalacha Dida spring was diminishing, due to increased siltation from erosion, they failed to dispose animal solid waste, which began to accumulate around the spring, which began to cause disease. The EMC stepped in to protect the sanitation of the spring. It was established that the EMC, which was supposed to play an important role as the chief manager of wells/domestic water sources in Kalacha, actually does very little. And since most wells out of town are for livestock use, the EMC is not involved with them in any way.

Water Users Committee (WUC)

Water Users Committee is a new concept, which is yet to gain ground in the management of water sources. The committees are found within centres such as North Horr, Hurri Hills and Kalacha, where they are more functional. They are charged with the mandate of managing domestic water sources. Management is a broad term, and the WUCs seem to be concerned more specifically with hygiene and sanitation of water sources. Since in the town centres water sources for domestic use are separate from those for livestock, the functions of the *Abaherega* and the WUC are quite distinct; they manage different sources and rarely collaborate. The survey found no form of collaboration between these two institutions. One problem with the WUC that is not reflected with the *Abaherega* is lack of impartiality. Most often the WUC individuals have been accused of receiving khat bribes to favour water supply

[21] This is also the case in North Horr.

to a particular section of the city in North Horr, leading to irregular distribution of water supply. In cases like these it is expected that the community approach the WUC to resolve the issue. Nevertheless, these cases are still reported to the *Abaherega* even though he is not involved in the issues concerning water for domestic use. This is an indicator of the trust and confidence that the community has in the traditional system of management, and its reservations around the WUC as a legitimate water resources manager. Of all the surveyed sites, only 3 had WUCs Only in Hurri Hills did there seem to be an elaborate list of activities for the WUC. In the outskirts of towns, WUC is non-existent.

Table 9: Differences between WUC and the Abaherega

Abaherega	**WUC**
Focuses on livestock water sources	Focuses on Domestic water sources
Activities in outskirts of towns/ villages	Activities confined within town centres
Are not remunerated	Are remunerated sometimes
Do not collect payments	Responsible for collecting water levies
Consulted sometimes by domestic water users	Never consulted by livestock water users
Have community confidence	Accusations of corruption
Focus on roster, organization and equitable access to water	Focus on hygiene and maintenance of sources.

Environmental Management Committee (EMC)

This committee is unique to Kalacha town. Formed in 1996, it was an initiation by GTZ's but was inspired by the community to deal with indiscriminate logging of tress and environmental degradation Its purpose was to protect and sustainably manage environmental resources. . In 2000 it evolved into a committee, and registered as an environmental group. Their major role is as custodians of the environment through inhibiting indiscriminate logging; reforestation; regulating pasture and grazing; punishing offenders of the environment; issuing permission for collection of firewood; and raise awareness on environmental issues especially resources conservation. One of the accomplishments the EMC of Kalacha has achieved is initiating the protection Kalacha Dida – of one of the most important springs of the region. They have also managed to tremendously reduce logging within the town as well as manage rangelands during the wet season. Management of pasture has involved encouraging the community/pastoralists to graze far away from the town during the wet season so that they are able to utilize the unused pasture closer to the town as fallback during the dry season. This activity has elicited a positive response from the community. Since the committee members of EMC also double up as members of the WUC, they are involved to some extent in

management of domestic water sources within the town, as mentioned above. The challenge to this group is that their activities are currently limited to the town and areas closest to it, since they would have to meet the cost of transport to the rural hinterlands themselves.

THE CDC (Community Development Committee)

A Community Development Committee is present in all the surveyed locations. It is a government initiative whereby individuals are selected from each *olla* to represent their areas in matters of development as well as to bring to attention the problems experienced in their areas. This group benefits from training and workshops to increase awareness and promote pro-active responses to the risks to which the community is exposed. The group is trained on disaster risk reduction, for instance, and coping strategies/responses to the common risks in the area, i.e. drought, floods, fire, epidemics and conflict. Although they are involved in all issues affecting the community, and play a fundamental role in pasture management, they seldom get involved in the management of water resources; the role of the CDC in the management of water and water sources is indeterminate.

4.3.3 Utilization

93% of the respondents in North Horr concur that they utilize wells for domestic purposes and that 63% of these wells have their access regulated. Regulation of hours to access wells is not solely to limit utilization but mostly for safety purposes. The wells are open from around 8am until noon, are closed and then reopened from 3pm until 6pm. In total, a regular well functioning within North Horr town is open for water access for about 7 hours per day. The average quantity of water fetched by the surveyed households is 92 litres per day per household.

The study also revealed that residents preferred water from specific sources for different activities. For instance, most people prefer tap and spring (Horri Guda) water for drinking to well water. This is because they say the tap and spring water are fresh sources, unlike the well water, which is salty and often contaminated. The challenge, however, is distance to the spring and unreliability of tap water. One factor that has been noted by water users in the North Horr centre is that, since people prefer spring and tap water, most of the wells in the town are underutilized, which contributes to increased salinity of those wells. This hypothesis is linked to the fact that when water in the well is not used, there is an imbalance between ground water discharge and recharge. Water is not only a resource that supports the daily domestic activities and livestock production in North Horr, it is also a source of livelihood for some people. In Olla Turkana, for example, most women earn money-fetching water for others.

On average, the quantity of water fetched is 71 litres per day per household in Kalacha. 5% of households utilize more than one source at a time, a very low figured compared to north Horr. This is perhaps due to the fact that the other source, Kalacha Goda, is far from the *ollas* and is also utilized for livestock watering as well as for irrigation. The other reason is that wells in Kalacha contain fresh water unlike in North Horr, and people are thus satisfied with the water quality in terms of its salinity (low salt concentration <1%).

Kalacha is indeed a place of plentiful water; Kalacha Dida is the major source around which a water-trucking industry transporting water to areas with severe shortage (such as Hurri Hills) thrives. Ksh 2,000 is charged per 10,000 litres tank. Water for humanitarian assistance to Hurri Hills and Maikona, however, is free to recipients. Who charges this amount and what the money is used for, was, however, indeterminate.

Agropastoralists' uses of water in Kalacha

One of the most important water sources is the Kalacha Goda spring, which is the main source of water for the agro-pastoralists in this area. The total area under irrigation is 78 ha with a total of 130 farmers, of which 30 are still outside the main enclosure for the planned expansion of the irrigation scheme. These farms, though individually owned, are managed by the Irrigations Board. Commodities produced here are hay, fodder trees (*Lucaenalucocephala*), some multipurpose trees like *Moringa oleifera* and alien invasive species (*Prosopis juliflora*), used as fodder, building poles for the traditional *mandase* huts and for medicinal purposes (*moringa* seeds and roots). Initially, there were only about 50 farmers and the lands were allocated by a committee. The presence of wild animals have prevented farmers from planting food crops as baboons, porcupines and squirrels damage crops

Water allocation and access are the main challenges of this scheme. Water allocation is carried out by a 6-member committee, which decides on a water access schedule. It also ensures that everybody gets equal access to water. The committee also tries to address farmers' issues, problems and concerns.

Every farmer/plot receives water every 15 days. Out of all the farms, about 10 situated upstream get water daily. The problems in water allocation are the inequitable distribution of water between the farms upstream and those downstream, water scarcity, and poor design of the irrigation system. There is plenty of water according to the farmers, although the number of farms has increased over time and outgrew the system that was initially planned for only 50 farmers. The general view of the farmers is that the available water is not enough to support crop production, because the crops, especially vegetables, would dry up if they were to receive water only every 15 days. Farmers are divided over the question of water accessibility; there are those who feel that water is insufficient and those who feel that it is not a question of water availability, but rather the irrigation system and planning around water allocation. If sprinkler irrigation were used, for instance, less water would be wasted via evaporation from the open channels. Again, the canals for water supply seem to have been designed inappropriately; in some sections water does not flow, but stagnates and is thus rendered useless.

The water allocation problem notwithstanding, this irrigation scheme has offered diversification to livelihoods and reduced over-dependence on rangelands for grazing. Fodder from the farms is sold to pastoralists which saves them from walking 40-70 km to pasture and, as a result, the livestock is healthier and more productive. Hay fodder is an important source of income for the farmers too; between 20-25 kg wet weight is sold at an average of Ksh 400. In a day a farmer obtains at least Ksh 300-400 from the fodder or poles sales in addition to being able to use the fodder they produce to feed their own livestock benefiting from their own livestock produce.

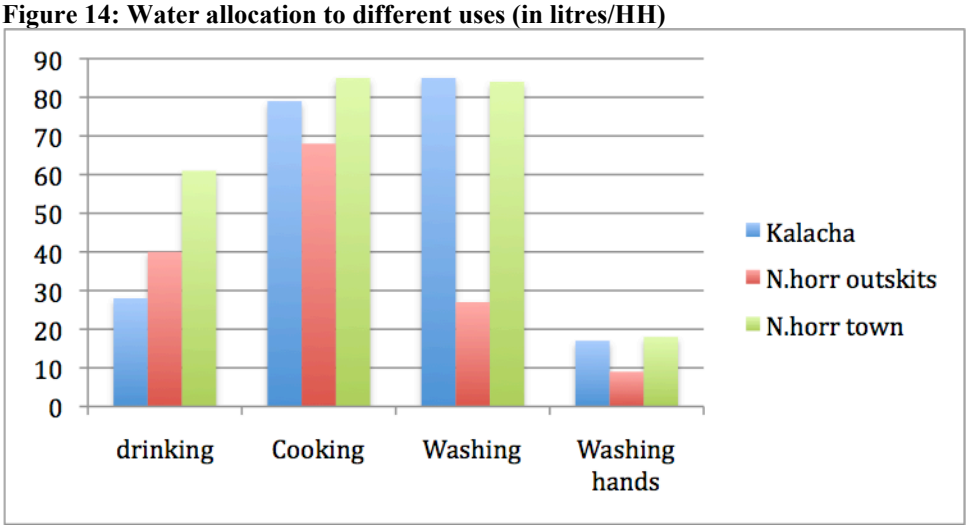
Farmers' perception of the risks involved in farming versus livestock keeping is that farming is less risky compared to livestock, because farming here is not dependant on rain, and there is room for expansion. Farmers also have the freedom to change what to grow in order to optimize production.

In the three sites studied here, some water sources are used during the wet season and some others only during the dry season. In the outskirts of North Horr for instance, *laggas* are an important alternative source of water in the wet season.

Fetching water for domestic use is largely women's task as illustrated by the respondents' statistics. Women collect 84% of all water for domestic use. 90% of men are in charge of watering animals. Collaboration between men and women in the tasks of water drawing is more evident in the outskirts where men draw water from inside the wells while watering animals and women collect it at the trough. On average, only 2 individuals per household are charged with the responsibility of collecting water for domestic use of the household.

Figure 5 displays water allocation (average) for different household requirements for domestic use per household per week.

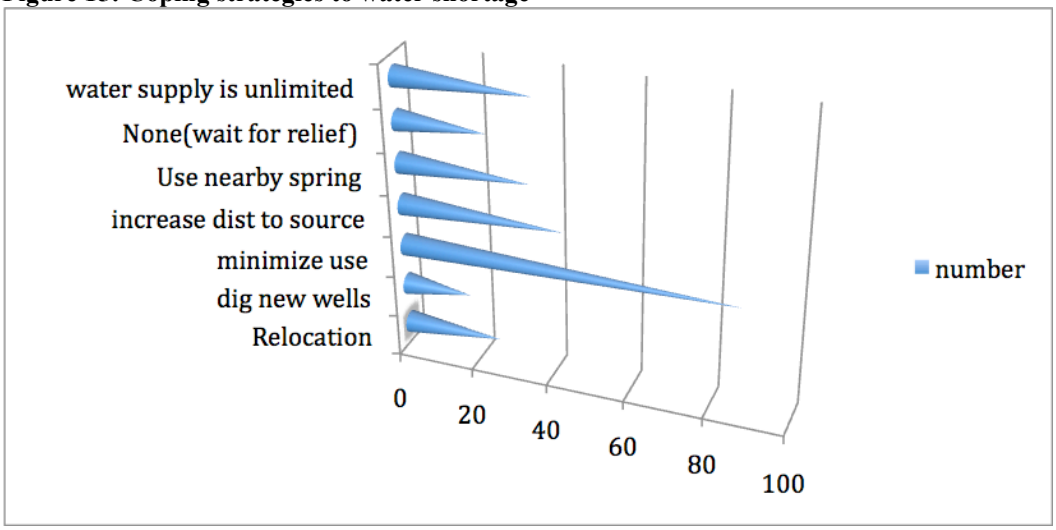
Figure 14: Water allocation to different uses (in litres/HH)



The fact that the households in the outskirts of North Horr utilize less water as compared to Kalacha and North.Horr town (except for drinking) is attributed to the long distance from the *ollas* to the accessible water source. Most people make at most only two trips, making the amount of water fetched per day much less than in the other surveyed areas. It was established that generally, larger households tended to utilize more water than smaller households, that is the more the number of people in a household, the greater the demand for water. The study found out that the social cost of water for a larger household is less compared to that of smaller households. This is attributed to the division of labour where the task of drawing water is divided among the members of that household and is not entirely dependent on one or two individuals within the household.

Figure 16 below gives an insight to the most commonly employed strategies to deal with diminishing water sources.

Figure 15: Coping strategies to water shortage

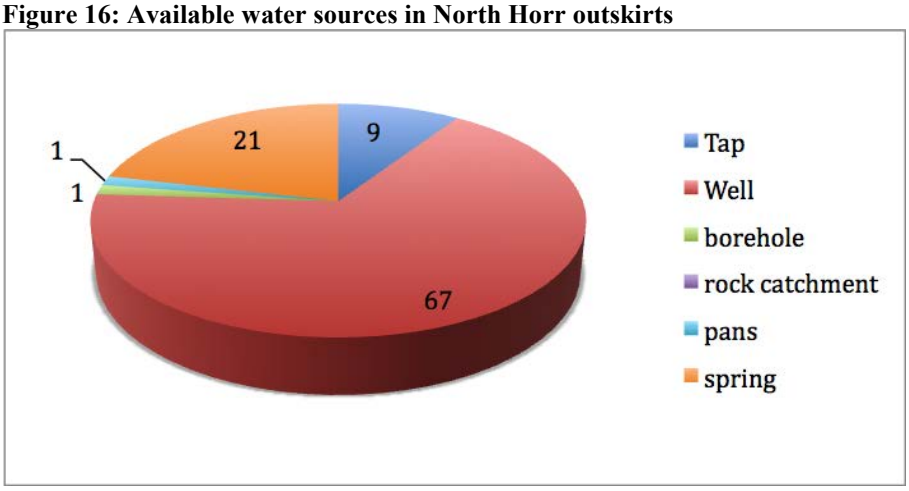


4.4. Non Urban Water

4.4.1. Availability, Quality and Localization

The *ollas* around North Horr (i.e. the outskirts) face a different situation in terms of water accessibility. For this reason, these localities were studied separately from the North Horr town so as to get a true picture of their specific context, and to enable comparison between the outskirts and the town itself. 76% of the respondents have access to a water source close to their areas of residence – mainly wells. Only 8% access more than one source at a time – usually springs (Horri Guda was most commonly quoted) – *ollas* that are not far from from the spring 89% of the water sources accessed in the outskirts are public. The average time taken to water sources in the outskirts is 2 hours 6 minutes, with an average distance of 3.4 Km. The average amount of water collected is 40 litres per day per household compared to 92 litres in North Horr town. Figure 17 below indicates the water sources accessed. 83% of water sources accessed here are unregulated as compared to 37% in North Horr town, and only 1% of the population pays levy for water, which is applicable to those accessing some sources within the town.

Figure 16: Available water sources in North Horr outskirts



The population living in the outskirts of North Horr using taps come all the way to the town to access the tap water.

While there is no water shortage within the town, households situated in areas around and within Kalacha location have difficulties accessing water both for livestock and for domestic use. Areas like Arilo, Elgade and Dakane have animal pasture but no water. In times of dire scarcity, such as at the time of this survey, both livestock and people have to travel to get water to Kalacha, which is 70 km away. During drought many people settle in Kalacha, greatly increasing the demand for and pressure on water and pasture resources.

Hurri Hills is a place of dire water shortage for both domestic and livestock use. Underground tanks are the main facility available for water storage, with the main source of water for these tanks being roof catchments and water relief. There are 51 underground tanks with average capacity of 10, 000 litres in Hurri hills. The community manages 13 of these while the remaining 38 belong to individuals and groups. The community tanks are for all residents, private tanks belong to individual households and group tanks are for group members. There is one rock catchment, which is in bad condition and therefore unutilized. There are also 3 dams in this location, but only one is in good condition. Water is so scarce in this area that the residents do their laundry in Kalacha 70km away because water received here is used for cooking and drinking. Even cooking is a challenge because the inhabitants depend on relief food (in the form of dry grain), which requires a lot of water and energy to cook.

Dukana has 38 shallow wells distributed along the *lagga*. These are used for domestic and livestock consumption; there is no distinction between domestic and livestock water sources. A pipe system exists but only for institutions like schools, the police camp and health centre. Water is pumped by generators from the wells to the supply point. There are 2 boreholes in Dukana, which are both dysfunctional.

The major concern in Sarimo that overshadows water scarcity is insecurity, to the extent that even drought is revered because of its ability to foster peace; when there is drought, peace prevails. The two communities (Gabra and Turkana) share resources, water and pasture. In the wet season, conflict is more common and ethnic loyalties stronger. Each community is expected to stick to their sides and graze and water their livestock within their boundaries. In interviews, both communities agreed that during drought they are more peaceful with one another because they perceive drought as a unifying element, something that affects them both in the same way, and that they mutually rely on one another for survival. This is because there are water sources on parts of Gabra land that have not dried up, similar to the Turkana side, but soon, the only water source available could be on the territory of the other community; it is logical to be at peace in order to share vital resources. This is a fascinating notion, especially since it contradicts popular belief that during drought, communities scramble for scarce resources, thereby sparking conflict between them. Distance to the nearest water sources here, near surface water from the *laggas*, is about 7 km from the village.

Hurran Hura is about 60 km from North Horr and is comprised of 10 villages of approximately 10 households each. The only sources of water for these villages are 2 wells, namely El Hurran Hura, which is 8 km from the nearest village, and El Wano for villages closer to it (4 km). In serious drought, however, households in this area move to Sarimo. The

most important factor that determines the move to Sarimo is not water but pasture – as long as there is pasture, even without water, households do not move to Sarimo until all the pasture is finished. Likewise, motivation for movement back to Hurran Hurra is rainfall

4.4.2. Population, Access and Management

The Hurri Hills community is dependant upon relief water during drought, such as at the time of this survey. Water trucking from Kalacha and Maikona is common and very expensive for a community that is already grappling with the effects of extreme poverty and malnutrition. Hiring a water truck from Maikona to Hurri Hills cost Ksh 23,000, which is then sold by owners of private underground tanks at Ksh 50-70 per 20 litres. At times, NGOs such as Solidarites and PISP provide relief water to the region and each household receives 20 litres per day. Water available at Hurri Hills is for domestic use (cooking and drinking only); livestock have to trek 3 days to Kalacha or Ethiopia.

Access to and distribution of water in this community is very organized, given the critical situation of water. Allocation of water is done in such a way that each of the 14 blocks in Hurri hills utilizes 1 tank. Unlike other places in the area of study, the WUC here have a clearly-defined role and are entrusted with most elements of water management and allocation. The WUC has representatives from each of the 14 blocks and oversee the distribution of relief water; they schedule and decide the amount of water to be supplied to each household. The WUC has a register and hold the keys to the community tanks. Apart from controlling other sources such as pans during the wet season, their primary responsibility is maintenance of the tanks, cleaning and de-silting.

When there is no water relief, the community blocks and groups organize themselves to contribute cash for hiring trucks from Kalacha or Maikona. The groups then sell water to villagers to get cash to hire the trucks again, as well as to clean and maintain the facilities. The water is sold cheaper to the group members (Ksh 50 for 20 litres) than to non-group members (Ksh 70 for 20litres). Every 3-4 months, each group member pays Ksh 500 as a maintenance fee and as additional contribution for hiring water trucks. The main challenge is that in light of the difficulties in accessing water, there is no means of ensuring equitable supply of water. During wet seasons, the water situation improves and people use roof catchments and the *laggas* as sources of water.

The challenge of access to water in Dukana, however, is that, most wells are individually owned. Due to the absence of WUC, access and management of water is left to the traditional system. There is accumulation of waste in the wells, causing pollution which leads to waterborne diseases.

4.4.3. The traditional (Abaherega) system

In the past, water management was mainly conducted for wells and not springs; organization of water services was centred on livestock consumption and not domestic utilization. This involved designing a schedule that would act as a guide to determine which livestock access which watering points, on which days, and after how long the animals should return to that watering point. Usually for cattle the cycle is 2 days, for sheep and goats 3 days, and for

camels 4/5 days. Responsibility for this kind of schedule was left to the *Abaherega*, whose name literally means 'father of roster' in the Gabra language. Not much has changed in so far as this traditional system of management is concerned. The *Abaherega* is present in the entire Gabra society and in all the locations of study, and is the chief individual responsible for water management for livestock consumption. Although the *Abaherega* does not concern himself with domestic water use and management, he is still consulted in any cases of dispute or to assist in resolving issues around domestic water. The *Abaherega*'s duties revolve around wells outside the urban centres, since these are the ones used by livestock. He is not employed in management of open water sources like springs, even though these are also utilized by animals.

An *Abaherega* is a respectable member of the community. He is chosen by the elders and possesses qualities and skills to enable him perform his functions effectively. He is should possess conflict resolution skills, absolute objectivity and impartiality, and have good relationships with other community members. After the *Abaherega* has been chosen, he decides who his deputy will be – a person who can perform the *Abaherega*'s functions in his absence and to whom duties can be delegated for efficiency. Besides ensuring that the roster runs smoothly, the a*Abaherega* also receives new water users as in the case of migrants to a locality, especially during dry spells. One challenge 'the father of roster' faces is that he has to be at the wells every day, to supervise daily activities around it, meaning he has little or no time for his own activities. Furthermore, his work is entirely voluntary, and he is not renumerated. The *Abaheregas* are always men; the research did not find a single instance of a female *Abaherega.*

An *Abaherega* is not immune to punishment, and in cases of aberrant behaviour, the elders decide on an appropriate punishment. In severe cases this may result in removal from 'office'.

4.4.4. Utilization

Figure 15 (water allocation for different uses), gives an insight into the differences in utilization of water vis-a-vis domestic activities. It indicates that it is in the non-urban areas where water allocation for each use is least as compared to the other areas. This is attributed to the longer distance to water sources, as discussed previously, as well as limited access to water sources. Again, the quantity of water drawn per household is least in the non-urban areas (average is 40 litres). This can also be attributed to the afore-mentioned reason.

4.5. Changes Happening Over Water Resources, Ownership and Management.

For a long time, resources have been utilized by this society without a particular group claiming responsibility to its management, save for the *Abaheregas* who are accepted as managers of water sources. Groups like Water Users Committees (WUC), Environmental Management Committees (EMC), and Community Development Committees (CDCs), were non-existent. With the evolution of such groups, ownership of resources, water, pasture and natural resources has swiftly shifted from the community to these groups. Since these groups serve to coordinate or spearhead sustainable management of these resources for the community, the community sees the resources as belonging to these groups, and that they

should therefore be responsible for them. This has made the community somewhat apathetic towards management and conservation of resources. The sense of ownership of resources has diminished if not lost entirely. For instance, in Kalacha just before the survey, there was a fire outbreak near the Kalacha Goda spring. Instead of the community taking action, they looked to the EMC saying, that the 'Acacias of the EMC' are on fire so they should go and extinguish it. Once wells are improved, they cease to belong to the community but to the organization that improved it, even though the whole community uses it. 80% of the population, however, said the water sources belong to the community.

As much as it is positive that there are several bodies entrusted with management of resources in these regions, one weakness is that in a place like Kalacha. for example, where all these committees exist (WUC, EMC, CDC, *Abaherega*) there are overlapping roles, duplication of efforts and uncertainty regarding who performs which functions, whose mandate ends where and whose responsibility it is for some activities, to the extent that activities of some of these committees are unclear and therefore not well executed/implemented. The role and functions of the *Abaherega* seem to remain clear, however.

Settlement patterns and natural resources availability were understood by key informants to have changed in recent years. Pasture has diminished because rainfall has become scanty and erratic, making drought a regular, increasingly common phenomenon. It is rather confusing that while they testify that rainfall has reduced and droughts are more prominent, in areas like Kalacha and north Horr, decline or diminishing water sources has not been observed: they concur that "water is as plentiful as it used to be" Besides noting changes in climatic patterns, the community attests that population has increased over time and so has livestock population (as backed up by census data from KNBS). For this reason, pasture is exhausted faster than before and the distance between settlement, pasture and water is significantly increasing. Most informants felt that population increase has nothing to do with resource scarcity, because in the wet season there is always enough water and pasture for everyone, and so the problem lies with a climate that has disorganized the rainfall patterns. An alternative opinion is that the water problem has always been there in areas with no water, and there has not been a change in climate.
In so far as utilization of water sources is concerned, due to increased populations of both livestock and man in comparison to resources, some water sources are now used differently Springs like Horri Guda, a fresh water spring, was originally for camels only, while Renderigudo, a salty spring, was left for small stock. Cattle also had separate wells. Today, all livestock use these sources. At the same time, in areas like Dololomeeti and Bas Kooba, water sources have apparently diminished completely as a result of drought.

Alien invasive species that did not occupy some areas previously, have become a cause for concern as they have negatively impacted on the water supply. Species like *Prosopis juliflora* and Chiladu, are said to be the cause of diminishing water levels at the Horriguda Spring. Chiladu species, said to have been introduced in 2006 from a government nursery consumes, on average 5 litres per shoot per day – one plant has as many as 50 shoots. Prosopis, on the other hand, has colonized pasture and grazing grounds. In Kalacha, it is disrupting the agro pastoral livelihood as it competes with the farmland species, thus reducing the output considerably. In Kalacha, this plant is said to have been brought from Baringo by an AIC priest and each household given 3 seedlings to plant, from then on, it has spread and wreaked

havoc both for livestock and people. One positive use of this plant is for building animal pens and enclosures; it is very thorny.

Socio-cultural aspects

Water is a fundamental component of the Gabra society; besides supporting their main source of livelihood without water, the backbone of this society crumbles. Water resources are crucial in this part of the country categorized as arid and semi arid and water scarcity and low, unreliable and erratic rainfall. So valued are these sources that most regions/areas names originate from water sources. "El" in Gabra language means "well". Examples of such places include El-buka, El-borumagado, El-hadi, El-beso, and El-gade, among others. Settlement patterns seem to be aligned to follow water sources and hence the naming of the new settlement after the water source.

Water and water sources form an important part of history for this society. A story is told, for example, of the Wordai wells/sites – giants who previously occupied Gabraland, and their wells are identifiable to this day. Cultural aspects among the Gabra community such as presence of singing wells[22] are deep-rooted In all the surveyed areas, singing wells are an important part of the society and has great cultural significance; the elders are afraid that improving and fitting wells with hand pumps is slowly eroding this culture, and indeed, most wells have ceased to be points of socialization that they once were.

4.6. Sanitation and Hygiene

4.6.1. Latrine Availability and Accessibility

The sanitation component of this survey looked at the availability of sanitation facilities, which covers latrines/toilets, bathrooms, hand-washing units and waste disposal, their conditions, utilization, as well as the general sanitation situation of those areas surveyed. The sanitation situation is similar in urban centres with significant differences observed between the town settlements and settlements in the more rural areas. Again, North Horr town and North Horr outskirts were treated separately to enable comparison between the two, as well as to give a true feel of the situation in these distinct areas.

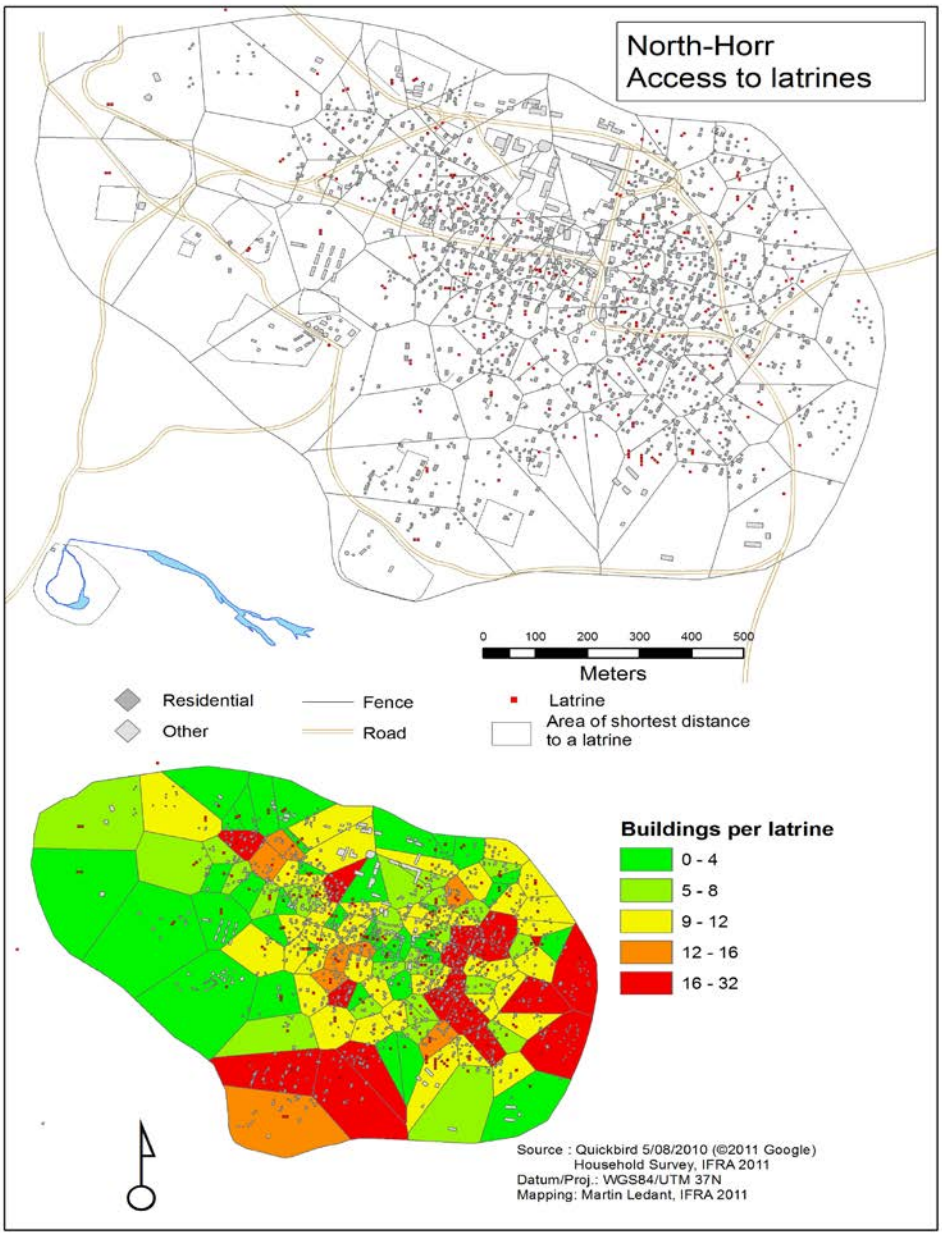
Within North Horr town, 34% do not have access to <u>any</u> sanitation facility. Of the 66% that can access some sanitation, only 56% say they own these facilities. The question therefore remains as to who owns the remaining 44%. Latrines are shared between an average of 3 households per latrine, and most of the people without access to latrines were recent -migrants into the community at the time of the survey, and did not benefit from the SI latrine scheme. Others without access to latrines say their latrines are filled up and that they cannot afford to construct new ones; they opt to use the nearby *lagga* for human waste disposal.

Map 10 (North Horr access to latrines) indicates where the latrine facilities are present, their distribution and their proximity to the households that utilize them. 71% of the population in North Horr town do not have waste disposal facilities, Of 111 respondents 2% (3 people) have access to bathrooms, the rest of the respondents indicated that they either bath inside

[22] These are open shallow wells, usually communally owned and that involve singing traditional Gabra songs, usually in praise of livestock, as the drawers of water pass on the bucket to one another. Men are positioned at different levels from the bottom of the well to the surface, where water is poured into the trough for livestock

their houses or outside at night. In addition, 98% of these respondents affirmed that they do not have access to hand washing facilities.

Map 10: Access to latrines in North Horr town

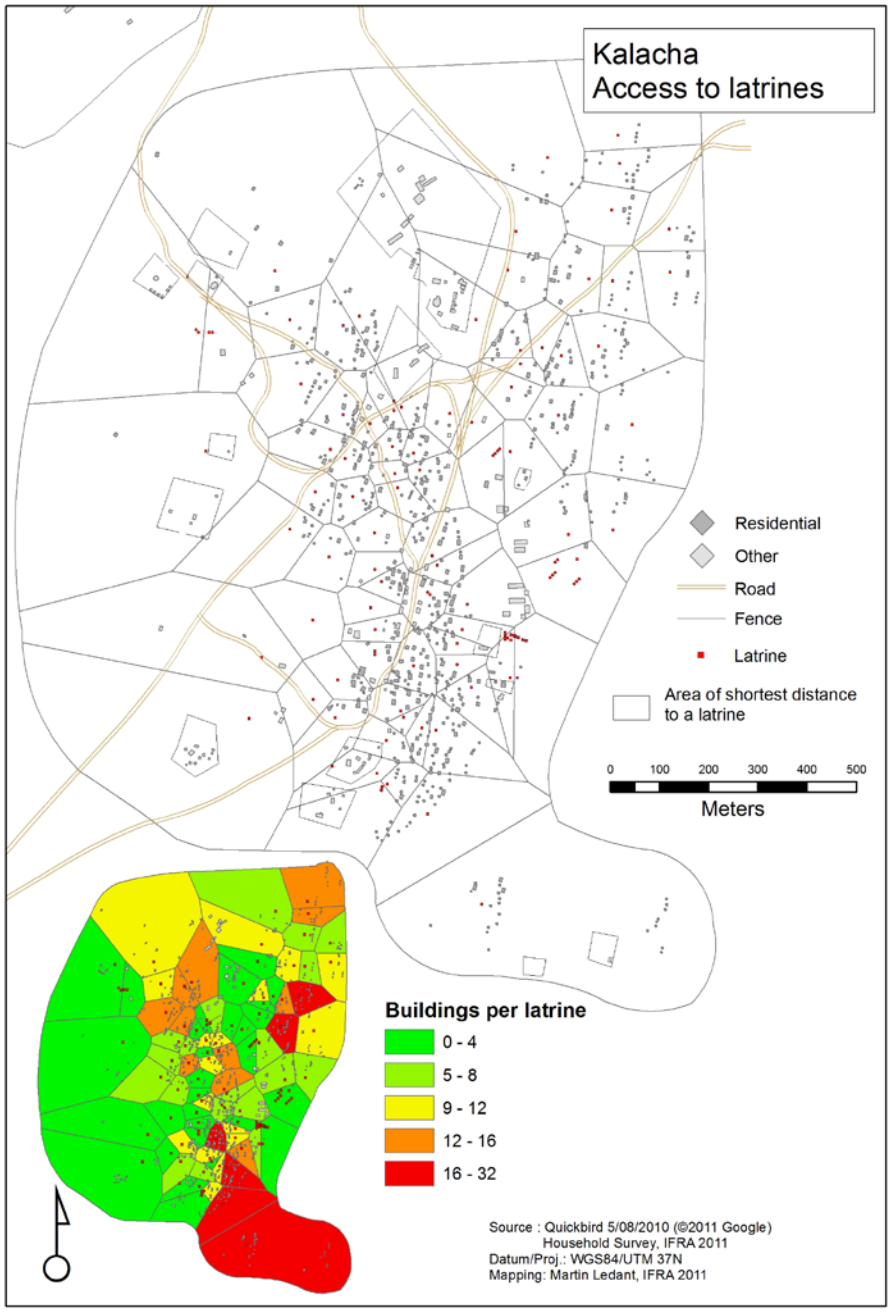


The situation in the outskirts of North Horr town in terms of access to sanitation facilities is grave. 97% of the respondents have no access neither do they own any sanitation facilities. Although a reason behind this may be that the communities are highly mobile and therefore do not see the need for such facilities as important as they may be, most of the settlements around North Horr town are more orientated towards permanent settlement than nomadism. 100% do not have access to bathrooms, waste disposal facilities and hand-washing units

while only 3% have access to latrines. Presence or absence of bathrooms does not seem to be a problem in the outskirts since people bathe in the open shallow wells.

In 2009, there were 40 latrines in Kalacha. Presently, this number has significantly increased. Like North Horr, there are latrines only within Kalacha town, but not the outskirts. 74% of the population in Kalacha town have access to latrines, out of which only 55% said they own the latrines. 19% have access to waste disposal facilities while only 4% have access to a bathroom.

Map 11: Access to latrines in Kalacha centre



Map 11 (Kalacha access to latrine) shows the presence and proximity of latrines to households as well as the distribution in the *ollas*.

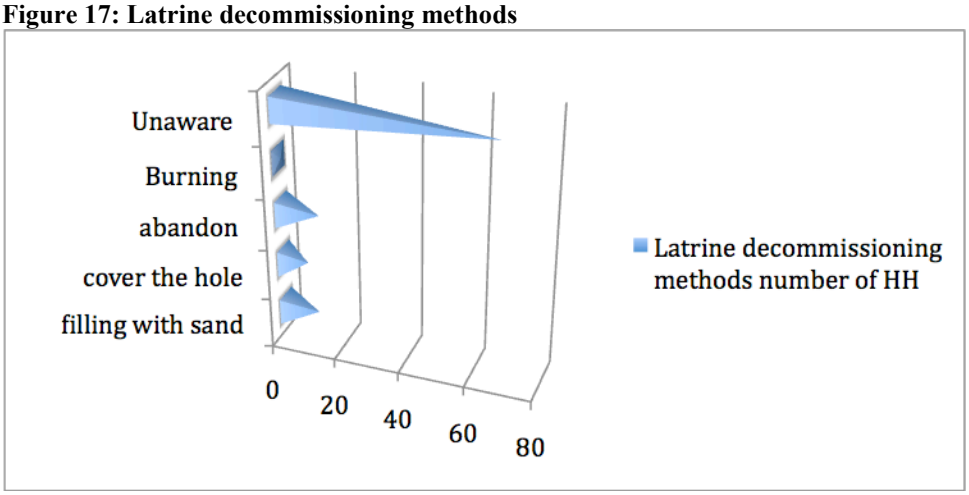
The maps show the location of the closest latrine in the study area. When looking at the size of the polygons and locations of buildings, distance to the closest latrine seems to be even, indicating that the distance to the closest latrine does not vary greatly across town. However, in some areas, greater distances must be traveled to find a toilet. In North Horr, those areas are to the west near DO, and to the south near Mathare and Fila. In Kalacha, the main point of concern is the area to the southeast of Chira.

Secondly, the maps show how many buildings are located in the proximity of every latrine. Areas lacking latrines can therefore be determined. In North Horr, three main areas can clearly be identified: 1) Olla Filla, 2) a strip of dense residential neighborhood just east of town (SoraBonaya West, Ayano), 3) the eastern end of town (Tullu, SoraBonaya East). In Kalacha, 1) the south tip of Olla Chira is problematic and 2) the south of Olla Duke presents densities which might be too high for the number of toilets.

4.6.2. Latrine maintenance, decommissioning

Although all the 263 respondents agree that hygiene and health has been improved as a result of the construction of latrines, the already existing latrines are insufficient. As indicated by Figure 9 below, 66% of those interviewed have no idea how to handle filled-up latrines. People use different techniques to handle filled up latrines, including filling them with sand, covering the hole, burning and abandoning, which is the most common treatment. The filled up latrines are, therefore left in a deplorable state and are an eyesore as well as a health hazard. As NGOs are busy building latrines for the community, and as the population increases, the community is not trained on how best to handle decommissioning, and there is the risk of adverse effects on inhabitants' health. Moreover, latrines in these areas are used until they are filled up completely and overflowing, whereas health regulations consider that a latrine is full when the human waste is about 1 metre from the slab.

Figure 17: Latrine decommissioning methods



All the institutions/schools surveyed in North Horr have some form of sanitation facilities. 100% of these access and own latrines and there is an average of 8 latrines in each school. The average distance to latrines in the institutions is 0.27 metres. 28% of the institutions have access to bathrooms – these are the boarding schools within North Horr. 86% have no hand-washing units and in most of the 14% where they exist, tanks fitted with taps double up as hand-washing units, i.e. there are no structures specifically installed to serve as hand washing units. 57% dispose of their waste by burning and do not have specific waste disposal facilities. The 43% that have waste disposal facilities have disposal drums. In 86% of the institutions, soap is unavailable because it is too expensive to provide soap for the entire school every term. Just as in the *ollas*, the decommissioning methods for latrines are poor; most of the latrines are abandoned once they fill up.

Generally, latrines are shallow and fill up quickly because they are shared by a number of households. The increasing population means that there is a growing risk of ground water contamination. Soon there will be more space with filled up latrines like the case of nomadic girls school in Kalacha. An alternative is needed.

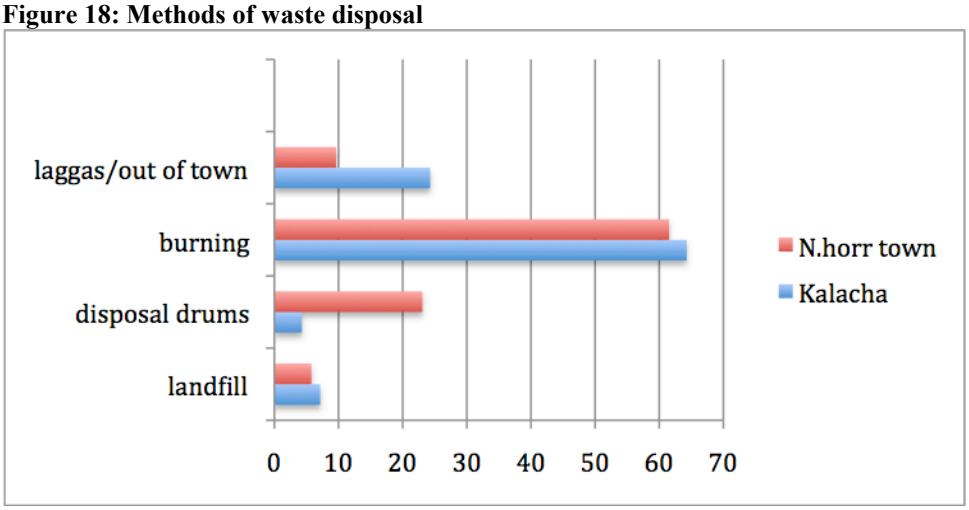
For obvious reasons, the distribution of latrines across town must follow the distribution of population. Otherwise, households might be located too far from latrines and will be tempted to use the bush

The sanitation situation in Hurri Hills is exacerbated by inadequate water for cleaning, bathing and washing. Approximately 23 toilets exist (5 others have been declared not usable). This number compared to the population means that there is about 1 latrine for 93 households.

The number of latrines in Dukana is estimated to be between 100 and 120 and on average; one latrine is shared between 3 households. Many people have private latrines. Latrines here are also very shallow (the depth is less or equal to 4m). The increasing number of latrines has improved hygiene and reduced the use of *laggas* and bushes for human waste disposal. About 15% of people have access to bathrooms while the rest bathe inside their houses.

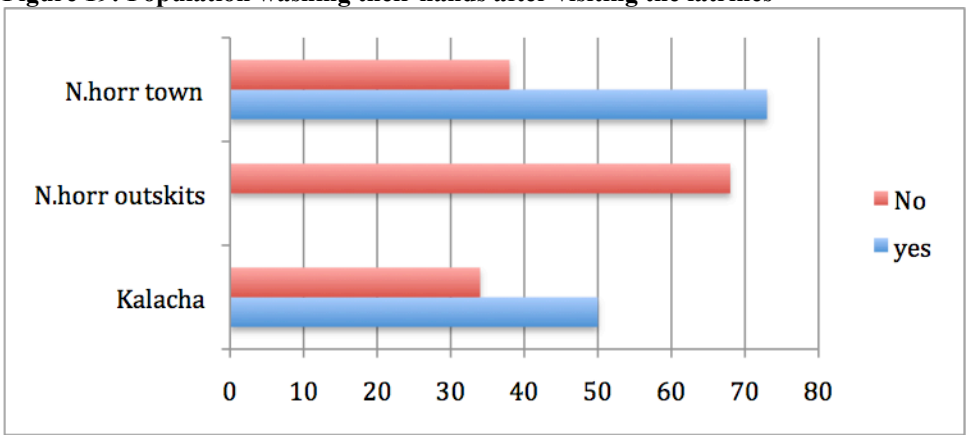
4.6.3. Hygiene and Waste Disposal

Figure 18: Methods of waste disposal



Waste disposal and accumulation of waste is one of the greatest concerns in North Horr and Kalacha towns. As attested by the EMC of Kalacha, accumulation of waste, especially polythene papers and other household waste, is problematic. The survey confirms that an average of 84% of the population have no access to waste disposal facilities But even without proper waste disposal facilities, people have still found ways to handle their wastes – the most common method in both towns is burning (more than 60% -- refer to Figure 19). Disposal of wastes in the *laggas* out of town is another method and cause for concern of because. during the wet season, *laggas* are a major source of water. Perhaps it is the people in the outskirts who suffer most from water contamination in the *laggas*, and it should not be forgotten that it is these people who have no health facilities within their localities and have to travel an average of 14 Km to access health services.

Figure 19: Population washing their hands after visiting the latrines



Although most of the population do not have access to hand washing facilities, (mostly available in hotels and eateries), more people in North Horr and Kalacha wash their hands after visiting the latrine than those who do not. The situation in the outskirts of north Horr is the exact opposite: all the respondents do not wash their hands after the toilet. 64% in Kalacha feel that soap is readily available and inexpensive compared to 53% in North Horr who feel that soap is scarce and not readily available, meanwhile all the respondents in the outskirts said that soap is not available.

The ratio of population to the number of bathrooms is 6000:4. Hand washing units are non-existent for households; washing hands is luxury that the people of Hurri Hills cannot afford.

More rural, nomadic settlements such as Hurranhurra have no single latrines, bathrooms, hand washing units or waste disposal facilities. Nobody washes hands after going to the latrine here.

Some of the challenges to sanitation in the surveyed regions include water scarcity as in the case of Hurri Hills, and the cost of establishing sanitation structures. The hand-washing units available have been improvised.

4.6.4. Health

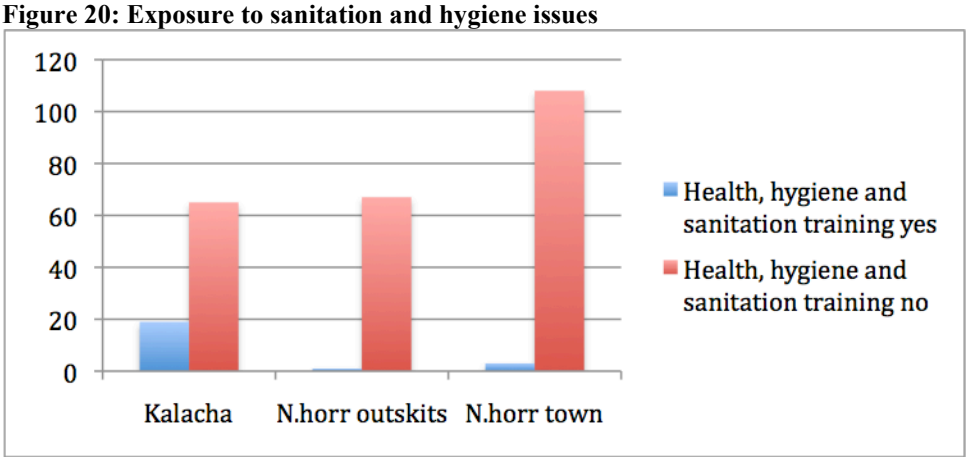
Results of the survey indicate that there is a correlation between water accessibility, sanitation conditions, hygiene and health. The disparity in health conditions in the outskirts of the towns and the town settlements themselves mostly occur as a result of lack of or inadequate water and sanitation resources. According to dispensary records, one of the most prevalent diseases in North Horr and Kalacha are respiratory illnesses. The general layout of the mandase, which also serves as cooking areas, coupled with the use of wood fuel as the major source of energy, contributes a lot of smoke. Overcrowding in these houses also causes infection and re-infection of diseases. Spitting is a dangerous habit, which is often overlooked and may act to enhance the spread of respiratory diseases in these areas.

Diarrhoea is common in children under 5 and a major cause for concern is attributed to water and food contamination and lack of good hygiene practices such as washing hands. Malnutrition for children under 5 is common; kwashiorkor caused by protein deficiency and marasmus are most prevalent. More than 97% of households in Kalacha, 95% in North Horr

town and 100% in North Horr outskirts are beneficiaries of relief food. High poverty levels coupled with harsh climatic conditions have exacerbated the poor health and living conditions of populations. The food types donated as food aid are mainly maize, wheat and beans, the majority of which is carbohydrates. Some NGOs, however, have come up with programs to provide grain fortified with vitamins and soya beans for children under 5 years of age. Although noble, the effort is still inadequate to meet the demands of the increasing population of children.

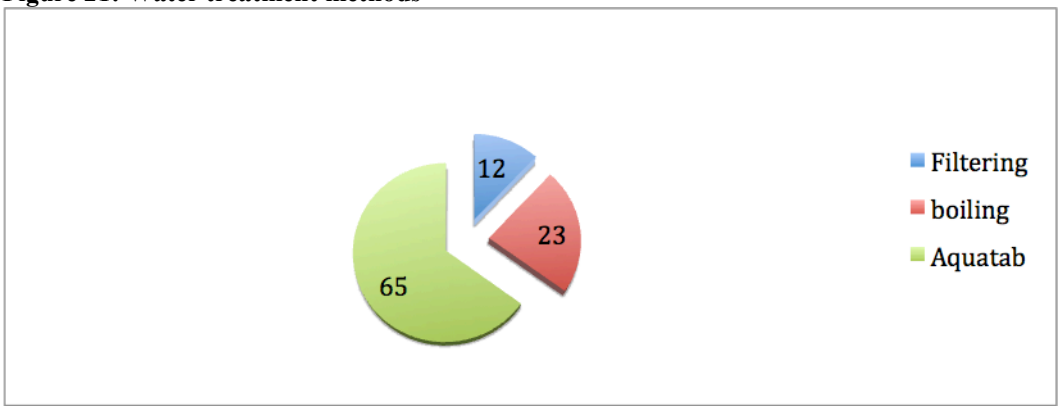
The average distance to a health facility in North Horr town is 0.9 km and 0.5 Km in Kalacha. This distance increases considerably in the outskirts, since no health facilities are present within these localities and people, therefore, have to travel all the way to the nearest health facility in town. The average distance for North Horr outskirt settlements to a health facility is 14 km. While a visit to the health centre in North Horr and Kalacha towns take under an hour, it takes an average of 3 hrs 18 minutes to reach a health care from the *ollas* in the outskirts of north Horr town.

Figure 20: Exposure to sanitation and hygiene issues



Even though a considerable number has not received any training on health, hygiene and sanitation, 69% of the population that received training have said that they have benefitted from it and that they employ some of the techniques they learnt from the training, which include the importance of washing hands; water treatment; and HIV aids prevention. As a result, their sanitation and health behaviour and consequently situation has improved. 21% and 11% of the population treat their drinking water in Kalacha and North Horr town respectively compared to 1% in the North Horr outskirts. The most common method (Figure 22) for water treatment is using Aquatab (chlorine tablets), courtesy of the Ministry of Health through the dispensaries that not only distribute but also train the residents on how to use the tablets.

Figure 21: Water treatment methods



During the wet season, the *lagga* are filled with waste disposal, both human and household. Most wells are shallow due to the shallow water table, with an increasing number of latrines coupled with poor decommissioning methods. ground water contamination is a growing concern, perhaps a disaster waiting to happen.

Taking a long refreshing bath in the well after completing the hard task of watering animals is a leisure activity for pastoralists. However, this behaviour is a health hazard that the population refuses to acknowledge. This same water is used 5 minutes later by people for drinking, while some others fill up their containers to carry home.

4.6.5. Ownership And Management Of Sanitation Structures And Health Facilities

The 56% of respondents who say they own sanitation structures also perceive "ownership" as being synonymous to "private", meaning that only members of their household have access to this facility. It is unclear why households sharing facilities built for them by some NGOs do not look at themselves as owners of these facilities. Only 36% of respondents using shared facilities said they own the facilities. In light of this, people keep referring to latrines as 'those Solidarite latrines' or 'that FHI toilet'. What this indicates is that the sense of ownership of these facilities is poor. Consequently, because people do not feel that they own the facilities, they do not take care of them. This could explain the dilapidated state of some of these shared facilities. Because the latrines are shared, and most people generally don't own them, no one takes the responsibility of cleaning them; there is no arrangement for its management. A similar perception is the notion that toilets belong to the people that built them.

There is no particular form of organization as far as sanitation and sanitation facilities is concerned. If a household does not construct its own facilities, and does not benefit from NGO-built ones, they have to look for an alternative. In Kalacha, the EMC concerns itself with sanitation and waste disposal and advise the community on cleanliness, proper waste disposal and hygiene.

The main issues identified that influence community ownership and management of WASH structures are community participation; effectiveness of water and sanitation related institutions; economic situation of the people; and awareness level of the population. The decision to adopt a particular practice is often made by community leadership and generally

adopted or endorsed by community members, attested by the results of the study, which established that the *Abaherega* was the most influential decision-making body with regards to water resources.

The study revealed some key challenges with regard to the sustainability of water and sanitation facilities. The first challenge is the ability of the community members to ensure regular payment for the maintenance of WASH facilities. After the construction of a facility, the community members expect to fetch water, use the sanitation facilities until there is breakdown, or there is a problem, so that they can contribute towards solving the problem. This pay-as-and-when-repairs-are-required strategy adopted by the communities in some of the areas surveyed adversely affects the sustainability of facilities. Another key challenge is that the community identified themselves more with water facilities than with sanitation structures, which are seen as secondary, probably due to the culture of using the *laggas* and bush, and that while they can survive without latrines and hand washing units, they cannot live without water.

4.6 Conclusionon WASH

5. CONCLUSION AND RECOMMENDATIONS

The pastoral production system is directly dependent on herd mobility and the availability of environmental resources, especially water and pasture. Thus, human livelihood of the pastoral peoples indirectly derives from the natural environment. These two environmental elements (i.e. water and pasture), and herd mobility and availability of environmental resources, are critical for the survival of pastoralists and the sustainability of pastoralism. The availability of environmental resources is combined with social human behaviour to define issues of access, control, and use rights. The rules governing the access and use of natural resources fall within the framework of the traditional institutions and customary structures of the Gabra community. These traditional structures provide benchmarks for assessing access rules and user rights in managing different community natural resources.

Among many factors, drought is a common climatic occurrence in the dry lands of northern Kenya. People bemoan that droughts occur with greater frequency in recent years compared to the distant past. Their claim that droughts are occurring more often is supported by the considerable decline in livestock wealth of the settled populations around permanent water sources. The evidence suggests that those families without sufficient herd size to sustain and keep them mobile are sloughed-off from the pastoral system, and forced to settle around permanent water sources. The households settle in order to seek alternative forms of livelihood. The settled former pastoralist families constitute a vulnerable and relatively poor segment of the region's population. As the informants pointed out, settling around water sources increasingly constrains mobility of households that are already settled around trading centres, with negative ecological consequences, and also with negative impacts on livestock growth and human welfare.

Moreover, the survivability of the herds, and hence human welfare in the pastoral economy, is closely linked to availability of natural resources that are accessed through seasonal herd mobility. Mobility (of either herds or household or both) is more constrained during the dry season when forage is limited and water points are further apart. The water sources (points) in the dry lands are often located great distances from each other, and herding systems regulate access to permanent water points more than for the pasture. Access rights to water sources typically imply access and rights to use rangelands surrounding water resources. Hence, rights to pasture lands in the pastoral areas are typically defined in terms of rights to water sources. Yet it is lack of pasture and not water that causes more livestock mortality during extended periods of drought.

Water is not a problem in the areas where water sources are located and j supply seems consistent. However, in areas like Hurri Hills the water supply is mainly dependent on rainfall and water is in dire shortage. Distance to water sources especially in the outskirts is the major challenge that affects sanitation, hygiene and health. More rural communities are apathetic towards upholding sanitation and hygiene of water and water resources and people seem unaware of the consequences of water pollution. A key issue of concern may not so much be water availability but water quality.

With the advent of community ownership and management, it is thought that ownership of facilities will lead to responsibility for their management. In reality, just because a community

owns a facility does not necessarily mean that it will not acquire a sense of responsibility for its management, nor does it guarantee a willingness to manage or pay for its maintenance. However, it was established that enhanced ownership renders facilities more sustainable demonstrated by the 'better' condition in which the facilities labelled as 'owned' were in as compared to those that are viewed as being owned by others. Evidently, notions of ownership influence the attitude and behaviour towards facility custodianship and management.

Recommendations

More capacity building and awareness creation is the most effective way to enlighten the community on matters concerning WASH. This will serve to enhance the communities' abilities and understanding and will allow them to improve their sanitation and hygiene. A forum for capacity building also enhances understanding of the obstacles that inhibit sustainable utilization and management of WASH facilities. With the increasing population and high water table, the ventilated improved pit (VIP) latrines and other latrines fill up very quickly. Double pit latrines can be considered permanent installations. We recommend that these results of differences in the latrines be used for the implementation of new latrines in areas that are lacking. Although the maps produced do not provide an idea of the ideal density of latrines that should be provided, they identify areas, which are lacking in comparisons to others under the assumption that the density of population per building is homogeneous.

Every latrine or toilet must have hand-washing facilities. Hygiene is an essential component of health promotion and one of the critical times for hand washing is after visiting the toilet. A latrine without a proper hand-washing facility will not serve its ultimate objective of disease prevention.

There is a need to examine the options for improving water quality in wells and permanent and drought-significant water sources. Excessive pollution renders water sources unfit for human consumption. It is also important that where a taping system exists, the water distribution schedule and household allocation should be compared to geographical data.

Creation of a sense of ownership of sanitation and hygiene structures could guarantee sustainability of facilities. Community ownership of facilities through participatory transfer of technologies is a potential means of achieving sustainability. Therefore, there is a need to create a sense of ownership of WASH facilities by the community. One method might involve collaboration with influential groups within the community such as the *Aba herega* as concerns water resources and the EMC in the case of Kalacha.

General recommendations

i. Mobility remains important for pastoral populations and their way of life, whether mobile, semi-mobile, or permanently settled. In response to variability of environmental resources, security concerns continue to restrain herd mobility, especially access to water and pasture resources, and more recent climate change threats in the dry lands. Thus, facilitating inter-group, cooperative access and sharing of natural resources (to aid security), climate change adaptation interventions, and

restocking of pack animals (especially camels because of their resistance to drought) to enable household mobility are recommended.

ii. To address vulnerability and development in the pastoral areas, there is a serious need to strike a balance between pastoral mobility and ongoing sedentarization process in order to enhance pastoral livelihoods. The provision of WASH facilities for already settled households around permanent water sources, without encouraging settlement through external interventions, is one area where more interventions and support will continue to be required.

iii. The key aspects of the pastoral system of livestock exchanges that deal with risk through reducing effects of future exposure to risk require deeper understanding of traditional culture and ways of responding to climatic changes in order to strengthen future development efforts. Improvement of household capacity to maintain livestock will boost indigenous systems of livestock sharing and is recommended in order to address sporadic risks that pastoral households face.

iv. The process of settlement of former pastoralists is not a recent phenomenon nor is it likely to slow in the years to come. With increasing settlement of the pastoralists, assessing environmental impacts and monitoring of the ecological conditions of the surrounding rangelands is an important need. It would be worthwhile to incorporate local knowledge of changes in social, economic, political and environmental conditions to generate information relevant for future policy interventions.

v. Traditional institutions and customary structures should be used as a basis for maintaining social order in the Gabra society and their role in livelihood functions need recognition and future strengthening for a settled context. Such traditional structures did not exist in a settled context as these communities were formerly pastoralists, and thus these traditional structures need support as settlements continue to grow.

vi. Response to the periodic droughts in the pastoral areas has tended to be biased towards reactive assistance and interventions. Future efforts should focus more on building the capacities of individuals and communities to cope with risk and shock factors.

vii. Challenges exist regarding how individuals and collectives in the region deal with risks. People believe risks such as droughts originate from God (*Waaq'a*) and therefore humans have no control over their occurrences or their devastating consequences. As a result minimal planning seems to be undertaken in the face of impending drought in risk-prone dry lands. This issue raises concerns regarding strategic and proactive planning about livelihood options and the need for mitigating actions ahead of projected future risks. The blending of elements of the traditional decision-making processes with modern intervention approaches to risks would represent a move in the right direction.

viii. Further investigation is needed to gain deeper understanding of the traditional early warning system and traditional risk reduction strategies of pastoral communities. This knowledge should then be used to in synergy with modern, scientific approaches to monitoring and predicting future risks.

Recommandations on WASH

ix. More capacity building and awareness creation is perhaps the most effective way to enlighten the community on matters concerning WASH, in order to enable people to improve their sanitation and hygiene A forum for capacity building also enhances

understanding of the obstacles that inhibit sustainable utilization and management of WASH facilities.

x. With the increasing population and high water table, the VIP latrines and other latrines fill up very quickly. Double pit latrines can be considered because they are more durable. Although the maps produced do not provide an idea of the ideal density of latrine that should be provided, they identify areas, which are lacking in comparison to other areas under the assumption that the density of population per building is homogeneous.

xi. Every latrine or toilet must have hand-washing facilities. Hygiene is an essential component of health promotion and one of the critical times for hand washing is after visiting the toilet. A latrine without a proper hand-washing facility will not serve its ultimate objective of disease prevention.

xii. There is need to examine the options for improving water quality in the wells and the permanent and drought-significant water sources. Excessive pollution renders the water sources unfit for human consumption. It is also important that where the tapping system exists, the water distribution schedule and household allocation should be as compared to the demographic data i.e. depending upon the population density of the different sections (ollas) of the town.

xiii. Creation of a sense of ownership could guarantee sustainability of facilities. There is need to create a sense of ownership of WASH facilities by the community, for example via collaboration with influential groups within the community such as the Abaherega and involving the community at all stages of development.

6. ANNEX :HOUSEHOLD QUESTIONNAIRE

INTERVIEWER	……..	MANYATTA	……..
LOCATION	…….	DATE	……. …
COORDINATES	N :……. E :……. .	CASE	……. …

A. RESPONDENT PERSONAL PROFILE

A.1.NAME……

A.2. SEX 1. MALE 2. FEMALE

A.3. AGE…… If no answer, year of birth……

A.4. Is the respondent head of the household ? Yes […..] No […..]

A.5.If no, explain why……

A.6. Religion of: (i) the respondent…… ; (ii) head of houshold…….

A.7. EDUCATION a) none b) primary c) secondary d) tertiary

A.8. Occupation of the respondent : ……

B. HOUSEHOLD DATA

B.1. Type of housing (Mark X in the appropriate box and precise the number) :

Marara	**Mandase**	**Mabati**
Number if exist :	Number if exist :	Number if exist :

B.2. Number of houses and material for each (*State the number of houses by type and give detail for each house) :*

House type	**Roofing**	**Wall**	**Floor**	**N° of rooms**

C. Composition of the household

C.1. Total people living in the household at the moment: Female[……] Male [……] Total [……]

C.2. Give details of all people living in the household at the moment.

Name Names persons living in HH	**Relationship** Relationship to the head of household	**Sex** Male/ Female	**Age**	**Religion**	**Marital status**

C.3. Give details of the income contribution for each member of the household per month.

Name	**Level of education**	**Main activity**	**Income in-kind /month**		**Cash income /month**
			Item	**Value**	

D. Mobility of the household

D.1. For how long have you stayed in this place: ..... in months

D.2. What specific event made your household settle in this location……..

D.3. State two immediate locations of settlement of your household and the duration of stay at each location.

Location	**Duration of stay**	**Motives of moving**

E. Assets and household income sources

E.1. Does your household own any livestock: Yes […....] No [..…..]

E.2. *Please provide the following information* ***at present***

Type	**Number**	**Main uses**	**Rank (most important 1)**
Small stock			
Cattle			
Camel			
donkey			
Chicken			
Other			

E.3. Give main reasons for ranking the different livestock types as above: ……

……..……

E.4. Give composition of animals in your herd according to the following at the moment:

Type	Total	*Alal*	*kalasime*	*dabare*	*darran*	Other
Camel						
Cattle						
Small stock						
Other						

E.5. Which animals are *fora* or home:

i. Fora ……., ……..…, …… ii. Home ……., ……, ……..…...

E.6. If *fora*, give present location of animals owned by the household:

	Small stock	Cattle	Camel	Other
Place of residence :	…….	…….	……	……
nearest centre:	…….	…….	……	……
nearest water source:	…….	…….	……	……
direction from water source:	…….	…….	……	……
distance from water source:	…….	…….	……	……

E.7. When did your household settle in the present location: Month […..……] Year […..……]

E.8. Give the last four periods when your fora animals returned home:

	Last time	**2nd last**	**3rd last**	**4th last**
Cattle	….……...…	…….....	…….	……
Camel	…...……	…….....	……...	……...
Small stock	……	…….....	……	……..……

E.9. Explain the main reason for your livestock to move to the present location:

……..……..…...……..……

……..…...……

E.11. How many livestock did you own when you settled around this place:

	Camel	Small stock	Cattle	Chicken	Donkey	Other
Number	…….	...…..……	……..	…….	……	……

E.12. Explain the reason for difference in livestock owned by your household when you settled and today? ……..……..……

……..……..……

E.13. Does your household intend to go back to mobile life in future Yes [……] No […..]

Explain your answer ……..……

E.14. Between selling livestock and slaughtering, which would you consider the most important to deal with severe events? Sale of animal [……] slaughter of animal [……]

Explain your answer: ……

……

E.15. Did your household give or receive animals in the last one year, give the following details:

	number	**estimated value**	**time of exchange**	**relation to the head**	**reason for exchange**
Give:					
Cattle	……..….	…….....	…….	……	…….
Camel	…..……	…….....	……..	……...	…….
Small stock	……	…….....	……	……..……	…….
Receive:					
Cattle	……..……	…….....	…….	……..……	…….
Camel	……	…….....	…….	……...	…….
Small stock	…….	…….....	……	……	…….

E.16. Number of animals in milk at home: camel…….. cattle…….. small stock……

E.17. Is the number of livestock owned sufficient for own food needs Yes […..] No […..]

E.18. *If no, provide number of livestock considered sufficient for meeting own household needs:*

Number	**Number (combination of:)**
Small stock alone ……	Small stock ……& cattle ……..…
Cattle alone ……	Cattle …… & camel …….
Camel alone ……	Camel …… & small stock …….

F. Sources of income

F.1. Estimate of your household total income per month: KSh. …….

F.2. Amount of the total income spent on the following per season (in KSh.):

	Fees	Food	Fuelwood	Water	Other
Dry season	……	……	……	…….	……..
Wet season	…..……	……	……	…….	……..

If expenditures are different, explain the reason: ……

F.3. What are main sources of your household income (amount/month; most important 1)

Source	**Dry season**	**ranking**	**wet season**	**ranking**
formal employment	……..……..…	…..……	……..…..…..	…….
casual labour	……	……	……..…..…..	……
animal produce	..……	...…..……	…….	….……
Sale of livestock	….……..….	…..…..…...	…….	……
Sale of farm produce	….…..…….	…..……	….…….	……
Sale of firewood	……..……..	……..……..	……..……	……
Trade,	……..……..…	….…..……	……..	……

other, specify ……... …….. …..…… …..…..……. ...…….

F.4. Review the monthly income, in cash or in-kind, your household received for the last 6/six months.

Month	Income in cash	Income in-kind per month		Main source of the Income
		Item	Value	
June 2011				
May 2011				
April 2011				
March 2011				
February 2011				
January 2011				

F.5. Does your household own any of the following items (tick as appropriate)

Radio [……], wheel barrow [……....], Solar panel [……...….], Other [….……]

F.6. Sources of food for the household: ……

F.7. What are the options for dealing with food shortage at the moment: ……

…….

G. SOCIAL SERVICES REGARDING WASH

G.1. Are water sources accessible to you in this locality ? Yes […..] No […..]

G2 Water Source used	G3 Specific name	G4 Status	G5 Distance (km)	G6 Time taken/trip	G7 Quantity/trip (litres)	G8 Quality	G9 Use of water	G10 Mode of transport

G2	G4	G8	G9	G10
a) Tap b) well c)borehole d) rock catchment e) roof catchment f)pans g) spring h)Other…	a) Public b) Private c) Own	a)salty b) fresh c)Very salty d)polluted e)Other	a) drinking b) washing c) cooking d) cleaning e) animal use f) Other	a) Back b) Donkey c) Rolling d) On head e) Other

G. 12. Do you pay for transporting water from the source ? Yes […..] No […..]
G.13. In either of these sources, is water regulated ? Yes […..] No […..]

G.14. Do you buy/ pay for water ? Yes […..] No […..]

G.15. Water source (dry season)	**G. 17. Regulated source**	**G.18. Regulation time**	**G.19. Cost of water (monthly)**	**G.20. Cash paid used for ?**	**G.21. Responsibility for fetching water**	**G.22. Number of individuals fetching water**
G.16. Water source (wet season)						
					G.21. a) Women ; b) Men	

G.24. In your opinion what would you say about the quantity of water in this locality :
Very Scarce […..] Scarce […..] Plenty […..] Very plenty […..]

G.25. When there is limited supply of water, how do you cope ? ……
……

H. Sanitation

H.1. Are there any sanitation structures accessible to you ? Yes […..] No […..]

H.2. Do you have a waste disposal facility ? Yes […..] No […..]

G.23. Uses	**drinking**	**cooking**	**Washing**	**Washing hands**	**cleaning**	**others**	**total**
Amount used (litres)/week							

H.3. Do you use soap ? Yes […..] No […..]

H.4. Sanitation structure	**H.5. Type**	**H.6. Distance (M)**	**H.7. Is structure owned ?**	**H.8. Impact of structure**	**H.9. Decomissioning method (latrine..)**	**H.10. Waste facility**	**H.11. Use of soap**	**H.12. availability of soap**
Latrine								
Bathroom								

Hand washing unit								
Other								
H.10. a) Landfill, b) Disposal drums, c) Burning d) Out of town e) other								

I. Health

I.1. Is there a health facility available in this locality ? Yes […..] No […..]

I.2. Is there a health facility that is accessible to you ? Yes […..] No […..]

I.3. Name of health facilities	**I.4.Distance (km)**	**I.5.Time taken to health facility**

I.6. List 3 diseases that are most commonly experienced by your household members :

i. in the wet season a)..... b)..... c).....

ii. in the dry season a)..... b)..... c).....

I.7. Have you had any health training in the past one year ? Yes […..] No […..]

If yes, what have you done with the knowledge you acquired?.....

I.8. List all the contaminants of water sources and rank them from the most significant to the least significant.,

Contaminant a)..... b)..... c)..... d) .....

Rank …… …….. …… ……

I.9. Do you get food relief ? Yes […..] No […..]

I.10. Type of food	**I.11. Source of relief food**	**I.12. Quantity received (kg)**	**I.13. Frequency (Duration)**

I.14. Beside relief food, do you receive any external support/assistance Yes […..] No […..]

If yes, specify the type……. Quantity…….
frequency/month……..…….. Donor……..

I.15. Do you treat water for drinking? Yes […..] No […..]

If Yes, list the methods you use. a)…… b)…….

c)…….. d)…….

I.16. Do you wash your hands after visiting the latrine? Yes […..] No […..]

I.17. Energy Source of lighting	**I.18. Bought/ collected**	**I.19. Distance to energy source (Km)**	**I.20. Time taken to energy source (Hrs)**	**I.21. Frequency/ week**	**I.22. Quantity used/week**	**I.23.Means of transport**

I.17 a) wood b) charcoal c) kerosene d) Other….
I.23. a) back b) Head c) Donkey d) Vehicle e) Other

I.24. Energy Source for cooking	**I.25. Bough/ collected**	**I.26. Dist. To collection point**	**I.27. Time taken to collection point**	**I.28. Frequency/week**	**I.29. Quantity used/week**	**I.30. Means of transport**	**I.31. Type of stove used**	**I.32. Species of trees used**

I.24. a) wood b) charcoal c) kerosene d) Other….
I.30. a) Back b) Head c) Donkey d) Vehicle e) Other
I.31. a) Earth b)3 stones c) clay jiko d) tin jiko e) paraffin stove f) Other

J. WEATHER

J.1. What would you consider as a *normal year*? ……

J.2. In your view, state main features of the following seasons as related to the rainfall:

Below-average year: …….

Average-year: ……

Above-average year: ……..……..

J.3. What would you consider as a *drought year*?……..

J.4. Give local terms used for intensity of dry seasons: ……

……

J.5. Recall four past years of worst drought in the region: year, unique feature, own coping strategies per period:

Year	**Specific feature**	**Coping strategy used**

J.6. Did your household get support from external sources during these periods, and by whom?

Time …….. By whom? ……

J.7. What is your perception of change in the weather patterns in the recent years, explain ……

……

J.8. Give three worst years in the local language and their effects of each to your

Year	household	livestock	Environment
……	……	……	……
……	……	……	……
……	……	……	……

J.9. What are the indicators of coming event (early warning) based on and action for each :

	Indicator	2-examples	anticipated action
Animal behavour	……	……	……
Environment	……	……	……
human behaviour	……	……	……

J.10. What are the indicators of the following risk factors to the household, response and specific year

Risk type	*Specific year*	*indicator*	*Household response*
rain	.., ..		.. , ..
Drought	.. , ..		,
Raid/security	,		,
fire	,		,
Other, specify	,		,

J.11. What are the main challenges faced by livestock keepers today? Explain ……...……

……

J.12. What are the main risk factors faced in the region by:

i. households……

ii. livestock keepers …….

J.13. In your own opinion, how do you see the future of livestock Keepers …….