

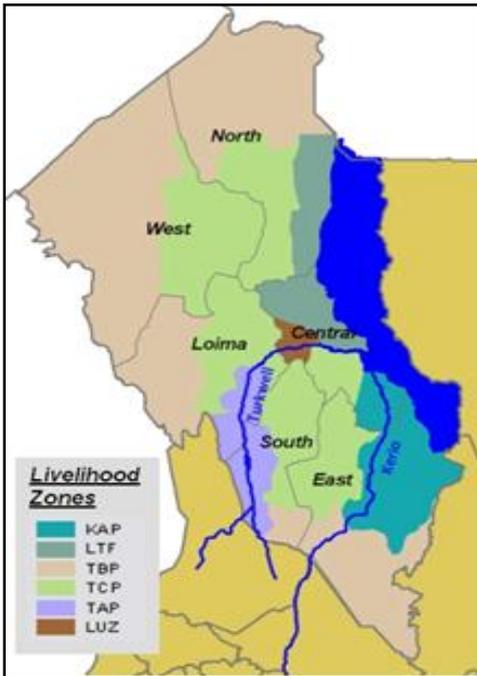
# Turkana Livelihood Baseline Profile

## Kerio Riverine Agro-Pastoral Zone

June 2012<sup>1</sup>

### Zone Description

#### Kerio Riverine Agro-Pastoral Zone (KAP)



The Kerio agro-pastoral (**KAP**) zone is a **riverine** belt in Lokori Division of Turkana East. The central feature of the zone is the Kerio River and the adjacent riverine forest. The river's water level and flow varies seasonally in conjunction with rainfall. It never fully dries up and occasionally it floods (most recently in 2010 and previously in 1997/98). South of the river rises the Loru Plateau. The hill range offers better grazing but the area borders Pokot territory and is often abandoned due to conflict. To the south-east beyond the Suguta Valley is Samburu territory which provides safer grazing options when migration is required.

Within the livelihood zone, the population is predominantly Turkana; the few other ethnicities are found mainly in Lokori town. Population density in Turkana South is low (12 people per square km).<sup>2</sup> Nonetheless, people are concentrated in the irrigation settlements along the Kerio River. These settlements include agro-pastoralists with *shambas* (farms) in the schemes as well as herders displaced by raiding. Cropping and livestock production (milk, meat, blood and grains purchased from livestock sales) are the basis of the economy but so too are the sale of bush products. All three sectors depend on the riverine resources. Notably, the newly-opened

Tullow Oil rig (Ngamia One) will likely create additional settlement (and the accompanying resource pressures) as well as bringing many needed jobs.<sup>3</sup>

Field research for this livelihood profile was undertaken in 8 villages along the Kerio River just east of Lokori town. The 8 villages fall under three irrigation schemes. The largest is Morulem which was founded in 1975 and lies just a few kilometres east of Lokori town. Further down river is the Lokubae scheme, and beyond that is the Elelea scheme which was developed in 1985/86. Five of the villages assessed -- Lodupua, Nakwasinyen, Nabwalinyang, Nakwamomwa, and Lokwii -- are located in the Morulem Scheme. 3,000 households are registered in this scheme. (In addition, there are about 40,000 people or roughly 6,000 other households who settled in the Morulem area after being displaced due to raids.) Within the Lokubae Scheme, Lokubae and Namortunga villages were included in the assessment. As in Morulem, 3,000 households are registered in this scheme. In the Elelea Scheme, 300 households are registered. For the assessment, only those households with land in the scheme were included in the survey. A separate inquiry is needed to develop a livelihood profile of the displaced pastoralists who have neither farmland nor viable herds.

Much of central Turkana is extremely dry. The cumulative rainfall total for 2011 in the Kerio Riverine zone

<sup>1</sup> Field work for this profile took place in May 2012. All of the data collected refers to the July 2011 – June 2012 reference year, an average to good year based on local standards. As long as there are no massive, rapid changes in the economy, the information in this profile will remain relevant for around 5 years (i.e. until 2017).

<sup>2</sup> According to the population census of 2009, there are 28,437 households in Turkana South and an estimated 228,379 people.

<sup>3</sup> The Tullow oil company began oil exploration at the Nakukulas / Kodekode site in Turkana East in late 2009. The oil well was declared officially open and operational in April 2012. Also in Turkana East, oil exploration has begun in Kangatit.

was 435mm, significantly higher than the long term annual mean of 264mm. The rainy season is bi-modal. The long rains fall traditionally between March-May. The short rainy season is during October-November. However, the new rainfall trend is greater variability and more extreme events. Ultimately, the outcome of the rainy seasons determines the condition of the rangelands. Cattle, camels and shoats (sheep and goats) are herded separately although the riverine forests are a key source of fodder for all livestock. Crop production also depends on the riverine eco-system. This system is fed by rainfall in the Cherigani Hills, a highland region located south of Turkana County. This highland source creates sufficient water flow both for irrigation and for forest growth, sustaining herds and farm.

*Land ownership and access:* Land in the irrigation schemes is divided into Phase I and Phase II farms. Phase II farms are located further from the river. These farms receive less water and yields are typically lower. Different types of soil also affect production potential. Soil along the river is loamy or mixed loam and sand. Sorghum does best in the mixed soils; maize output is highest in loamy soils. Depending on water flow, either Phase I and/or Phase II land is cultivated.

Land in the scheme is divided into basins. During registration, wives (and some husbands) were each given 14 basins per phase<sup>4</sup>. Protocol varied by scheme and by registration period. In some households, just one person owns land. In other households, two or more people are registered. In households with 2 wives, typically each wife owns 28 basins in total. If the husband also owns land, his output is shared with his wives when their stocks are finished. It is also kept for visitors. In theory, 28 basins average 0.5 acres (or 0.2 ha or 2,000 m<sup>2</sup>). However, the basins themselves are not uniform in size and plots vary greatly within schemes as well as between schemes.<sup>5</sup> This variation in farm size does not necessarily correlate with wealth although as a man marries more wives, the household cultivates more land. However, each wife's allocation is still 28 basins. In general, older households (including many of the better-off households) likely cultivate more land as husbands and wives were both originally registered. Irrigated land is neither rented in nor rented out (hence wealthier households cannot accumulate more land in this way). When the owner dies, land is inherited by the eldest child. It is not sub-divided nor does it revert back to the scheme management.

*Production Factors and Average Yields:* If the Kerio River irrigation schemes are a story about opening up new opportunities for livelihood diversification for pastoralists, the outcome has, not surprisingly, been highly variable. (See the verdict about irrigation at right by a consultancy firm in 1990.) Several factors affect crop outcome from year to year:

- (i) Water levels in the Kerio River: Is water flow high enough and sustained enough over the season to allow for a ratoon crop of sorghum or a second planting of maize?
- (ii) Location of the farm: Is cultivation on Phase I and/or Phase II land?
- (iii) Siltation conditions and infrastructure: Have the main canal and diversion channels as well as the rest of the irrigation infrastructure been maintained?
- (iv) Timing: Was planting, weeding and harvesting timely? (The very poor and poor households tend to weed their farms less leading to lower output.)

In 1990, after an environmental review of the district, Norconsult concluded that *"it is generally admitted by all who visit the schemes (in this case, the Turkwel schemes) that they have failed. The massive capital invested in the schemes was unsustainable. Intensive land preparation did not take into account the social and ecological cost of damaging the riverine forest which had been managed thorough traditional user rights. Nor was the tendency of the river to change course included in the design. Farmers report decreased harvests which they attribute to the change from furrow to basin irrigation."* (Norconsult, June 1990)

To be highly productive, irrigation schemes require the regular maintenance of intakes and diversion gates as well as the regular de-silting of canals and channels. Coupled with regular clearing of the prosopis bush – all this work notably done by hand – irrigated crop production is, consequently, extremely labour and capital-intensive. The rationale fuelling continued support for the schemes is now that the initial large capital

<sup>4</sup> In many cases, men were not around as they had migrated to Kitale or Eldoret in search of work.

<sup>5</sup> In Morulem, each basin typically measures 4 x 28 metres. 28 basins, therefore, may total 3,000 m<sup>2</sup> whereas in Lokwii, for example, the basins measure on average 3 x 17 m, totalling 1,500 m<sup>2</sup> for 28 basins. In Elelea, basin measurements varied widely. The largest were as big as Lokwii basins but others were very small, measuring only 5 x 10 m<sup>2</sup>.

investment has been made, it is worth the relatively small capital inputs needed to keep these schemes functional. Some years require more support than others. Although World Vision handed over management of the Morulem Scheme to the Morulem Water Users Association in 2005, after the 2010 floods destroyed much of the infrastructure, World Vision channeled assistance from FAO to rehabilitate the main intake. This work was completed in February 2011 in advance of the 2011 growing season. The government's Turkana Rehabilitation Project (TRP) has also provided substantial rehabilitation assistance in the form of food-for-assets (FFA). Since October 2009, they have provided regular, monthly FFA assistance to workers to clear bush and repair canals in the Morulem and Elelea schemes. The FFA programme will likely continue until May 2013 when all the canal structures should be fully functional and the farmland cleared. After May 2013, TRP plans to shift the focus of its interventions from rehabilitation into production and marketing.

The Kerio River agro-pastoralists principally farm staple food crops, namely sorghum and maize. Typically, in a 14 basin farm, around 6 basins will be used for sorghum and 6 basins for maize. The remaining 2 basins will be planted with cow peas and green grams. Chemical fertilisers are not used<sup>6</sup>. During the 2011 reference year, production levels were higher than they had been for some years due to relatively high river flow. To say something about average production per basin is difficult, given the varying size of the basins. However, as a general statement, in 2011, on Phase I farms, 6 basins yielded about 2-3 sacks or 100-150 kg of maize. For a few households, an additional 50 kg was harvested in the second season. 6 basins of sorghum typically yielded about 5 sacks or 250 kg with an additional ratoon harvest of 50 kg. In total, therefore, crop production yielded about 500 kg of grain per 14 basins over the full season. Some of the grain, particularly maize, was sold but coupled with fresh consumption of the grains, the 2011 output was generally sufficient to last most households about 5 months (from July to November/December). Maize stocks were finished quite quickly but as households sold less sorghum, with good management many households made the sorghum last until May 2012. Notwithstanding all the factors that result in varying outcomes for different households, we do know that the 2011 production year was good enough that the village Farmer's Stores in Morulem and Namortunga still had sacks of sorghum ready for sale in June 2012. In the Morulem store, there were 1,000 sacks of sorghum in early June awaiting sale. Most members contributed between 1-3 sacks. In Namortunga, about half of the 3,000 households registered in the Lokubae scheme brought in sorghum or maize for sale (typically a household contributed 250 kg).

Pulse outputs (cow peas and green grams) were very low in the 2011 production year. Not much land is allocated to these crops. Moreover, green grams were infected by *leaf mosaic*, resulting in extremely limited yields. Cow peas are mainly eaten fresh and their green leaves provide an important source of nutrition for about 4 months. Cash crops, such as market vegetables, are not grown due to weak market linkages, although some watermelon in Elelea was harvested in the 2011 production year.

*Livestock production:* Fresh milk is an important source of food and income for middle-income and better-off households. The Turkana drink camel, cattle and goat milk as it comes into season around June. During the peak period of production (around 6 months), camel milk yields vary from 3-5 L/day then drop to 2 L/day for a further 6 months. Cattle milk yields are around half the output of camels, averaging 1-2 L/day during a 4 month peak period (and dropping to 0.5-1 L/day in the subsequent 3 months). Goat milk yields are substantially lower. Most goats typically provide a household with 0.25 L/day over a 2-3 month period. Given the relative proximity of scheme residents to Lokori town, milk is sold by most households with livestock. During the reference year, middle-income and better-off households sold between 25-50% of the milk produced.

Livestock are valued not only as a direct source of milk and meat but also as a form of savings on the hoof. This investment herd is often sent away from the homestead to more distant rangelands. As such, the reserve stock is not quickly accessed by the household nor easily quantified. Consequently, these livestock were not included in the herd estimates. In terms of trade value, barter rates for goats were typically 1 sack of maize for 1 medium goat or a cash value of KSh 1,500 in 2011/12. Prices vary seasonally with peak prices negotiated around June (for instance, goats in Lokori market were valued at KSh 2,000-3,000 in June

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<sup>6</sup> Notably, World Vision and the MOA introduced fertilisers this year through the distribution of free inputs for the 2012 production season(s).

2012). Grain prices also rise during the off-season. In June, the price was KSh 2,500-3000/sack. In food energy terms, a 50 kg sack of grain provides about 40% of the monthly food needs of a household of 7. Hence, a poor household could expect to meet 80% of their **monthly** food energy needs through the sale of 2 goats. Given the current terms of trade, a household of 7 would need to sell 30 goats (or 4-5 cattle or 2 camels) over the year to meet 100% of their annual food energy needs.

In a relatively good year, sales and slaughter need to be managed to ensure some herd growth. Slaughter occurs mainly during festivals. Additional meat is eaten when an animal dies. Livestock sales are necessary not only to purchase beans, maize meal, sugar and oil for much of the year but also to pay for school fees in January. Overall, offtake was a little higher than is the norm for optimal herd management. This may in part be attributed to the Turkana tendency to under-estimate their total herd numbers. More likely it reflects those livestock lost through **raids**. Cattle offtake over the year was an estimated 30% (optimal cattle offtake is around 25%). For shoats, the rate was 50-60% for poor households (compared to an optimal rate of 40%) and 40% for the better-off.

*Bush Products:* Forestry products are a crucial resource in the Kerio River zone. Acacia trees in particular supply edible pods for fodder. The prosopis bush (*mathenge*) also provides edible pods but the bush is a major problem for agriculture: it grows aggressively and colonises farmland quickly. Other forest products include wild foods, construction poles, firewood and charcoal. Tree bark and doum palm leaves are also collected for use in thatching and mat making. These products are not managed formally by the government. Traditional usufruct rights to riverine trees and their products exist through the Ekwar system. The extent that these rights still operate effectively and the extent that they have been affected by the schemes was not investigated during this assessment.

## Markets

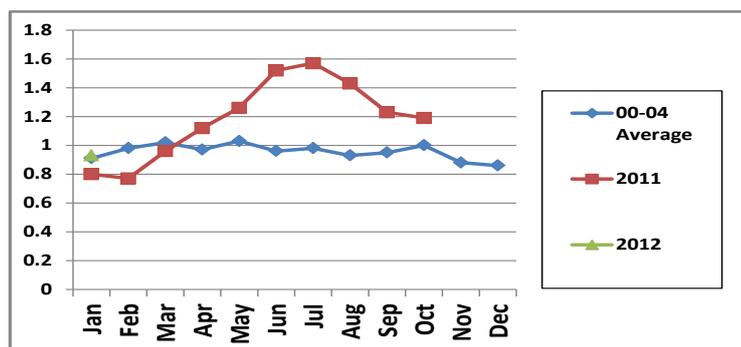
Throughout the year, a number of goods are sold and purchased yet there are few large markets in Lokori Division. On the one hand, there is no cash cropping to fuel market linkages. On the other hand, poor road infrastructure likely dampens interest in cash cropping. In June 2012, sacks of sorghum still sat in the Farmers Stores awaiting sale. Thus, most goods sold in the Kero riverine zone (including milk, sorghum, pods, thatch, and firewood) meet local demand, both rural and urban. The only products that feed markets outside of the zone are charcoal (sold mainly in Lokichar and Lodwar) and hides and skins, which are sent to a processing plant in Nakuru.

Livestock are a key income source but livestock markets are chiefly local. Demand is generated from Lokori butchers as well as from rural herders. In Lokori, a petty livestock trader buys and sells only about 10-12 shoats per month. It often takes several days to re-sell a shoat. There are roughly 20 traders operating on a similar scale in Lokori town as well as many more whose operations are smaller (i.e., sales of 5-6 shoats per month). Profits vary seasonally. The highest profits are realised in December/January when livestock prices and the volume of livestock sales peak. With an operation of this size, profits rarely go beyond 2,000 – 4,000 per month.

Local grain is also destined mainly for local markets. In 2011, a Lokori trader typically bought and sold about 150 kg of local grain. In 2010, volumes of local purchase were zero. Prior to 2009, the Morulem Scheme Association operated a store in Lodwar to take advantage of the larger urban market. When production collapsed from drought (2009) then floods (2010) the Association could no longer afford the rental costs of the store. In 2011, the only trade outside the zone was maize sold to the Diocese of Lodwar and to TRP but these agencies brought their own lorries to Morulem from Lodwar to facilitate sale and transport. Whereas locally-produced grain is not exported out of Turkana County, maize is imported into the zone. Imported maize is very seasonal. Only small amounts are available from January to May and are typically sold only in Lokori town (not in village markets). Sales peak in June/July. At that time, maize is ready for harvest in Kitale but crops are not yet mature in the Kerio riverine zone so demand for the grain is high. Volumes of trade (and hence demand) show sharp variation from year to year. In 2011/2012, a medium-size trader in Lokori purchased an estimated 20 x 90 kg sacks of maize per purchasing trip to

Kitale. This volume doubled when local harvests failed in 2009 and 2010. At that time, the Lokori trader bought 50 x 90 kg sacks per purchasing trip.

#### Cereal Meat Price Ratio 2011, Turkana County



Source: NDMA Turkana County

Prices of staple foods also have marked **seasonal** variation. In 2011, post-harvest, local maize sold for KSh 1,500 per (50 kg) sack. Sorghum sold for KSh 1,700 a sack. In June 2012, prior to the harvest, the price doubled to KSh 3,000 per 50 kg sack of maize. Beans, vegetable oil and sugar are other staple foods purchased throughout the year. The price of beans increased seasonally by 150-200% as did sugar and oil. In 2011/2012, prices of sugar and vegetable oil fluctuated several times

during the year in response to the rise and fall of fuel prices. In addition to seasonal variation, there are also marked **annual** price fluctuations. The graph above shows how the terms of trade (cereal to meat) varied by year. The data compares the price ratio of cereals to meat in 2011 to the average price ratio from 2000-2004. The spike in the ratio from April to July 2011 reflects the very high price of cereals that year. The price slowly declined and reached normal levels again in January 2012 (ALRMP II, Turkana County *Drought Monitoring Bulletin* January 2012).

Poor market infrastructure means that many goods cannot be obtained in village markets. Basic farm tools were difficult to obtain in Lokwii, Lokubae and Elelea. Household items including beads, cooking pots and shoes are also unavailable in village markets. Moreover, there are often shortages of needed drugs, both human and livestock. Whereas many households sell thatch and construction poles for building, other types of building materials are unavailable locally and to purchase construction items people must travel to Lokichar or Lodwar.

#### The Reference Year and Timeline

The baseline assessment refers to a very specific time period called the reference year. In the Kerio riverine agro-pastoral zone, the reference year covered the period from July 2011 to June 2012. This year was an average to good year. After several crisis years, in 2011 there was a reasonable harvest in the first season from Phase I basins. For a few, there was a ratoon crop after the first harvest but a harvest during the second season was rare. Insecurity from livestock raids significantly affected livelihoods during the year.

Year	Season	Rank	Event – TIMELINE
2011	short rains	4	Heavy rains. Some damage to irrigation structures. No second harvest.
	long rains	3	Good first season harvest after GoK, WV and TRP rehabilitation efforts. Ngipwarin raid led to human death. Resettlement of Lomelo and Lochakula.
2010	short rains	2	Flash floods which swept livestock.
	long rains	2	Heavy rain; good pasture but flooding, intake damage and displacement also occurred. Carmel raid (police inspector killed). IDP camp established in Lokori. Napeitom security increased.
2009	short rains	3	Water in the Kerio led to second planting. Security personnel in Lokori recruited. Tullow oil started exploration.
	long rains	1	Drought in Turkana. Livestock taken to insecure areas. Water in Kerio River but poor harvest. Napeitom massacre of Turkana youth by Pokot.
2008	short rains	2	Sorghum harvested. Post-election mediation occurred. IDPs settled in the zone.
	long rains	2	Post election violence. IDP camps formed. Poor harvest led to food aid to Morulem farmers for the first time. Migration to Samburu.
2007	short rains	3	Election in December. Kerio Valley Development Authority rehabilitated the Elelea intake.

## Seasonal Calendar

In the Kerio agro-pastoral zone, the agricultural cycle begins around January/February with soil preparation. Once the long rains start sometime in March/April, planting begins, followed by weeding. Short-cycle crops take around 3 months to mature. By July, in the Morulem schemes, families begin to eat fresh produce (both maize and sorghum). Further downriver, in the Lokubae and Elelea schemes, the agricultural cycle is generally 2 weeks later. During the period of fresh crop consumption, 'green' sorghum and maize are typically eaten 2-3 times a day. For lunch, it is eaten right off the cob, boiled or roasted, as well as cooked with beans (*githeri*) for the evening meal. The dry harvest typically occurs in August/September. In 2011, the main harvest was followed by a ratoon crop of sorghum in November/December. A few farmers also had a second crop of maize.

**Men and women** are both actively involved in productive work. Traditionally, management and ownership of livestock is through men. Men make decisions about livestock offtake, migration and medical care. In the settlements along the river, where grazing is more concentrated, women are more active in the daily care of livestock. Hence, decisions about livestock management are often discussed within the household. Agricultural labour is also shared by men and women. Only threshing is considered to be exclusively women's work. Women manage the food stores in the home and also carry out milking.

The livestock cycle is also closely linked with the rainy seasons. In March/April, with the onset of the long rains, animals go into heat. Births follow 5-6 months later (goats) or 9-10 months later (cattle) or 13-14 months later (camels). Hence, depending on the mix of livestock in the herd, fresh milk production tends to peak from May – December. Livestock sales are highest during festival periods, particularly Christmas in December, but also in January when school fees are due as well as when grain needs to be purchased in May/June. In the second half of 2011, good long rains ensured an adequate supply of forage and the healthy condition of livestock led to favourable terms of trade for those herders needing to buy grain.

Different types of wild foods come into season at various points in the year. *Esokhon*, *edome* and *edapal* are very rain dependent, flowering and maturing in June/July if rain is sufficient. *Engoli*, or doum palm, is not as rain sensitive. Around October, the fruit is eaten fresh. From December to April, when the fruit has dried, it can be harvested and ground into flour. *Erut* and *edung* are likewise less rain sensitive and their season of availability also falls in the January to March period.

Income-generating activities are pursued throughout the year although certain activities are associated with different seasons. Cash needs are highest from January to June. Sales of charcoal and firewood are an important source of income during the dry season. To earn cash when it is rainy, poorer households look to local farm employment. Work starts in January/February with bush clearing and land preparation, followed by planting with the arrival of the rains. Later, in May/June, weeding work begins, then harvesting in August/September. Outside of farm work, there are very few other local labour opportunities. Fetching water and thatching homes are examples of two types of local jobs. Lokori town offers some casual labour opportunities. However, the job situation may change significantly if Tullow Oil employs local labourers at Ngamia One. For wealthier households, cash needs are met prior to the harvest by selling milk as well as by selling livestock. This timing of sales generally benefits herders during a good year as by May/June/July, the condition of livestock is good. Milk production is also highest at this time.

The period in the year when poorer households face the most uncertainty is while crops are still maturing (April-June). The labour needed to produce food competes with the labour needed to earn cash to buy food. The most difficult months are May-June. By May, meals are often reduced. At this time, adults take sweet tea for breakfast using milk from their own livestock

We adults can go without food for a day but we cannot miss tea"  
*Nakwamomwa elder*

or else milk purchased locally. Lunch is often missed (children eat at school). Dinner consists of maize and beans (*githeri*) for the whole family. Alternatively, large stock may be bled and the blood mixed with maize meal or with the flour made from the doum palm. Depending on the timing of the rains and the resulting river levels, fresh sorghum may be ready in June, easing some of the food shortages. By July, consumption of the fresh crops is widespread and the main hungry season is over.

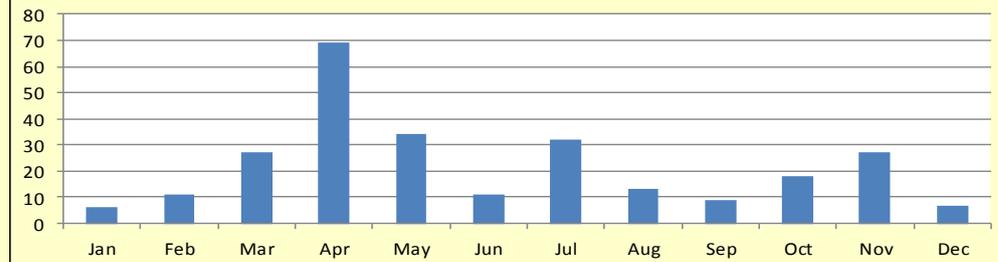
## Seasonal Calendar

	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall				[Blue bar]							[Blue bar]	
<b>WILD FOODS</b>												
Engoli / Doum Palm	[Green bar: Dry]									[Green bar: Green]		[Green bar: Dry]
Edung		[Green bar]										
Erut	[Green bar]											[Green bar]
Edapal				[Green bar]								
Edome -						[Green bar]				[Green bar]		
Esokhon						[Green bar]				[Green bar]		
Ebei		[Green bar]				[Green bar]						
<b>CROPS and LIVESTOCK</b>												
Land preparation		[Light green bar]										
planting / weeding					[Light green bar]	[Light green bar: weeding]						
sorghum & maize harvest							[Green bar: GH]	[Green bar: H]				[Yellow bar: ratoon]
cowpeas harvest					[Red bar]							
crop sales									[Red bar]			
cattle & shoats in heat					[Grey bar]							
cattle & shoat births +- milk season					[Grey bar: cattle births]			[Grey bar: camel]			[Grey bar: shoats]	
cattle & shoat sales - peak period	[Brown bar]					[Brown bar]						[Brown bar]
purchased cereals - peak period	[Dark green bar]				[Dark green bar: peak prices]							
livestock diseases - PPR peak period					[Brown bar]							
raids	[Brown bar: peak]			[Brown bar]				[Brown bar]				[Brown bar]
school fees due	[Blue bar: peak]				[Blue bar]				[Blue bar]			
hunger season			[Blue bar]									

Rainfall - Long term mean (LTM)

Kerio Riverine

Source: USGS satellite imagery



## Wealth Breakdown

To be poor is by definition to be without assets. In the agro-pastoral zone, being poor means owning no, or very few, livestock. There are also those poor without land as well. This group, including the IDPs, are mainly pastoralists who lost their herds through raiding and who subsequently settled in the schemes. In Lokwii, for instance, there are several new villages which were created after major raids in 2011. This group of households were not included in the baseline assessment as the purpose of the assessment was to assess the livelihoods of agro-pastoralists. However, within the zone as a whole, the IDPs constitute an additional “displaced poor” wealth group in that they own neither land nor livestock (or very few) and food must be secured through a number of labour-intensive, low-paying cash earning activities.

Within the agro-pastoralist population, wealth is defined principally by livestock assets. Land is not the primary determinant of wealth because, for those registered in the schemes, the land allocation was uniform (14 basins per wife in Phase I; 14 basins per wife in Phase II). Land use is not expanded through rental arrangements. Hence, savings are invested in livestock as well as, for wealthier households, in a small business.

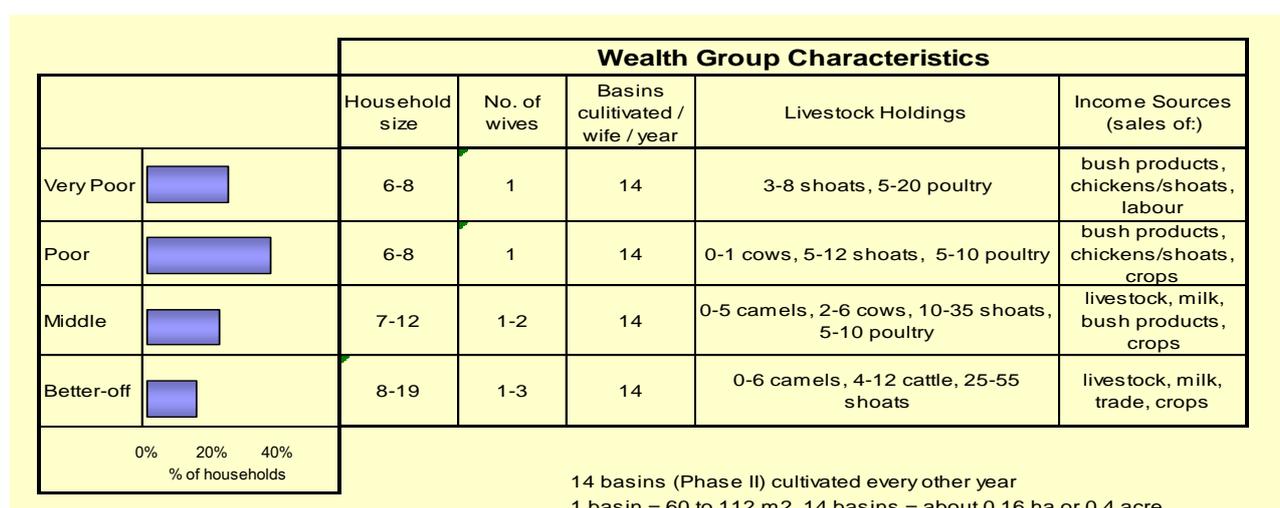
Wealth is associated with larger as well as more diverse herds comprising of both large and small stock. Middle-income and better-off households own the full range of stock: camels, cattle, sheep and goats. By contrast, poorer households own very small herds of sheep and goats, (i.e. typically less than 15 shoats). A few poor own 1 cow. Middle-income households own 1-5 cattle, 1-2 camels in addition to roughly 20-30 small stock. Those who are

20 years ago, a poor man had 3 cattle.  
Today, a poor man has none.  
*Lokwii elder*

better-off own 5-8 cattle, about 3 camels and 30-50 small stock. For pastoralists, these stock numbers are not particularly high. A report from 1995 indicated that amongst the Ariaal in Marsabit, middle-income and better-off households typically owned three times the herd sizes found in the Kerio riverine zone.<sup>7</sup> In the HEA assessment, low herd sizes may reveal a reluctance to reveal accurate livestock numbers. In addition, the reserve herd (i.e. livestock being grazed away from the homestead) were perhaps not counted. Those with more livestock typically disperse different animals into various herding units (the *adakar*) for security. Nonetheless, the most likely reason for relatively low herd sizes is due to hostile relations with the Pokot and to regular and repeated raids on Turkana herds.

Various exchange arrangements exist allowing some poor households to gain access to livestock products by caring for the livestock of other owners. These arrangements were not widespread in the reference year. Hence, the assets noted in the description below are based on ownership, not shared arrangements.

The bigger the herd, the more labour that is required to manage the herding requirements. Consequently, better-off households are also large households. A man married to 2-3 wives has sufficient labour for both cropping and herding. In some villages, it was reported that better-off households prioritise herding over formal schooling and organise their children's time around optimal livestock management. However, for those wealthier households who do prioritise education, they can afford to educate their children at secondary and tertiary levels.

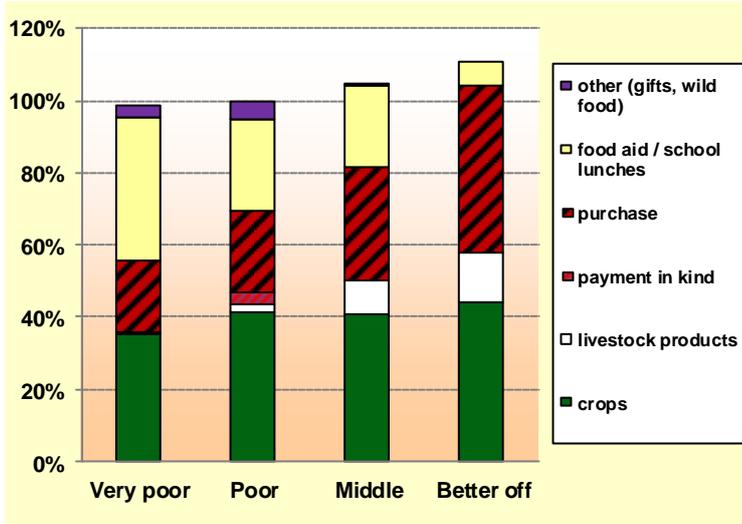


Poorer households comprise the majority of households. An estimated 38% of households in the assessed villages fall in the poor category (*ekebotonit*) and 25% in the very poor category (*ekirionit*). These households usually have 7 members living at home. Typically they comprise a husband and wife with 5 children at home (and an additional 0-2 children at boarding school). Middle-income households often comprise 2 wives and hence may reach 10-15 members although it is likely that more children (2-4) are living away from home at boarding school. Better-off households are that much larger, especially if a man has married 2-3 wives. Young children attend local day schools but older children may be living away for part of the year, either herding, or at boarding school (on average 2-6 children are attending boarding school). Middle-income households (*lokidingos*) comprised 22% of households; the better-off (*ekabaran*) were 15%.

<sup>7</sup> Specially, a middle-income household owned 15-30 cattle and/or camels as well as 20-70 shoats. Wealthy households owned hundreds of shoats as well as 50+ cattle and/or camels. (A. Nicol, 1995. *Livestock and Livelihoods*, Risk Mapping PDU, SC UK)

## Food Sources in the Reference Year (2011-2012)

The graph shows different food sources expressed as a percentage of total annual household food energy needs (2100 kcal per person per day) for each wealth group.



In 2011, a decent harvest from the long rains and a small ratoon sorghum harvest in the second season allowed most households to meet 35-45% of their annual food needs from their own crops. Not all of the harvest was consumed – grain sales post harvest were used to buy beans, sugar and oil – but with limited market demand, production is mainly for subsistence rather than for sale. The very poor produced somewhat less than other households (see graph at left). Forced to look for other work during the growing season, their farms were weeded less often and planting may also have been late.

In addition to the dry harvest, households also consumed their crops fresh from the field. In July, fresh sorghum and maize were eaten daily. In 2011, this green consumption met about 8-9% of annual food needs. In addition, in roughly half of the villages visited, households also ate a second crop of fresh sorghum in September/October. Fresh greens (cow pea leaves supplemented by some green gram leaves) were also eaten daily from May to September. They are an important food during the hungry season although the value of fresh greens is more in their nutrients than in their food energy.

Every day for a week we cut 5 cobs. We boil the maize or sorghum for dinner and eat it with kunde (green leaves). We also roast about 3 cobs at lunch. We eat it daily for a month or more although after 1-2 weeks we reduce the number of cobs we eat.  
*Nakwamomwa elder*

What is not produced on the farm must be purchased. In the reference year, relatively high levels of food aid reduced the need to buy staple food. In absence of food aid, poorer households would have purchased about 50-60 percent of their annual food needs; instead they bought 20-25 percent, while wealthier households bought 45 percent. The other difference between wealth groups is how they earn the cash to buy food. Better-off households earned cash through livestock and milk sales. By contrast, the poor earned cash to buy food principally through the sale of bush products. The **type of food** purchased also differed by wealth group. Due to the availability of food aid, in 2011/2012, even poorer households bought non-staple food, spending on average KSh 2,000-3,000 per person on beans, sugar and oil. By contrast, wealthier households spent on average KSh 5,000-6,000 per person.

The proportional importance of milk and meat (and some blood) as a food source obviously reflects herd sizes and herd access. Due to the frequency of raids, livestock were generally herded closer to the homestead. For those with cattle and camels, milk met 10-15% of their annual food needs. Milk production was roughly double the amount consumed. About 50% of the milk produced was sold in the local markets. Goat milk is drunk by all households but the quantities produced are low and are typically only drunk with tea or used to make porridge for children.

In 2011/2012, food aid contributed significantly to household food needs. Several agencies are active in the area. World Vision and AIC provided a general food distribution (GFD) to households in Lokwii and Lokubae. The ration varied depending on the food pipeline but typically met 65-75 percent of households' monthly food energy needs. In Lokori Division, their target population decreased during the year. In June 2011, 2,223 beneficiary households were targeted. This number dropped to 1,803 households from

December to February 2012 (at which point GFD stopped). The target group was those affected by recent raids as well as other low-income households still recovering from the 2010 floods and 2009 drought.

The TRP (Turkana Rehabilitation Project) was also active in the livelihood zone. Food was provided through a food-for-asset (FFA) programme. Over a period of 2.5 years, starting in October 2009, TRP have worked with local farmers to rehabilitate the Morulem and Elelea schemes. Through FFA support, farmers reclaimed land by clearing the bush and repairing canals. This rehabilitation effort resulted in an operational scheme for the 2011 production year. Households worked 12 days per month, earning a food ration that typically amounted to 61.2 kg of grain (plus oil and pulses) per month per household. TRP targeted 318 households in Morulem, 350 households in Elelea and 189 households in Nakwamomwa B.

Both the general food distribution as well as the FFA programme provided a mixed basket of food (when available) of grains, pulses, oil and CSB.<sup>8</sup> TRP provided food aid for 11 months during the reference year. The targeted number of households increased in response to the *Kenya for Kenyans* campaign. The GFD input was for 6 months overall but as beneficiary numbers declined, some households received the GFD for fewer months.

Wild foods, in season, typically provide a snack for the better-off but are a source of food for poorer households. In 2011/2012, a decent harvest coupled with food aid meant that food was generally sufficient for much of the year. However, from February to June, during the months of peak maize purchase, very poor and poor households did collect wild foods when income was too low to buy food.<sup>9</sup> Overall, wild food consumption contributed 5 percent of the annual food needs of the poor and very poor.

#### **How to quantify wild food consumption?**

Wild foods are very difficult to quantify. Earlier research indicated that 25 kg of fresh doum palm equals 4 kg of doum palm flour. In the field, responses about wild food consumption included these descriptions:

“It takes 5 hours to walk to the place where the doum palm grows. If I leave before dawn then I will get there by mid-morning. I collect about 25 kg in a big *sufuria*. I return home a couple of hours after sunset. This amount lasts us 3 days. I make a flour and mix it with blood and maize meal for dinner. In May/June, I went about 5 times in a month to collect the doum palm.”

“From February to April, we went to collect the doum palm fruit twice a week for 3 months.”

“Children collect *edome* and *esokhon* fruits along the river banks after the rains to eat for a snack.

We also crush and store the fruits to be eaten later.”

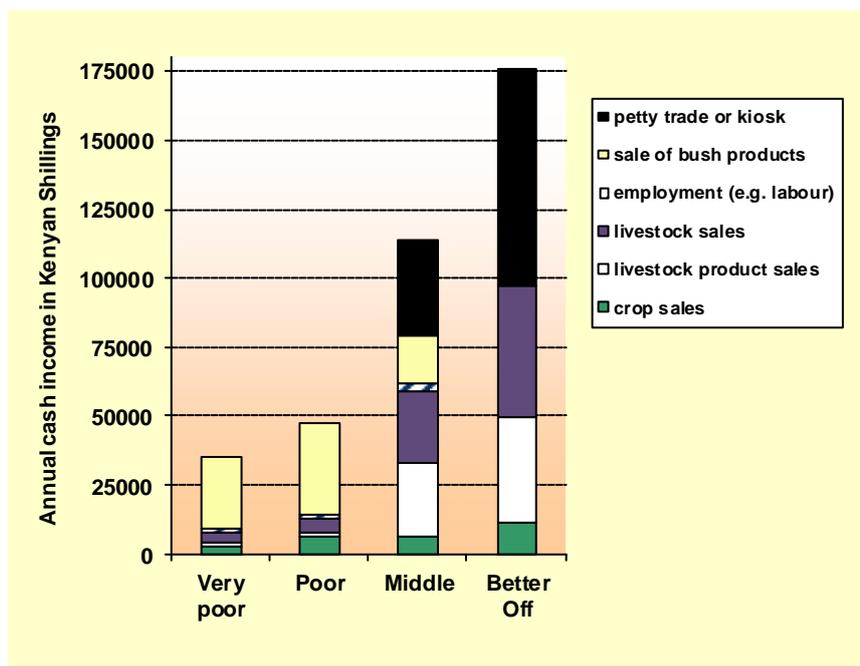
*Namortunga household representatives*

<sup>8</sup> CSB – corn soya blend – is a grain meal that is cooked as porridge. CSB provides outpatient nutritional support for underweight children.

<sup>9</sup> For instance, *erut* and *edung* seeds are eaten in February-March. With *edung*, the seeds are husked and boiled for 12 hours before they can be eaten (on their own or mixed with maize).

## Sources of Cash Income in the Reference Year (2011-2012)

The graph below shows the value of average cash income provided by different income sources during the reference year for a typical household in each wealth group.



Not only does the **amount of income** vary by wealth group but so too does the **source of income**. Middle-income and better-off households earned cash principally by selling crops, livestock and milk, as well as by running a small business. Sales of livestock and milk alone contributed 45-50 percent to the total annual income of wealthier households in the reference year. Milk sales were notably high. About 50 percent of the milk produced by camels and cows, as well as 20-30 percent of goat milk, was sold. Those buying milk were typically the settled population in Lokori town as well as in Morulem. Some poor households also bought milk, paying KSh 20 per day during the months when their goats were non-productive.

Livestock sales peak during specific times of the year: in December, to pay for Christmas expenses; in January to pay for school expenses; and in May/June to buy staple food. Selling a cow, or, in a few cases, a camel, earned about KSh 12,500/cow. This income was sufficient to purchase 250-310 kg of maize, or to pay for 3 children at boarding school and 3 children at day school. Middle-income and better-off households also earned an additional KSh 12,500-20,000 through the sale of 5-9 shoats. By contrast, poorer households sold 1-2 shoats which earned them KSh 1,500-3,000 (or enough to buy 25-50 kg maize).

Poorer households earned a little cash by selling their crops as well as by selling eggs and chickens. However, the bulk of their annual cash earnings – 70-75% – was made through the sales of bush products. The riverine forests are a critical resource in the zone. The forests provide wood to sell for firewood and charcoal; bark to sell for thatching; pods to sell for fodder; and poles to sell for construction. Charcoal was the main source of bush product income. Notably, the provision of food aid had an income effect by reducing the pressure to earn cash to buy staple grains.

Local employment is pursued by many poor households. However, the annual income earned by each household was low during the reference year. Most of the local labour was on-farm work for better-off households. The amount earned was typically calculated by basin although the KSh rate per basin depended on the labour intensity of the job. Bush clearing earned the most income for poor households: typically KSh 2,000 per person (or 50 kg of cereal if paid in food) for clearing 28 basins. The least income was earned for planting and harvesting.

### Payment Rates – Local on-farm labour

Land preparation: KSh 50 per basin  
 Bush clearing: KSh 70 per basin  
 Planting & harvesting: KSh 30 per basin  
 Weeding: KSh 50 per basin

*Lokwii household representatives*

There are some **gender differences** in sources of income. Men's income chiefly comes from livestock sales as well as from trade in livestock but also from local farm work. Women's income also comes from farm

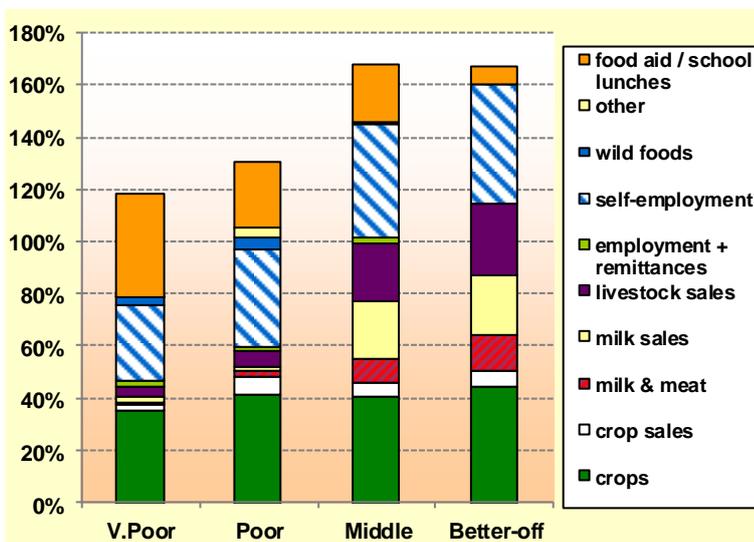
work as well as from sales of bush products and milk. However, in practise, women have rights to certain livestock and if cash is needed to purchase food, wives and husbands negotiate which of her animals to sell. Moreover, both husbands and wives engage in small businesses, depending on labour availability in the household. In a household with more than one wife, each wife manages her own income and is responsible for purchasing food and other goods that her 'small' household needs.

A number of agencies in the livelihood zone provided income support during the reference year. In Elelea and Morulem, Oxfam provided a regular cash transfer of KSh 3,000/month for 6 months to the elderly in vulnerable households through their Hunger Safety Nets Programme. Women's Finance Trust Fund provided sizeable loans to women in Lokubae. Due to VSF capacity building, women's groups in Lokubae are well-organised and linked into credit services. The GoK also runs an income support programme for youth called *Kazi ya Vijana* which will run for 4-5 years. Work support was provided in 2 phases (40 days in April 2012 and 20 days in June/July in 2011). The jobs were located in Lokori and paid KSh 300/day in 2012 (up from KSh 250/day in 2011).

The effect of food aid support and various income support measures by the government and aid agencies meant that very little labour out-migration occurred during the reference year. Another factor which had a dampening effect on labour migration is the upcoming election. People tend to stay close to home during election years when the possibility of violence creates a disincentive effect to move away.

### Total Food + Cash Income Per Person in the Reference Year (2011-2012)

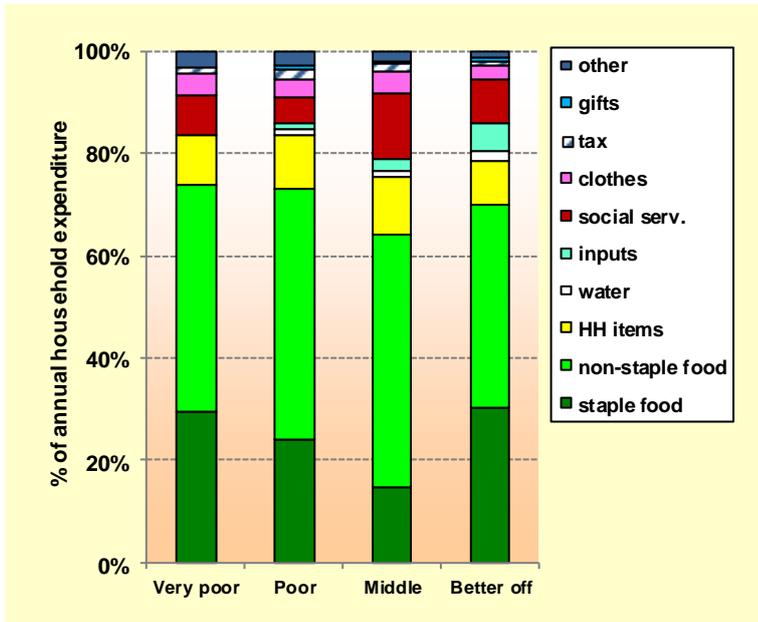
The graph provides a breakdown of total income (food plus cash) according to income source. Total income is expressed as a percentage of minimum food requirements, with cash income converted into its food equivalents based upon the amount of staple food (maize) that could be purchased, assuming that all cash from each source were used to purchase staple.



The total resources available per person from the various food and income sources can be expressed as a percentage of annual food energy requirements. The graph at left shows for each wealth group the total food energy secured in the reference year coupled with the total cash income (expressed in terms of its value in staple food). It is calculated per capita in order to judge to what extent the higher earnings earned by the 'big households' of better-off households resulted in more real income per person. The analysis shows that total food and income increased by wealth group. In large part, this was attributed to income earned from milk and livestock sales. In other words, as land access is fairly uniform across wealth groups, real wealth is held in livestock.

## Household Expenditure in the Reference Year (2011-2012)

The graph below shows the proportional importance of different types of expenditure during the reference year for a typical household in each wealth group.



During the reference year, **food aid** had a significant effect on expenditure patterns. Food aid inputs meant that there was less need to purchase staple grains and hence more money to buy other goods. Better-off households, who typically received no aid, bought more staple grains than other wealth groups. However, for those who received food aid, the money saved on buying maize was instead spent on beans, oil and sugar.

Nonetheless, even with significant food aid, in total **food (both staple and non-staple)** was still the main type of good bought during the reference year by all wealth groups (see graph at left). Food purchases

comprised roughly 65-75 percent of annual expenditures. Per capita, **non-staple food** purchases ranged from 40-48 percent of total annual expenditures. Proportionately, better-off households spent less of their annual income on non-staple foods (and more on staple grains) than other wealth groups. However, proportional spending is different from absolute spending. In terms of the **actual cash** spent on non-staple food, middle-income and better-off households spent per capita about double the amount spent by the very poor. **Sugar**, in particular, was a prioritised item.

In addition to food aid, there were other types of expenditure support in the zone. For instance, World Vision covered the cost of school fees for many poorer households. As with food aid, this education support affected expenditure patterns by reducing spending on education (and hence freeing up income for other expenditures). A small part of social service spending was on medical expenses. In focus group discussions, it was noted that sick children were taken to the local clinics but adults were typically treated with local herbs. Although dispensaries and/or clinics were found in each sample village, drugs were not necessarily available when needed. This reduced health spending.

Alongside food and school fee support, in previous years World Vision had also provided farming tools. Such tools are not often available in village markets. Hence to replace old tools, families need to travel to more distant markets. Households also received support with seeds. The National Irrigation Board and the MoA, together with World Vision, provided composite varieties to supplement local seed supplies.<sup>10</sup> In terms of other productive investments, middle-income and better-off households spent cash mainly on farm labour. All wealth groups, except the very poor, had some expenses on livestock treatment drugs. Notably, the annual PPR vaccination campaign is largely subsidised and herders do not incur expenditures for the PPR vaccination. Other diseases, such as mange, which affects camels, as well as tick-borne diseases, are treated on an individual basis to the extent a household can afford the drugs if and when they are available. Poor availability of treatment drugs limited spending to some extent. Similarly, productive investment in business was in part limited by the poor local availability of construction materials. Clothes and beads are also not available in village markets and this limited spending on those items.

<sup>10</sup> For the 2012 production year, the NIB and World Vision are providing PH4 hybrid seeds together with pesticides, fertilisers (DAP and urea) and drip pipes.

Goods and services that were more available in local markets – goods such as soap and batteries, and services such as flour mills for grinding grain and hand pumps for household water use – were purchased or paid for throughout the year.<sup>11</sup> In addition, many households paid their annual irrigation maintenance fee. The annual scheme contribution can be paid either in cash (KSh 200/household in Morulem) or in kind (10 kg sorghum or maize).

## Hazards

Agriculture	Poor rains	Disease	Pests
	Canal siltation	<i>e.g., leaf mosaic (green grams)</i>	<i>locusts, caterpillars, birds</i>
Livestock	Raids	Poor rains	Disease
			<i>PPR (shoats)</i>

Chronic hazards are those threats to production that are faced every year. Irrigated **agriculture** is affected by river flow and water levels which in turn are determined by the timing and distribution of rain in the highlands. Difficulties maintaining irrigation infrastructure

(canals and intakes) also affect production on an annual basis. In addition, the annual threat of crop pests and disease affect production outcomes. In the 2011/2012 reference year, *leaf mosaic* greatly reduced green gram yields. Other common crop pests and diseases include army worm, locusts, maize streak and stalk borer. In addition, for farmers with *shambas* close to the forests, there is the threat of elephants destroying ripening crops. Protecting crops from elephants or even from bird attacks requires labor and attention.

The three main chronic hazards facing the **livestock** sector are raids; shortage of pasture from poor rains; and livestock disease. During the reference year, pasture was sufficient. However, from September 2011, the incidence of disease was relatively high. Various diseases swept through pastoralists’ herds, including foot and mouth, PPR, TB, diarrhoea and mange. Even chickens were hit with a disease epidemic. Diseases, such as PPR, are controlled to some extent through annual vaccination campaigns conducted by the Ministry of Livestock Development. However, the campaign is restricted to areas accessible by road and is implemented only in the dry season just prior to the rains. In short, coverage is not 100 percent.

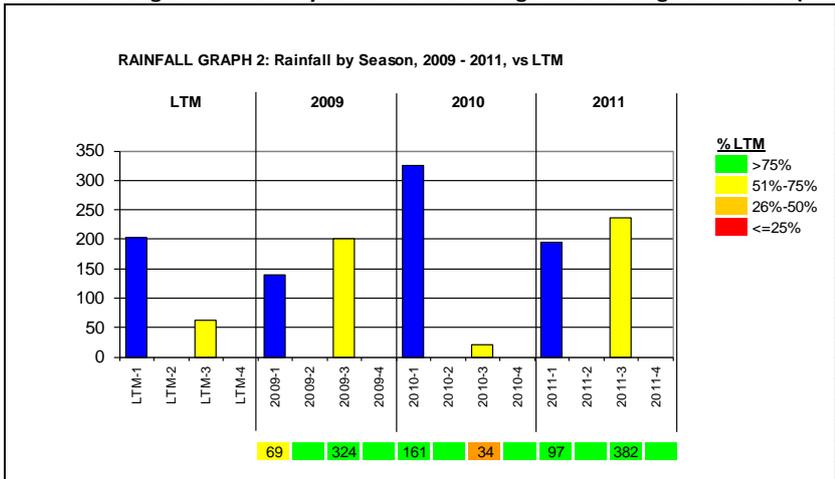
The greatest chronic threat to livestock production is **raiding**. Throughout the reference year, the incidence of raids by the Pokot was high, typically occurring 2-3 times per month. In May 2012, several hundred Pokot raided thousands of camels, cattle and shoats from the Turkana. During an interview in Namortunga, a middle-income man described his situation as follows: *‘After the Pokot raid last month, I was left with only 20 goats. Before the raid, I had 200.’*

Major raids left people dead. In 2010, 65 percent of those killed in the ASAL counties, most due to stock conflicts during the dry season, were from Turkana County (111 recorded deaths in total for the 2010 year). Incredibly, this number was significantly **lower** than the previous two years (OCHA Annual Review 2010). Of course, the Turkana also raid their neighbours causing damage, death and stock loss. Nonetheless, the incredibly high death toll in Turkana tells its own story.

Certain years are remembered for major events. The timeline on **page 5** summarises the major events from 2007-2012. These years were tumultuous, witnessing conflict, drought and floods. Looking back 5 years, the first major event was the Kenya national elections in December 2007. The following year, in 2008, poor harvests were compounded by post-election violence and displacement. Displacement from conflict continued in 2009 and 2010 – as did displacement from natural disasters. OCHA recorded that 35,130 people were displaced by floods during the first half of 2010 in Turkana County, accounting for 83 percent of the total number of people displaced in the ASAL counties (OCHA Annual Review, 2010). During that same year, the swollen Kerio River also washed away the Morulem Scheme’s main intake requiring significant resources to rebuild.

<sup>11</sup> Middle-income and better-off households typically paid KSh 200-300 per month for their water users’ fee. Very poor and poor households paid for water daily. Payment amounts were by the jerrycan (KSh 10 per jerrycan).

**2009-2011 long and short rainy season outcomes against the Long Term Mean (LTM)**



Source of Rainfall Data: USGS satellite imagery

The rainfall graph at left reinforces the timeline account. Note the poor 2009 long rains. Accumulated totals over season 1 were only 69 percent of the LTM. (In the graph, the 2009 blue bar is much lower than the LTM – long term mean -- blue bar.) This was followed by floods in late 2009. That season, accumulated totals were 324 percent of the LTM. (Compare the 2009 and LTM yellow bars.) Subsequently, there was extremely heavy rain in April 2010 (note the 2010 blue bar). Accumulated totals for season 1 (2010) were 161 percent of the LTM.

**Response Strategies**

Poorer Households	Wealthier Households
Reduce expenditures - <i>clothes, tobacco, local brew</i>	Reduce expenditures - <i>clothes, farm labour, tobacco, local brew</i>
Increase sales of bush products - <i>double charcoal and firewood production; will demand expand too?</i>	Switch expenditures - <i>switch from buying rice and wheat flour to sorghum or maize</i>
Sell 1-2 shoats	Sell 15+ shoats
Increase collection of wild foods - <i>daily collection of wild foods (particularly engoli or doum palm fruit) from October until the supply runs out</i>	Barter - <i>barter cattle or camels for some shoats plus grain</i>
More household members look for casual work	Sell charcoal
All children sent to school to benefit from school lunches	Collect wild foods

In response to these events, agencies provided aid to affected people. The GoK, World Vision International (WVI) and AIC all provided food aid. TRP also contributed to scheme rehabilitation through its food-for-assets programme. The NIB, MoA, WVI and FAO furthermore supported the rehabilitation work through cash funding. VSF assisted through livestock off-take. In 2011, Oxfam began cash transfers. These efforts, coupled with average-to-good rainfall conditions in 2011, resulted in a far better production outcome than the previous years.

Households also responded to the disastrous events of 2008, 2009 and 2010 with their own ways of coping (see box at left). The first response is typically to reduce expenditures; the next response is to expand income to cover production shortfalls. Another response is to eat less although as the high rates of malnutrition during crises attest, this is clearly a last option reflecting significant stress. In this sense, not all coping strategies are equally effective. The goal is to balance survival with livelihood protection. Households

may choose to go a little hungry to protect a core herd (and to avoid selling more stock than necessary) but this strategy only works early in a crisis when livestock are still in fairly good condition. Typically, in a drought event, wealthier households split the herd with a core herd taken to distant rangelands. Poor households may not have the network or labour to adopt this herding strategy. Some livestock sales are necessary both to fund the purchase of essential grain as well as to reduce stress on the remaining range resources. However, when the need (or pressure) to sell peaks, livestock conditions are often at their worst and the resulting poor terms of trade undermine the coping strategy. During flood events when only crop production is affected by the shock, livestock sales are an effective coping strategy.

## Key Parameters for Monitoring

The key parameters for a livelihood zone are the most important variables to monitor changes in food security. Changes in these variables are likely to have significant effects on food security within the livelihood zone.

Item	Key Parameter – Quantity	Key Parameter – Price
Livestock production	<ul style="list-style-type: none"> <li>Camels' milk production</li> <li>Cows' milk production</li> <li>Cattle sales</li> <li>Shoat sales</li> </ul>	<ul style="list-style-type: none"> <li>Camel &amp; cow milk prices</li> <li>Cattle prices</li> <li>Shoat prices</li> </ul>
Crop production	<ul style="list-style-type: none"> <li>Maize &amp; sorghum production (first season in particular)</li> </ul>	<ul style="list-style-type: none"> <li>Maize, sorghum and bean prices</li> </ul>
Other food and cash income	<ul style="list-style-type: none"> <li>Wild food collection</li> <li>Charcoal sales</li> <li>Construction pole sales</li> </ul>	<ul style="list-style-type: none"> <li>Wild food prices</li> <li>Charcoal prices</li> <li>Construction pole prices</li> </ul>

It is also important to monitor the prices of key items on the expenditure side, including maize prices.

## Programme Implications

**Roads and market infrastructure.** The Kerio Riverine agro-pastoralists have goods to sell but the current poor state of road infrastructure dampens sales rather than promotes it. In June 2012, many sacks of sorghum remained in the Morulem and Namortunga Farmers' Stores. Farmers in the Morulem scheme had contributed 1,000 sacks in total after the 2011 harvest, most of which still awaited sale. Similarly, of the 3,000 households registered in the Lokubae scheme, about half brought in an estimated 250 kg of maize and/or sorghum for sale. However, no large-scale traders came to the scheme to buy sorghum. The chief disincentive for traders is poor road conditions. Transport for farmers to deliver their grain to Lodwar is another constraint. With the rehabilitation of the scheme, market integration is important. TRP is considering having a lorry available for rent by scheme farmers as part of its proposed support to cash crop production on 600 acres of land that will be reclaimed under a Phase III development plan in Morulem. The proposed cash crop scheme will include vegetable production (kale, onions, tomatoes, spinach, and cow peas) as well as various fruit trees. Another market opportunity that may soon open up is the Ngamia One rig (owned by Tullow Oil) where workers employed at the site may provide a ready market for produce grown in the Kerio Riverine zone. Support to farmers on the scheme to take advantage of this opportunity would be a sound livelihood investment. Improved road and market infrastructure will also facilitate livestock marketing to meet external urban demand. Currently, livestock marketing principally revolves around local purchase and sale. The potential for higher offtake depends both on higher demand as well as the greater availability of goods and services in village markets so as to spend income.

**Prosopis bush control.** Since 2010, there has been an enormous effort to rehabilitate the Morulem, Lokubae and Elelea schemes and to restore these schemes to full functioning order. These efforts were reflected in a successful production year in 2011. However, irrigation schemes require a fairly high degree of constant maintenance work, such as de-silting canals and repairing intakes or diversion gates. In addition, the prosopis bush must be regularly cleared from farm land. Most of this work should be undertaken by the farmers themselves as a necessary investment in their livelihoods. However, in years where some food aid (or cash transfer) support is required – i.e., to IDPs or to pastoralists migrating to the schemes to recover from livestock raids – paying workers to reclaim land through clearing the bush is a sound investment in local agriculture. The goal must be to integrate this income support with a more comprehensive development (or security) plan that helps pastoralists to re-stock and to shift out of settlements as soon as possible.

**Land title.** One initiative worth exploring is the transfer of land title to the schemes' farmers. The initiative may be one of simple logistics (the land title office is in Kitale) but it may also involve other types of administrative or legal support. One advantage of transferring land title is that farmers can use it as

collateral to secure loans for small businesses. This advantage would mainly benefit middle-income and better-off households but nonetheless it would be one way to encourage further livelihood diversification in the zone.

**Fertilisers.** In an effort to increase yields in the Kerio River Schemes, for the 2012 production year, the National Irrigation Board distributed fertilisers (DAP and urea). This new initiative should be viewed with caution. First is the issue of cost. While an argument could be made that increased maize yields will lead to higher income which in turn means that households will be able to afford to pay for fertiliser in future years, incomes will only rise with better market access. Moreover, investments in fertilisers are a high cost risk in an environment where production is variable and few insurance mechanisms exist. A second concern is the run-off or seepage of fertilisers into the river and other water supplies and the impact on the health of both humans and livestock.

**Water utilisation techniques.** Water levels and water flow in the Kerio River are often too low to support a second planting of maize or are too low to reach all of the basins. There are ways to improve the utilisation of water and an investigation into the cost-benefits of providing access to affordable drip irrigation should be encouraged.

**Fodder protection and promotion.** The riverine environment offers a rich resource for animal fodder (both tree pods and grain stalks). Any new land opened up in the schemes, or other farm intensification initiatives, must not undermine these important forestry resources. Support to traditional systems of tree resource management should be linked to any continued work in the schemes.

**Veterinary care.** The improved availability of, and accessibility to, mobile veterinary care and treatment drugs should continue to be an important service priority in the zone.

**Security.** Pastoralists and agro-pastoralists alike have suffered huge livestock losses as a result of livestock raids. Insecurity has not only destroyed the livelihood of many pastoralists but it has also resulted in more settlement along the Kerio River and more pressure on the riverine resources. The GoK has responded with a number of measures aimed to improve the situation. Ultimately, the responsibility for security rests with the government but support to Turkana elders in any initiative to promote peace and justice should be a priority.