

ANNEX I. RESOURCE AND WILDLIFE DISTRIBUTION SKETCH MAPS

MUMBWA GMA LUKANDA

NT

CHONA
PLAIN

KANENA
ROAD

WILDLIFE

OLD MONEFU ROAD

SHOP

SCHOOL

TIMBER

FIREWOOD

KNP

HILLS

FIELDS

PUMP

HAMBA
HILL

GRASS

KAYALE
PLAIN

CATTLE

REEDS

REEDS

SEASONAL
FISHING

LUKANDA STREAM

FISH POND

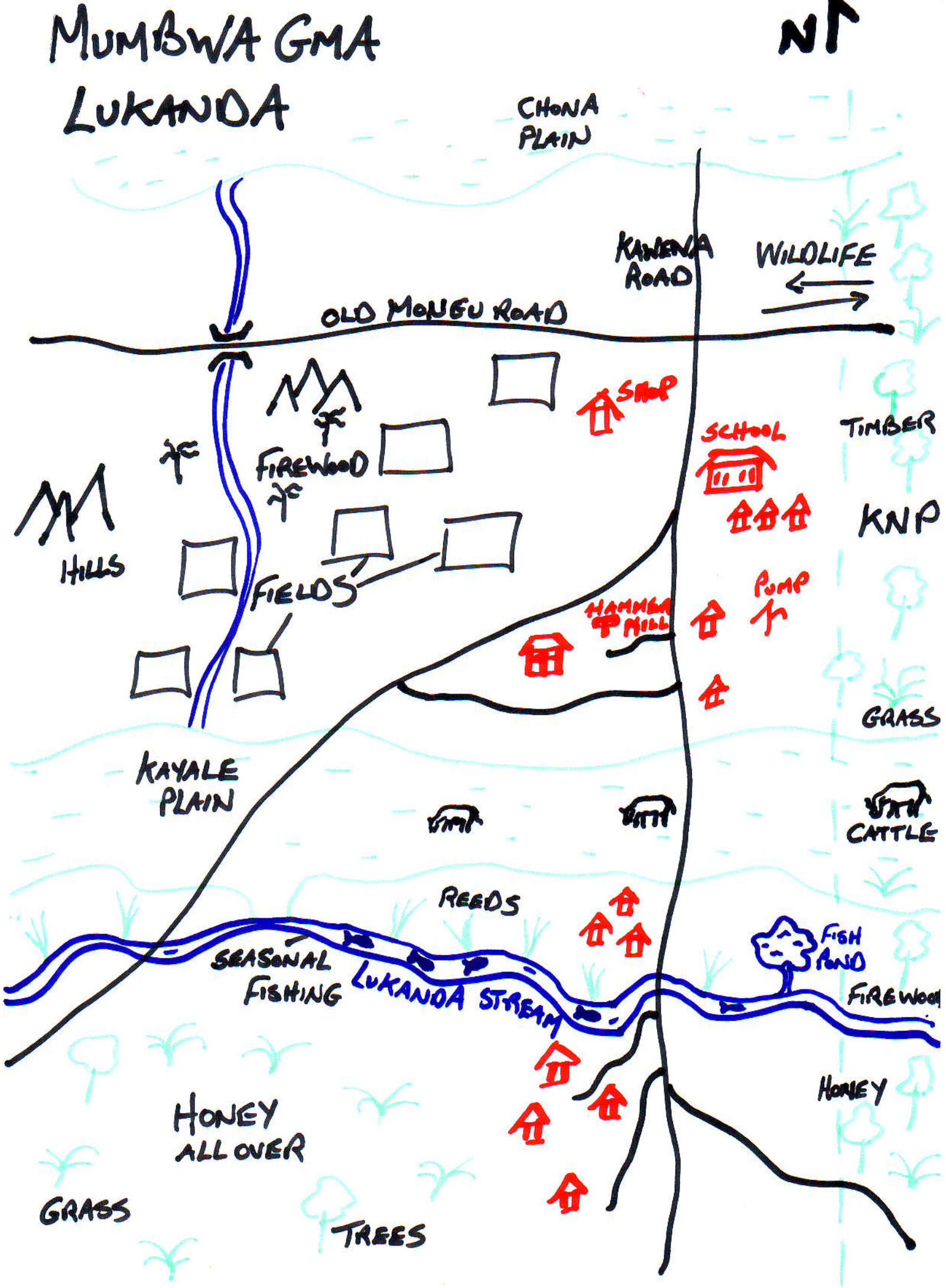
FIREWOOD

HONEY
ALL OVER

HONEY

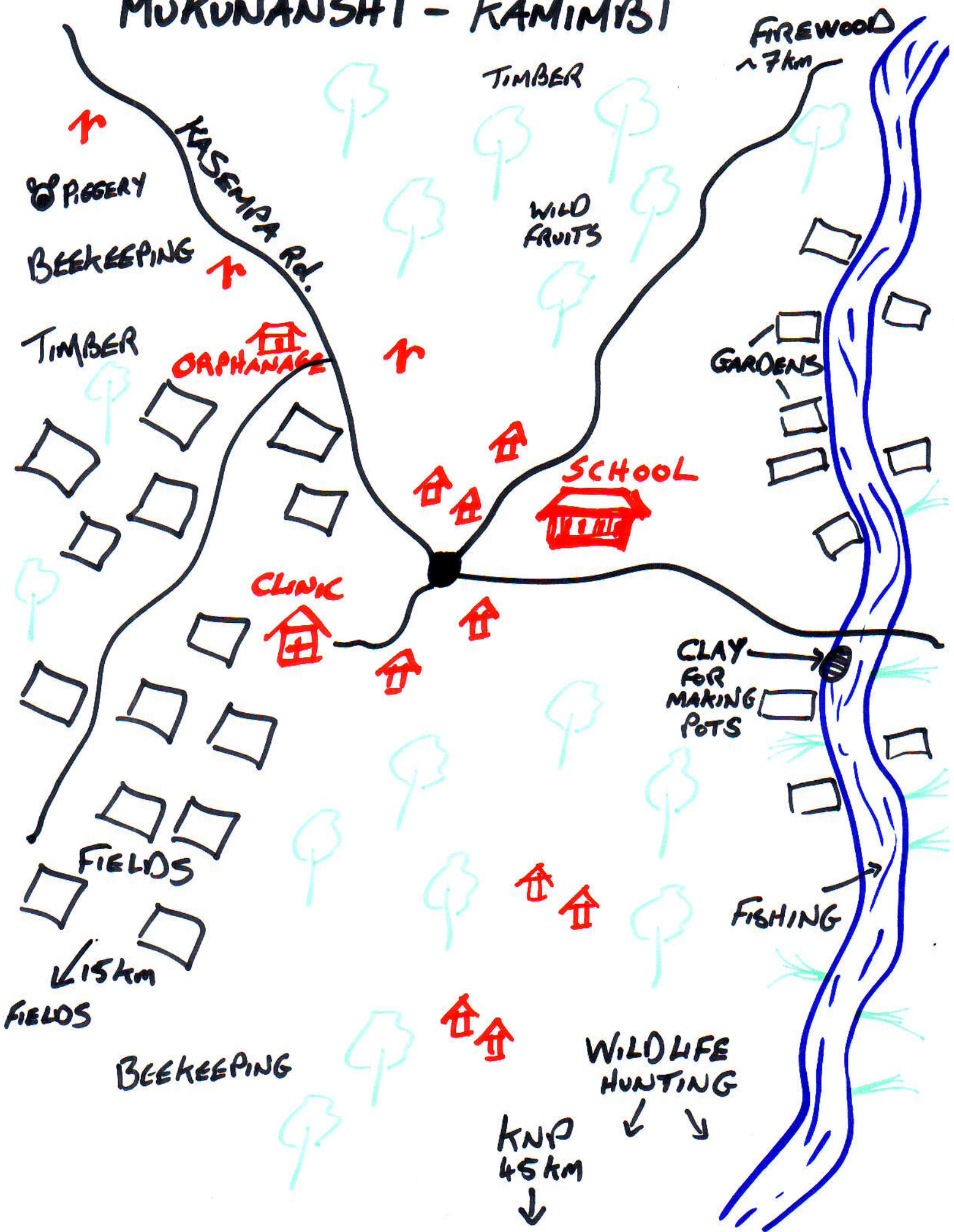
GRASS

TREES



KASONSO BUSANGA GMA MUKUNANSHI - KAMIMBI

North Arrow (N) pointing up



FIREWOOD ~ 7km

TIMBER

WILD FRUITS

ORPHANAGE

SCHOOL

CLINIC

CLAY FOR MAKING POTS

FISHING

WILDLIFE HUNTING

KNP 45km

BEEKEEPING

FIELDS

15km

FIELDS

ROBBERY

BEEKEEPING

TIMBER

GARDENS

MUFUNTA GMA

KAHARE - LALAFUTA

FRUITS

LONG LOMBE ROAD

FIELDS

GARDENS

KAMAKOKWE STREAM
THATCHING GRASS

SEASONAL FISHING

ROAD

WELLS

WILD FRUITS

VILLAGES

HONEY

ROAD

FIELDS

VILLAGES

HAMMER

MILL

SCHOOL

FIELDS

THATCHING GRASS ROAD

TIMBER

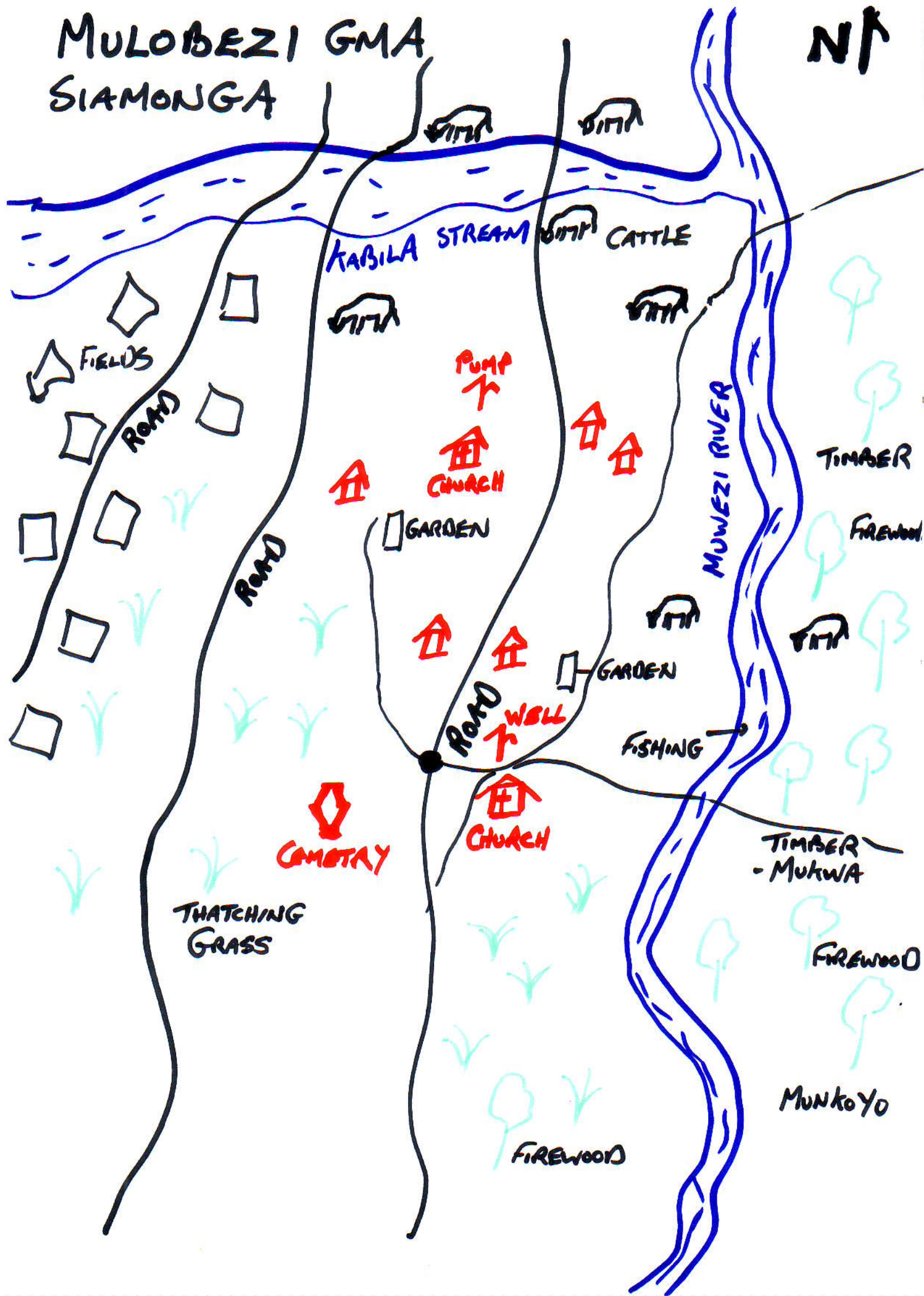
CHARCOAL

TOBACCO FARMS

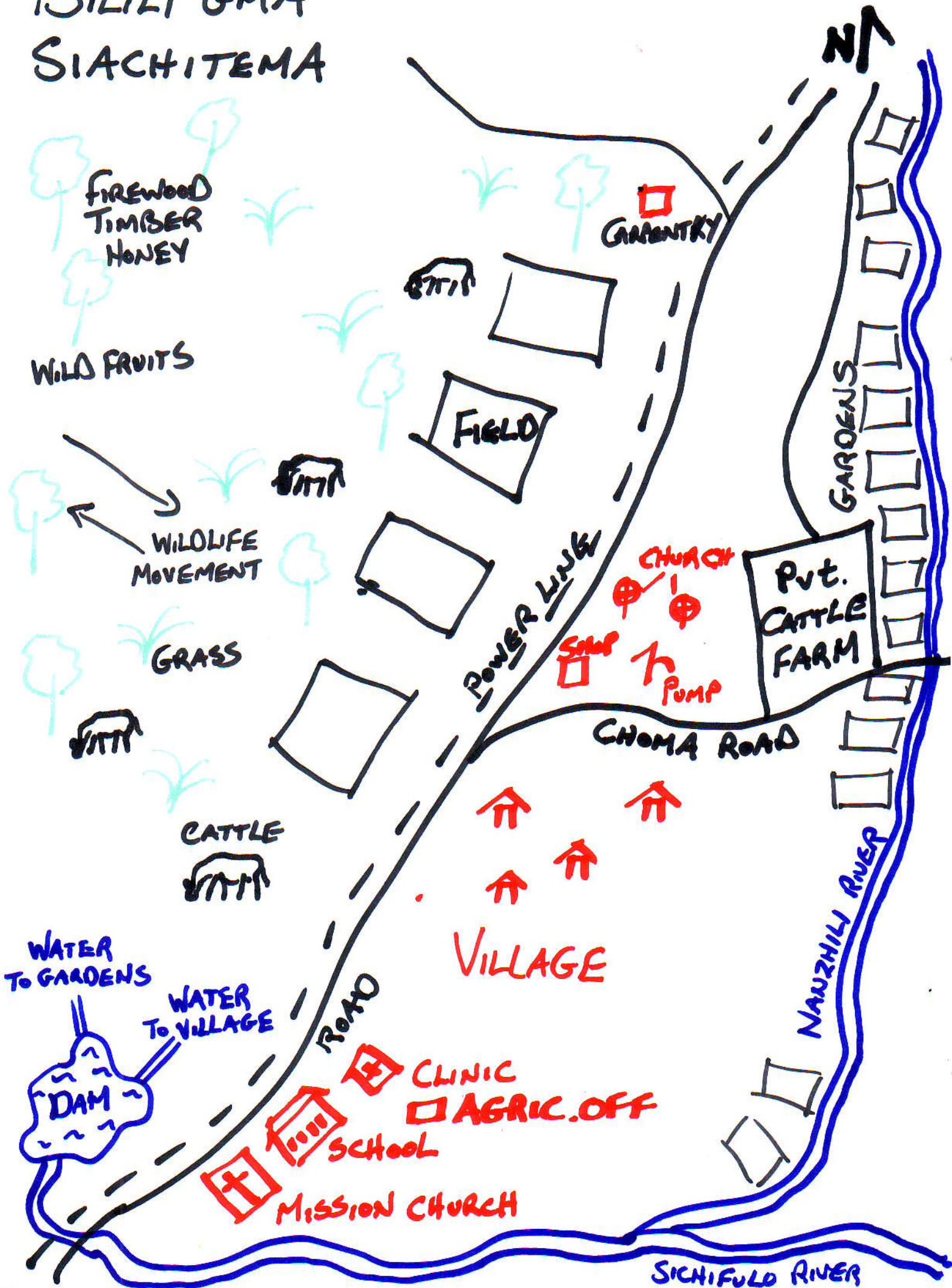
↑↑

MULOBEZI GMA SIAMONGA

NT



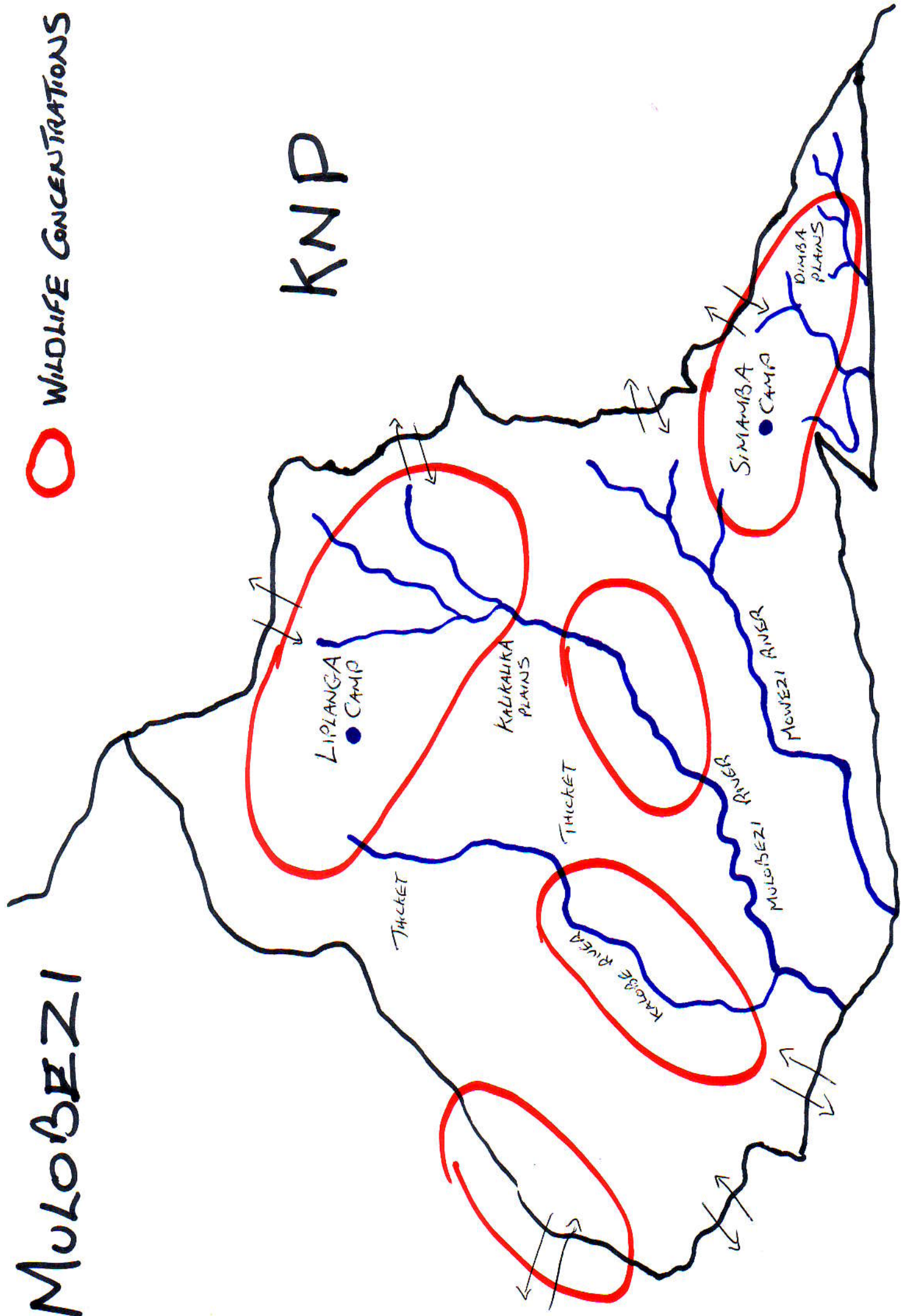
BILILI GMA SIACHITEMA



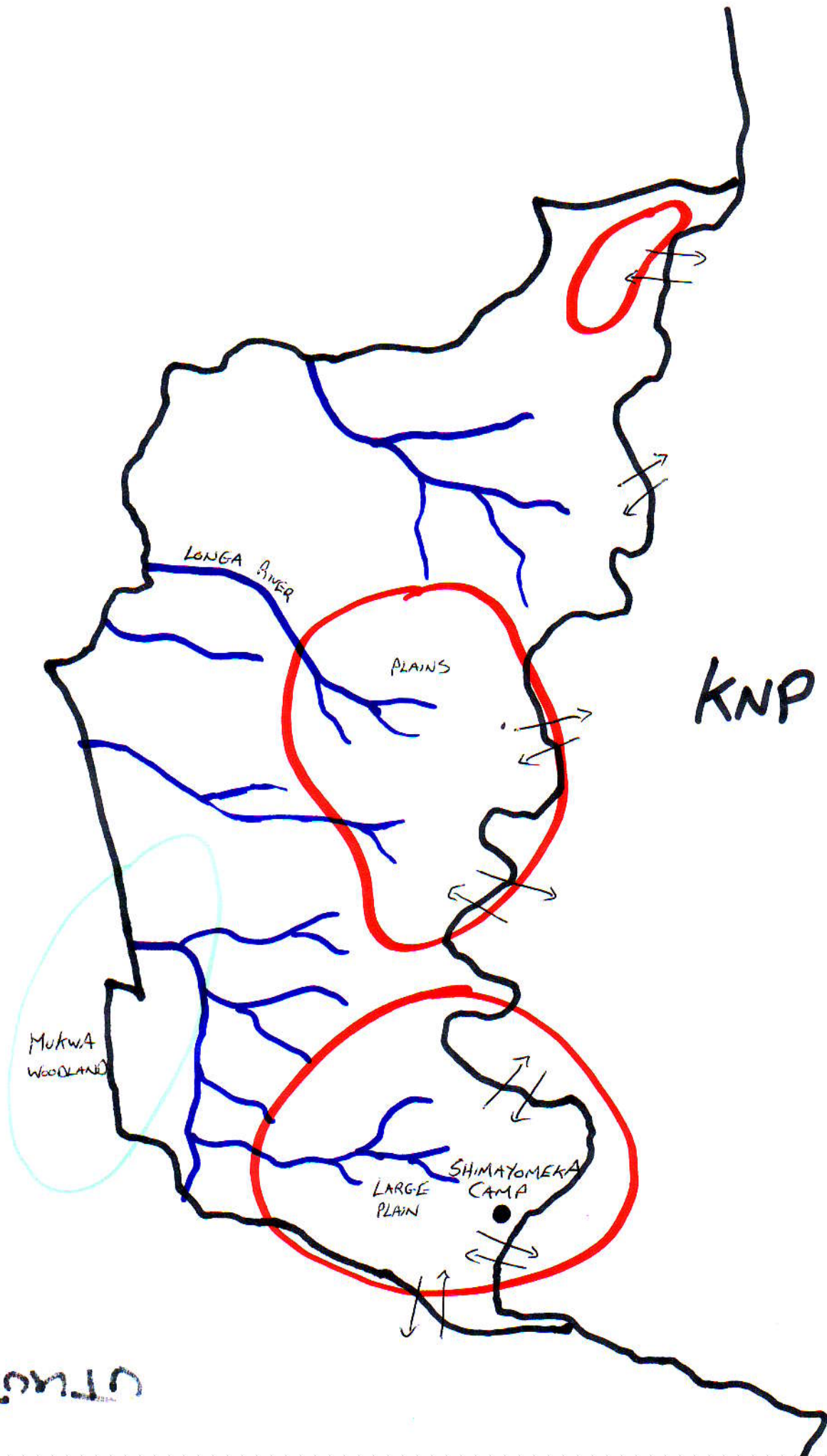
MULOBEZI

○ WILDLIFE CONCENTRATIONS

KNP



MUFUNTA



WILSON

ANNEX J. HOUSEHOLD CASE STUDIES

KNP GMA Household Level Case Study A
Mumbwa GMA, Kabulwebulwe CRB Catchment Area, Lukanda Village, 2 July 2011
Household of John and Catherine (names have been changed) – Cotton and Charcoal Production

John (age 40) and Catherine (age 39) of the Kabulwebulwe Catchment area were married in 1996. They now have six children, including two twin daughters (14), a third daughter (12), and three sons (ages 10, 7 and 6). All of the children are attending school except for the youngest boy.

The family lives in the Lukanda Community about 500m behind the Lukanda Basic School. Lukanda is the home village of John’s family. Their family compound is neat and tidy and consists of three mud and thatched huts, a small grain storage container, two mango and two orange trees, plus several shade trees. We met under one shade tree sitting on small wooden chairs and an upturned mortar.

This middle-aged couple form a cohesive pair providing for their family through diverse livelihood activities, including, in order of importance: cotton production and sales, charcoal burning, vegetable gardening, collection and sales of *munkoyo* roots (to make a traditional non-alcoholic drink), and buying and reselling dried fish. During times of good harvest they also sell surplus maize, ground nuts, beans, and cow peas. Otherwise they keep these for home consumption. See Chart below for estimated percentages of each activity’s contribution to household income.

Cotton	Charcoal	Vegetables	<i>Munkoyo</i> Roots	Dried Fish
.61	.16	.08	.08	.05

The couple share a one hectare field for cotton. In a typical year this can produce nine bags of cotton. Each weighing from 100 to 130kgs. They sell these bags to Dunavant (based in Mumbwa), which comes to Lukanda to buy the cotton. The 2011 price is K3,200/kg. The price is based on the going-rate for the year and does not depend on the quality of cotton produced. The burlap bags are provided by Dunavant for free, while each farmer must buy the necessary seeds and insecticide. Insecticide concentrate costs K105,000/liter, while cotton seeds cost K35,000 per 10kg. This year the couple estimates they will produce nine bags of cotton containing from 900kg to 1,170kg. They should be able to sell this amount for about K2.9 to 3.7 million. After expenses of K135,000, they hope to earn almost K3.6 million from cotton production in 2011.

Charcoal production is conducted by this family in the traditional manner, which involves lining up the large logs in a row, covering them with dirt/sand, and setting them on fire. They prepare the charcoal near their cotton field. John cuts the trees himself, including *mutondo* (*Julbernardia paniculata*), which produces the best charcoal, but also *musamba* (yet to be identified). They have been producing charcoal since 2004, and sell mainly to the teachers in Lukanda at K10,000 per 50kg sack. Sometimes they transport the charcoal to Lusaka where it can fetch prices up to K60,000/50kg. Both the husband and wife work together to produce and sell charcoal during the rainy season (November to March), as this is when the prices for charcoal are at the highest per year. Charcoal is mainly sold during March and April – the ‘lean’ or ‘starvation’ period when food crops have not yet been harvested and the previous season’s stores are running low. Other than their own labor and the price of an axe, the main expense involved in charcoal production is the cost of travelling to Lusaka to sell. They travel once or twice to Lusaka per rainy season to sell charcoal. A private transport company will charge per container being transported (K18,000/sack of charcoal x 15 sacks per trip = K270,000). On the trip out, the person traveling

is not charged, while on the trip home, transport costs K40,000 per person. John said he takes this trip, while Catherine remains at home to take care of the children and the fields and gardens. The couple said they typically earn about K1 million during each five-month rainy period from charcoal sales.

Vegetable gardening is this family's third most important livelihood activity. They grow mainly rape and tomatoes, but also sometimes cabbages and onions in a one lima size garden (one lima is equally to 1/8 hectare; four lima to one acre and eight lima to one hectare). Since 1989, they have been growing and selling vegetables throughout the year, keeping only some produce for home consumption. People from the community come to their garden to buy directly from the couple. They both work on this activity but Catherine said she typically works in the garden for about an hour each day. It takes her about one hour to walk to the garden from her home. Inputs per year include the seeds which they buy at Mumbwa, spending about K60,000/year, and chemical fertilizer, costing about K25,000/liter/year. They estimate that they earn about K500,000 per year from selling their vegetables.

The fourth best income earner is the sale of *munkoya* (*Rhynchosia* spp.) roots. They both go into the bush to dig and cut these roots, estimating that they collect and sell about 200 bundles per year. One bundle – about 30 cm in length and 10cm in diameter (see photo) – can sell for about K3,000. They typically collect and sell these roots only one month per year. One of them travels to Lusaka to sell these roots once per year, and they estimate they can earn about K500,000 during this one-month period.

Their fifth livelihood activity consists of John traveling to Kafue Flats in Namwala GMA during the winter months to buy dried fish from the fishermen there, including bream and barbell. He travels from home to Kafue Flats on his bicycle, which is about 200km, noting that it takes him about one and a half days to cover this distance. He typically pays K60,000 for one container of dried fish (about 60cm by 30cm by 15cm). He usually brings back home two containers of dried fish to sell in the Lukanda community. In Lukanda he can sell three dried fish for K5,000. If selling in Mumbwa, he said three fish will fetch K10,000. During the winter period (May to August), the family can earn about K300,000 from these fish sales.

Household assets include: two hoes (K15,000 each), two bicycles (which were given to them by World Vision; valued at K400,000 each), one axe (K30,000), mortar and pestle, two wooden chairs, one wooden stool, one metal container, one plastic bucket, and some other household furniture. They also own nine goats, which they use to produce more goats for selling (K80,000 to K90,000 per goat). The family owns no cattle/oxen, and they plough their fields and garden by hand.

In terms of expenditures, despite the fact that the family grows much of its own food, the cost of feeding the family is the main expense. Basic food expenditure comes to about K100,000 per month or K1.2 million per year. This includes such items as cooking oil (K9,000), sugar (K5,000), bread (K3,000), rice (K3,000), and salt (K1,000).

At almost K1 million per year, the family's second main expense each year is to cover the cost of sending five of their children to school. All of the school-going children attend Lukanda Basic School which covers Grades 1-9. Four of the children are in the basic grades, paying K5,000 per term (3 terms x K5,000 x 4 children = K60,000), while one of the twins is already in Lower Secondary, which costs K70,000/term (for three terms, K210,000). This means the family pays about K270,000 per year in school fees. Paying for school uniforms is another significant cost for the family, as follows:

Item	Price	Number	Total Cost (K)
Uniform	40,000	5	200,000
Shoes	50,000	5	250,000
Socks	3,500	5	17,500
Book bag	20,000	5	100,000
Books (K1,000/book; 10 books per child)	10,000	5	50,000
TOTAL			K617,500

The couple estimate they spend about K200,000 per year on other clothing items for themselves and their children. For example, tops cost K15,000, skirts cost K20,000, trousers K10,000, and jerseys K15,000.

Adding up annual income and expenditures creates this picture:

Total Income = K5.9 million

Expenses (not counting opportunity cost of own labour) =

K610,000 for income producing expenses

School fees and uniforms = K2 million

Food and clothes = K1.4 million

Total expenses = K4 million

Profit = K1.9 million

In terms of strategies to meet the family's needs, this couple has chosen to work closely together in all areas of production and to diversify their activities, so that they are not dependent on only one or two activities. During the time of the year when the new crop is still in the field and the stocks are running low from the previous harvest, they cope by spending more time on charcoal burning and selling to ensure that some income is obtained to buy food. They have experienced some problems with wildlife; for example, about three times in the last ten years elephants have damaged their crops. More often than that, they have had problems with wild pigs uprooting and eating the young maize plants. Their strategy to meet this challenge is to guard the fields at night, by building a fire in/near the field and sleeping there, watching out for the wild pigs.

KNP GMA Household Level Case B

Mumbwa GMA, Kabulwebulwe CRB Catchment Area: Lukanga Village, 2 July

Household of Mary (name has been changed) – Maize, Cotton and Cattle

Mary is a 43 year-old single mother, separated from a polygamous marriage.

She has a son of 22 years, who is looking for work in Lusaka. His girlfriend has a baby girl; they have no plans to marry. She also looks after her late younger sisters' two orphaned children, both girls (10 & 11). She thinks she and her husband died of HIV. She lives in her late parent's home, where she looked after her brother another younger sister until the married and left home.

Mary grows Maize, Cotton, Ground nuts, Beans, Pumpkins, sweet potatoes and vegetables (rape, tomatoes, and cabbage). She grows her crops in a field near her house, but only during the rainy season, as she has to walk about 3 km to get water. She doesn't do any occasional work for income.

She lives about 500m-1km from the KNP boundary and natural resources from the park are important to the family's livelihood. She collects firewood, wild fruits, poles, and sometimes makes charcoal in the park. She used to have beehives made of bark but they got burnt in the fires. She was given two wooded beehives by DANIDA, but they also got burnt. She cannot make her own, but she would like to get some Kenyan Top-Bar hives to use.

See Chart below for estimated percentages of each activity's contribution to household income.

Maize	Cotton	Cattle	Ground Nuts	Natural resources	Sweet Potatoes	Garden
42%	31%	12%	6%	5%	3%	1%

On further probing, she said it was difficult to place her cattle as they didn't sell any and no longer hired them out, but they were important as they are also used for plowing.

Mary has 2-3 hectares of where she grows Maize. This is her staple food. She uses about 50kg of seed, which typically results in 90-100 bags of maize, depending on the rains. This year she had malaria during weeding season, so the crop was not good. She said some people get 150-200 bags from a field of similar size.

Mary does the plowing and planting with help from one other person. This takes about 5-8 days, between around the 15th and 22nd of December. They work from around from 5.30am to 11am each day and sometimes in afternoons. She uses about 20bags of fertilizer for her fields. The Government only gives her 4 bags so this year she had to get a loan of fertilizer from a Mongu businessman. He charged her 6 x 50kg bags of maize per bag of fertilizer (50kg bag of Maize was worth 50-65,000 last year), so she owes him 72 x 50kg bags this year and is not sure if she will have enough left for her and the children.

Weeding takes two weeks per hectare and needs to be done once or twice depending on the rains. Mary does most of it, but sometimes gets outside help for which she pays one 20l tin of maize for 10 x 70-100m lines. Usually 3-4 people at a time help when she needs it.

Harvest takes 4 people 3 weeks and she uses an ox-cart to transport the crop 500m to her temporary store (Chipatwa). Shelling takes 1 week, using 3-4 hired people and she stores the maize in bags in her house.

Sometimes she has practiced conservation farming on a lima (50x50m) area of her field. This was helpful they lost their cattle to disease saved time on plowing and weeding.

Mary has not grown cotton for two years, but since prices are going up (up from 2,500/kg last year to 3,200/kg this year) again she may do so this year. She does not use fertilizer for cotton, which she uses as a cash crop when the prices are good.

She collects and sells grass every year, about 10-20 bundles at 1500/bundle. She uses the proceeds for toiletries and cooking oil.

Mary cares for the family cattle 14 adults and one calf, which they inherited from her parents. Her and her sister and brother take turns looking after them for a week at a time. They have 14 cattle and 1 calf. She uses the cattle for plowing, but does not rent them out because they lost all but two of the herd to foot and mouth disease and tsetse ten years ago. They do not use the cattle for milk, and only sell them in extreme conditions. She also has 9 goats which she sells, at 60-70,000 per goat, to buy seeds for planting. Mary has 9 chickens. Many of the chicks get taken by hawks before they can grow to an edible size, so she gets about 3-4 per adult.

Assets

Item	Price	Number	Value
Ox kart	bought it for 800,000, now worth about 1.5 to 2m	1	1.5-2,000,000
Plow	500,000	1	500,000
Cultivator	1.2 – 1.4m	1	1,200,000
Ripper	200,000	1	200,000
Hoes	20,000	5	100,000
Axes	15,000	2	30,000
Poles for hut construction	1500	8	12,000
Mortar for grinding maize	100,000	1	100,000
House – One bedroom, sitting room and pantry, with tin roof			
One mud hut for	160,000	1	160,000

cooking			
Open Thatch roof			

Mary is building another hut. The mud walls will cost 60,000 and the thatching will be another 100,000 for the thatching. The girls' education is free, for now, but she pays 5000 per term as a contribution to school teacher accommodation. She buys uniforms each year; shoes (60-70,000), trousers and shirts (30-40,000). She buys a chitenge sometimes for herself for 10-20,000.

She has a bicycle for transport donated by Min of Education.

Her monthly expenses consist of 2.5l oil (33,000), 2-3 tablets of soap (7,000-10,500), 500g washing powder (4000) when kids are at home, 1kg sugar (6,500), salt (3000), sometimes fish from Kafue flats (6-10,000). She also incurs labor costs, which she pays in kind with maize, as above.

Mary faces a number of obstacles, including worrying about her son becoming a poacher, which is why she sent him to Lusaka to find work. The lack of fertile soil means she has to fertilize her crops. She would like to see the government giving loans for additional fertilizer so she doesn't get 'robbed' by businessmen.

She has to take on debt to buy fertilizer, but she has no guaranteed income to repay them. She hopes to grow more cotton which does not require fertilizer. Water is another concern.

Her livestock drink in nearby streams, but she has to travel up to 2 kilometers to get water. Tsetse flies are a threat to cattle, the government vet to come every three months for injections (45,000 per sachet of medicine for 8 cattle). Malaria is also a risk; she had it last year. Her family tended to her and helped with her chores while she was ill. The family is an important part of coping with problems. In times of drought, the family decides whether or not to sell cattle. The Zambian government drought relief handout is only 50kg of maize. This lasts one month. Conservation farming is a good way of offsetting with drought and cattle die offs.

Elephants from the park pass by on their way Lukanda River, trampling and eating as they go. Bush pigs and monkeys are a bigger problem, eating maize and groundnuts. Her brother tries to bang drums and scare animals. ZAWA sometimes help with the elephants, and killed one in 2004, but the meat went back to ZAWA officers.

There are a number of outside poachers, ZAWA try to address this, but do not catch enough of them to make a difference. She thinks that if ZAWA gave more licenses to locals, they would help protect the local resources from outsiders.

KNP GMA Household Level Case Study C

Kosonso Busanga GMA – Kasempa CRB Catchement Mukanashi Village, 12 July 2001.

Household of James and Anne (names have been changed) – Maize and fishing Sales

James aged (57) and his wife Anne (age 48) of the Kasempa catchment area were married in 2001. James had previously been married but had a divorce. He was imprisoned for a period of 20 months in 2001 and he left his previous wife soon after his release. He relocated from the Copper belt to Mukanashi where he remarried. Anne is from the area.

James has 9 children from his previous marriage, four are going to St Mary's Catholic mission school in Kitwe and the other five have left home. He and Anne have two children together, one boy (aged 14) and a girl (aged 6) attending the local basic school, Munkunashi Basic (school population 450 students with 8 staff) which included grades 1-9.

The family's livelihood activities include maize production and fishing sales. They sell some vegetables and "munkoyo roots" (to make traditional non-alcoholic drinks at K2,500 per cup). Their main stable crop is maize, with some sweet potato, beans and cow peas. James estimates his income from maize in 2010 at K300,000 (5 50kg bags at K60, 000 each local co-operative). Any surplus is used for home consumption. He owns 3 lima (50 metres by 50 metres) of land far from his home. He estimates he should get 11 bags this year. He is a peasant farmer and extremely poor and occupies a homestead given to him by the local head man. He has no land rental or water costs. He collects his wood from the bush.

They spend about K20,000 on seed (4 x 10 kg bag or 1x 50 kg bag) during planting in Oct, Nov and Dec, and K100,000 on fertilisers and K20,000 per bucket for milling at the stamp mill. Other costs include around K60, 000 on shoes once a year, K250, 000 on clothes once a year. Toiletries include soap at K5, 000 per tablet, washing powder at K6, 000 per packet and then food costs include cooking oil at K10, 000 and salt at K4, 000, for a total of about 25,000 per month. They produce their own beans, maize and relish. They get relish mainly from fishing and occasionally buy chicken. They have no other livestock. Costs per year work out at to about K 870,000, not including the opportunity cost of labour. Water is free from a borehole. Their monthly costs are summarized in the table below.

Table 1. Yearly Expenses for – household and agricultural activities'

Item	Price	Number	Total Cost
Agricultural costs per year			
Fertiliser	K 100,000	1 bag 50 kg from Co-op	K 100,000
Seeds	K 5,000	1 bag x 4 times	K 20,000
Axe and Hoe	K 12,000	2	K 24,000
Milling Maize	K 20,000	Each time	K 20,000
Total			K 164,000
Clothing	K 250,000	1Per year	K 250,000
Shoes	K 60,000	1Per year	K 60,000

Total			K 310,000
Food per year	K 300,000	1Per year	K 300,000
Extras Salt	K 4,000	2Per year	K 8,000
Cooking oil	K10,000	6Per year	K 60,000
Washing powder	K6,000	8Per year	K 48,000
Total			K416,000
Grand Total			K 890,000

James pays K 1,181,000 per year for education. This includes school fees for the children of his first marriage. The children they had together attend Mukunashi basic school, which covers grades 1-9. It is their second largest expense apart from food costs.

Two of the children are in basic grades which cost K10, 000 per term for three terms (K30, 000 x 2 children = K60, 000. James 4 children with his first wife attend St Mary' catholic Mission in the Copper belt, which costs K75, 000 per term (for 3 terms, K215, 000 x 4 children= K 860,000). Other costs include uniforms, books and other resource materials. The table below outlines some of these additional costs:

Table 2. - Estimated educational expenses.

Total costs K60, 000+ K 860,000 school fees = K 920, 000
 Additional costs (extras –uniforms etc) = K 231, 000
Total educational costs = K 1, 151,000

(His previous wife pays the costs for uniforms etc for the 4 going to high school and houses them when not at school. She also contributes to boarding fees. James pays the school fees only)

Table 3. Extra educational costs for schooling in the small community of Mukunashi. (Mukunashi Basic School grades 1-9).

Item	Price	Number	Total Cost
Uniforms	K 30,000	2	K 60,000
Shoes	K 60,000	2	K120,000
Socks	K 3,500	2	K 7,000
Book bag	K 12,000	2	K 24,000
Note Books (10 books per child at K1000/book	K 10,000	2	K 20,000
Total			K231,000

James owns the 3 lima of land he grows his crops on, and lives in the settlement given to him by the traditional leader. He has free water. He owns two hoes (one broken) and an axe. His family possessions are simple and include some plates, cups and pots. He collects wood for cooking, this is freely available

in the bush around his home. He does not own a bicycle or any livestock. They own some blankets and personal clothes, one pair of shoes, she has sandals and few other items. The house includes a maize storage bin, two defunct huts used for washing and storage, an open hearth for cooking in and one very small hut with a thatch grass roof to sleep in.

He owns no equipment, such as plough and hires no labour. He works the fields with help from the one son during harvest season. They spend much of the time after planting weeding, fertilising scaring off birds and protecting the land from animals such as any wildlife threats. They also grow other vegetables such as beans, sweet potatoes. After the harvest there is no production during the winter months. The crops mature over five months from planting to harvesting and storage.

Obstacles and coping strategies

Anne AIDS and can no longer help in the fields. James works alone most of the time. Sometimes his son helps but he is in school. They live a very precarious existence. School fees are always a problem and he sometimes has to borrow money relatives when they are due. His income barely covers his living costs and the supplementary income from Anne's "munkoyo" sales and fishing activities are not enough to support the household. She is on antiretroviral drugs but can only manage simple household activities such as washing up and cleaning. She cannot collect water or firewood and they have to travel once a month to the clinic in Kasempa for more drugs. This is an additional cost which affects their household income.

They were cheerful and stoic living from day to day, and getting help from the children of the sister who lives next door. He receives no income from any of his older children working in Lusaka and in the Copper belt. James is retired and dependant on his farming activities but does not want to go back to work in the mines where he once worked as a casual labourer, and owned a larger farm which his ex wife now owns and manages.

KNP GMA Household Level Case Study D

Kasonso Busanga GMA, Kasempa CRB Catchment Area, Mukunanshi Village, 12 July 2011

Household of Miriam (name has been changed), Female-headed Household

Miriam (age 51) of Mukunanshi village in the Kasempa catchment area heads her household as a widow. She was married in 1975 and her husband passed away in 2000. She was his only wife, and she has not remarried. She is responsible for ten people in her household, including seven of her own children: four sons (ages 28, twins of 25, and 17) and three daughters (22, 20, 15). Other members of the household include her mother (78) and her deceased husband's brother (age unknown, but "very old"). One of the sons is mentally and physically disabled, and the brother-in-law is also physically disabled with an amputated leg at the knee. All of the children have attended school for at least some time. The disabled son reached Grade 7 before dropping out, one of the twins reached Grade 12, and the 22 year-old daughter dropped out in Grade 10. Currently four children are still attending school: the 25 year-old son is in boarding school in Kasempa, while the other three attend Mukunanshi Basic School near the family home. This includes the 20 year-old and the 17 year-old daughters, both in Grade 9, and the 15 year-old daughter in Grade 8.

The 22 year-old daughter, who is married, lives in Kasempa and is looking for work so she can return to school. Her husband is seeking employment at the new Lumono Mine, but in the meantime Miriam is supporting them both. One of the twins is living in the Copperbelt with his uncle (Miriam's brother). He is also looking for income to be able to continue his studies. Miriam continues to contribute to his upkeep.

The family compound is neat and tidy and consists of three mud and thatched huts, two thatched shelters with one for cooking and the other for socializing, one mud-bricked pit latrine toilet, one small maize grain storage container, two small mango trees and several banana trees.

Miriam provides for her family through two livelihood activities, including, in order of importance: 1) maize production and sales of surplus, and 2) regular sales of a traditional non-alcoholic drink made from *munkoyo* (*kankoyo*) (*Rhynchosia* spp.) roots, plus millet, sorghum or maize. During times of good harvest she sells surplus ground nuts and beans. She also grows sweet potatoes and tomatoes for home consumption. She owns one hectare and three lima (at one lima equal to 1/8 hectare or four lima to one acre and eight lima to one hectare) or about 1½ hectares. She obtained this land from the chief after her husband died. While he was still alive they used to have land "far away," but she gave that land up since it was too far from her home. Last year (2009-2010) she planted all her land with maize but only had sufficient pesticide for two lima. This year again she did not have money to buy enough pesticide for the entire plot, so she decided to only cultivate the two lima where she could apply pesticide, because the plants with no pesticide hardly grow at all, while the sprayed plants are much more productive.

In 2010 she was able to sell 55 50kg bags of shelled maize from the two lima, and she thinks this year's harvest will be about the same. The 2010 price was K65,000/50kg, earning her almost K3.6 million before expenses.

Her farm expenses include:

- Pesticide granules costing K50,000/50kg bag x 4 bags to cover 2 lima of land = K200,000 (she says if she was to put pesticide on all her land she would need a total of 12 bags)
- Maize seeds cost K85,000 per 10kg, which is enough for 2 limas.

- Cost of hiring labour to work in her fields. She pays by land area not by time. To plough and weed ¼ lima costs K20,000 per person. In 2009-2010 she cultivated 1 hectare and 3 lima amounting to labour costs of K880,000.
- She does the harvesting of maize by herself, which she says is a very tough job, leaving her with a sore neck and a cough.
- It takes her about one hour to walk from her home to her fields.

Her expenses for 2009-2010 agricultural season totaled approximately K1,165,000. After expenses, she earned K2,435,000 from maize production in 2010, not including the opportunity cost of her own labour.

Miriam notes that the process for selling maize is complicated and tedious. She gives each of her school-going children a bag of maize to sell. They take it to the government shed, which is along the road to Kasempa. At the shed, the bag is weighed and a receipt is provided noting the number of kgs. This receipt must be taken to Kasempa where another receipt is issued to take to the bank for cash. Walking to Kasempa from Mukunanshi takes about 11 hours. Often they have to wait for months, even into the next planting season, to be paid.

During the 2009-2010 agriculture year, Miriam planted about ¼ lima with groundnuts and beans. She planted late (in February) which affected the yield. In 2010 she was only able to harvest and sell about K80,000 worth of groundnuts and did not have enough beans to sell. This year she had to attend a funeral and the people watching her fields did not do a good job so she had no groundnuts at all and only a small tin of beans, which she will save to plant in the 2011 season. In 2010 she harvested quite a lot of sweet potatoes, but she noted that “no one wants to buy sweet potatoes because everyone plants them.” My kids are fed up with eating sweet potatoes for breakfast, lunch and dinner, when I have no money to buy maize for *nshima* (mealie meal porridge).”

Another source of income for this household is the sale of a non-alcoholic drink made from *munkoyo* roots and millet, sorghum or maize. Miriam buys the *munkoyo* roots rather than collecting them herself, at K1,000 per bundle (about 20cm by 20cm – see photo), which is much cheaper than the price in Lusaka, K3,000 per bundle. She makes the drink in a metal container which holds about 45 liters, using three bundles of roots (K3,000). The concoction takes about two days to sour ready for drinking. She puts up a sign on the path to her house to advertise that she has the drink for sale, and local people come directly to her house to buy. She sells the drink for K250 per 250ml cup. At this price, 45 liters should fetch K45,000, but Miriam says she typically makes from K15,000 up to K30,000 “if I am lucky” because many people want to first have a free drink “to taste how good the drink is first before buying.”

Since many people in the village make and sell this drink, the drink-makers try to allocate days for each drink-maker to produce and sell to cut down on the competition and wastage of any drink. With this system Miriam gets a chance to make and sell one batch twice in a month. However, Miriam notes that during the times when school fees are due “everyone forgets this system and everyone is ‘fighting’ to make the drink and try to sell to gain income for paying the schools fees.”

Noting that Miriam produces a batch of drink twice per month, and makes on average K20,000 per batch, this household earns about K500,000 per year from the sale of grain/*munkoyo* root

beverage. This makes it the second most important income earner for this household, at about 20% of what the household earns from maize.

The total annual income for this household from maize and drink sales after expenses amounts to almost K3 million.

The household owns no large valuable assets. The household assets include: two wooden stools (K5,000 and K10,000), about ten baskets (K10,000 to K30,000 each), one wood and metal sieve (K10,000), one 45l metal container and three large gourds for making the *munkoyo* drink, one bicycle and five wooden box beehives (which were given to her by an NGO supporting a beekeeping project; “I don’t know if they will come and take it away or not”), and some other household furniture. She owns no cattle or goats, only two chickens which she uses to produce more chickens which she sells. She says, “I used to have more chickens but people stole them. I now keep these two in the house at night to prevent them from being stolen too!”

Similarly, Miriam removed the five box beehives from the river, because “people were just stealing the honey!” “However, I am willing to try again with beekeeping because I really want to do something to improve our family livelihood.”

The household’s main expenses include school fees and agricultural inputs. Additional expenses include household goods and staple food including fish, vegetables for ‘relish’ and clothes.

At more than K2.4 million per year, the family’s main expense each year is to cover the cost of sending four of the seven children to school. This amounts to about 80% of the household income.

For the three children attending Mukunanshi Basic School, they must pay K25,000 per term per child (3 terms x K25,000 x 3 children = K225,000). For the two children in Grade 9, there is an additional Grade 9 exam fee of K35,500 each (K71,000 in total per year). For the boy at Kasempa Boys School, which is a boarding school, Miriam pays K552,000 per term which covers both school fees and hostel fees (for three terms, K1,656,000). This means the family pays about K1.95 million per year to cover school fees and boarding costs for four children. Miriam despairs at the fact that she cannot afford to keep the other three children in school and worries that she will no longer be able to continue to pay for the four currently in school. She says, “Every time one of my children comes home asking for school fee money, I get dizzy with confusion as I never know where this money will come from. I try to tell the principal, ‘please wait I am searching for the money.’” Paying for school uniforms is another significant cost for the family (see table below).

Item	Price	Number of children	Total Cost
Uniform for Kasempa Boys School	40,000/set of shirt and trousers x 2 sets = K80,000	1	80,000
Uniform for Mukunanshi Basic School	45,000/set	3	135,000
Shoes	40,000	4	160,000
Socks	3,500	4	14,000
Book bags	20,000	4	80,000
TOTAL			469,000

As noted above, the cost of farm inputs and labour amount to about K1,165,000 per year. This is the second largest annual expenditure.

The remaining income goes towards the purchase of basic groceries and food. This expenditure comes to about K66,000 per month or K792,000 per year and includes items like fish (2 handfals for K5,000), vegetables (K4,000), laundry/washing power (K6,000/box) and bath soap (K5,500/bar). Cooking oil (K10,000/750ml) and sugar (K7,000/kg) are considered to be real luxuries by Miriam, saying, “we can rarely buy these.”

Adding up annual income and expenditures creates this picture:

Total Income = K4.1 million

Expenses (not counting opportunity cost of own labour) =

K1.3 million for income producing expenses

School fees and uniforms = K2.4 million

Food and groceries = K1.0 million

Total expenses = K3.4 million

Profit = K700,000

Miriam has never experienced crop damage from wildlife because her fields are not near game areas, but she does get yearly damage from domestic animals (e.g. goats and pigs). In theory the owner of the animals must pay a damage fee but typically the owner claims it is not their animals that caused the damage. She says that most people will kill any animal found in the field, find the owner and take part of the meat as a damage payment. But she says, “I never want to kill someone’s animals so I just chase them away if I see them in my field.” The damage from domestic animals “hurts” and “causes bad feelings among neighbors.” Other than chasing them away and trying to claim compensation she has no other strategy to deal with the problem. In times of drought, “there is nothing we can do, so we just suffer.”

KNP GMA Household Level Case Study E

Kasonso Busanga GMA, Kasempa CRB Catchment Area, Shifwaba Village, 12 July 2011 Household of Steven and Pamela (names have been changed) -- Livestock and Maize

Among the people of the Shimuka VAG in the Kasonso-Busanga GMA live Steven, aged 30 with his wife Pamela aged 28, their daughters ages 7, 5 and their son who is one year old. They also live with their niece, age 11, a daughter to the wife's young sister. The daughters are in school at nearby Mukunanshi Basic School (approximately 500 m away) in grades 1 and 2 respectively. Steven completed his grade 12 at Kasempa Boys High School while his wife only reached grade 9. They live in a 4-roomed iron-roofed mud brick house surrounded by a thatched visitors shelter, toilet and bath-shelter, a maize-filled storage wood-woven bin, a dilapidated piggery and have a woven chicken run under construction. There are a few mango trees and one banana stand around the homestead. The homestead forms part of a continuous village of related people.

Steven ranked his livelihood activities as follows: piggery, goats, maize and chicken. The family also grows sweet potatoes, sells clothes locally (new and second-hand) which they buy in either Solwezi, Kitwe or Lusaka. They are also engaged in fish trading which they buy locally from fishers on Lufupa river and sell at either Kasempa, Solwezi or the new Lumwana mine. These trading activities are conducted during the off-farming season.

The household started the year with 29 pigs but now has 17 (**9 females**: 3 x 2yrs 3 months old, 4 x 1 yr old, 2 x 6 months old; **8 males**: 3 x 1 yr old, 5 x 6 months old). A boar was sold in February after 3 of the sows got pregnant.

Since January, 12 goats were sold:

Month	No. Goats sold	Age	Total Amount Sold, ZMK
January	2	1	600,000
February	3 + 1 boar	1 (boar, 2 yrs)	1,200,000
May	4	< 1 yr	800,000
June	2	< 1 yr	500,000
July	1	2 yrs	450,000
			3,550,000

Information on expenses was difficult to obtain because Steven does not keep written records. However, he recalls that for the piggery, he spent K50,000 for bricks, K30,000 to pay the bricklayer, K45,000 for roofing and thatching, and K15,000 for maintenance. He feeds salted maize, maize bran, boiled pumpkins, leaf and sweet potato tuber, and occasionally cassava. No amount was attached to these expenses because they grow them themselves. A total of K50,000 was spent on medicines.

The household had 14 goats at the beginning of the year, and gave out 8 females to 8 people on some kind of pass-on programme, whereby after one and a half years they get the original goat and 2 off-spring. Then the 'mother' goats are sold at a price ranging from K90,000 to K150,000. At the time of the visit, there were only 6 goats to be sold on demand. Over the past 3 years, this household has sold 8 goats, 11 goats (at between K300,000 to K400,000 per goat in Congo), and 5 goats (at K140,000 each) per year respectively.

During the discussion, Pamela was not with us all the time since she was also taking care of the children. However, Steven informed me that part of the fields visited during the transect walk the previous day was theirs, totalling 2.5 ha on which they grew maize. They expected to harvest

200 x 50 kg maize or 4 tonnes/ha and intend to sell 160 bags to FRA at approximately K65,000/bag, and retain 40 bags for household use (food and feed).

Steven's family used 20 x 50 kg bags (4 D Compound + 4 Urea/ha) fertilizer; used 10 kg improved seed and 20 kg local seed; spent K80,000 per lima x 8 limas on land preparation, and K40,000 x 8 limas on 1 weeding, and K40,000 x 8 limas on harvesting.

When discussing assets, Steven's wife was present. The family owns 2 x 4-roomed iron-roofed mud brick houses, one at the homestead and another one in Kasempa which they rent. They spent between K2.3 million to K3 million to build. According to Steven, these houses are jointly owned. They also own 3 ha of land 1 km away.

Other assets owned are listed below:

	Asset	Numbers	Ownership	Total Purchase Value, ZMK
1	Hoes	3	Joint	65,000
2	Knives, domestic	2		10,000
3	Axes	2		20,000
4	Bicycle	1	Husband	500,000
5	Plates	40	Wife	420,000
6	Pots	11	Wife	210,000
7	Beds	2	Joint	300,000
8	Mattresses	2	Joint	620,000
9	Clothes, male	7 trousers, 1 suit, 4 shirts, 4 T-shirts, 3 pairs shoes	Husband	
10	Clothes, female	20 blouses, 20 skirts, 5 suits, 6 chitenges, 4 pairs shoes		
11	Cups	12 metal, 30 plastic	Wife	118,000

Primary expenses include:

School fees K 200,000;

Church K 200,000;

Support to parents K 400,000;

Other family school support K2,500,000.

The family faces various obstacles, including malaria, flu', wounds coughing, diarrhoea which can reduce work performance. The family also cited jealousy as an obstacle, particularly when their animals stray into other's compounds as well as the attention attracted when one has more land, or a better house.

KNP GMA Household Level Case Study F

Mulobezi GMA, Moomba CRB Catchment Area, Moomba Central VAG, Lukena Village, 16 July 2011

Household of Lili (name has been changed) – Beer Brewing

The household has three members and it is headed by a widow aged 36 years old by the name of Lili. Her husband died in 1999 and she has since lived alone and kept her two children: a boy aged 15 and a girl aged 13. The boy stopped school in grade 5 because they did not have enough money; the girl is in grade 6. This family lives just behind the play ground of the school.

Evelina undertakes a number of livelihood activities on a very small scale. She ranked these activities as follows:

- Traditional beer brewing for sale,
- Plastering other people's homes in exchange for money or maize.
- Piece work of weeding in exchange for money, maize or blanket/clothes
- Maize production for consumption
- Groundnut production for consumption
- Digging munkoyo roots in exchange for clothes, soap, Vaseline sometimes
- She used to cut grass for sale when it was available nearby (before last year)
- Keeping chickens

The main activity is traditional beer brewing of a brand called Kachasu. She brews 5 litres per week because she has to borrow the big pot she uses to brew beer as hers was damaged and she has not been able to replace it. She uses two methods to brew this beer:

Method 1: To brew 5 litres of kachasu, she uses 5kg millet or 5kg of maize which is soaked, then left to germinate before she pounds it into flour. She mixes 2kg of sugar with the pounded flour and adds 25 ltrs of water to the mixture. She leaves the mixture to ferment for 1 or 2 days and then cooks the mixture in a big covered pot. The pot has mechanism where a pipe is inserted through which the vapour drains to get to the 5l container which collects the beer. As the hot vapor passes through the pipe she pours water on it to cool the beer before it collects in the 5l container. She uses this method between April and October when maize is available

Method 2: She uses 50 kg of wild fruit called "mawi" in the place of maize or millet to brew 5 litres of kachasu. She gets the liquid inside which she pounds and then adds to 5l of water. She puts the mixture in a container and leaves it for 3 days to ferment. She cooks the fermented mixture in the covered pot on the 4th day. The pot has mechanism where a pipe is inserted through which the vapour drains to get to the 5l container which collects the beer. As the hot vapor passes through the pipe she pours water on it to cool the beer before it collects in the 5l container. She uses this method from November to March when maize and millet become expensive.

Below is a break down of her sales, costs, and the division of her labor between these activities:

- Beer brewing: She does beer brewing from April to early February. She buys 2kg of sugar at K14,000 and 5kg of maize at K2,500 or 5kg of millet at K5,000. She sales 5ltres of kachasu at K49,000 (K7,000 per 750 mls bottle)
- Weeding: she does piecework from early February to March in the morning. She is paid 25 kg mealie meal plus K10,000 for relish when she weeds 20 rows of 20mtrs each. She

prefers mealie meal and money for relish. Last season she weeded 75 rows (60 rows for mealie meal + cash for relish) and 15 rows for which she was paid K15,000 (K1,000 for each)

- Part time Plastering houses: from April to August as and when she has been requested to do so. On average she plasters one house per year for which she is paid 20kg maize and K10,000 to use for grinding it; or K20,000 cash . She takes 2 days to plaster a house

Her assets include a thatched house which was built for her by people she gave beer to on credit, blankets, 12 plates, 4 pots, 5 x 20l water containers, 3 handicraft mats used to sleep on, clothes, 2 big hoes and 2 small holes for planting, 5 spoons, 1 pan, 1 bench, All income is spent on food, household goods and school accessories for the child going to school. She uses about K100,000 per month.

She has no ox plough to cultivate the whole field and grow enough food to meet household needs (her field is 82 yards by 100 yards), she has no one to help her as she is the one who also supports her old mother who lives a few houses from her house who has refused to move in with her as she prefers to live alone.

KNP GMA Household Level Case Study G

Mulobezi GMA, Moomba CRB Catchment Area: Lukena Village, 16th July

Household of Robert (Name changed) – Cattle, Crops, Hammer Mill Job

Robert is 43 years old and lives in Lukena village and heads a family of two wives and eight children:

Wives	Boys	Girls
1 st Wife (37 years old)	1 (5 years)	3 (13, 10 and 2 years old)
2 nd wife (younger?)	2 (one from a previous marriage and the other is 8 years old)	2 (one from a previous marriage and the other is 7 years old)

There are no other family members in the household. Three of the children attend the local school in the village.

Robert is a farmer, but also works at the local Maize hammer mill, owned by the local school headmaster. He has worked there for the past three years. His wives also brew and sell beer, collect and sell grass, and he has one cow/ox that he uses for ploughing. They collect wild fruits and Munkoyo for home consumption.

When ranking the importance of his different livelihood activities, and assets he ordered their relative importance as follows: Ox - 26.6%, Crops –25.7%, Hammer mill Job – 17.4%, Wild fruits and Munkoyo – 16.5%, Brewing Beer – 9.2% Grass – 4.6%.

Their staple crop is maize, but they also grow beans, pumpkins and sometimes sweet potatoes. The soil is bad for good sweet potatoes. Each wife has a 50 x 100m sized field. Their fields neighbor each other. It takes about five days to plough each field with the ox. Because of the bad rains this year each field only produced a half a scotch kart load. This will only feed the family from March to September. They normally harvest 4-5 scotch kart loads from each field. If there is not enough maize harvested, Robert has to buy maize and his wives do piecework in other fields to earn maize. One tin (20l) of maize costs 15,000 in June, just after harvest and up to about 30,000 in September-October. His wives can earn one tin of maize by doing 10 lines of weeding.

His wives do the weeding during the wet season; each field takes about 2 months to weed fully. The harvest takes two weeks and the children help on the weekends. He rents the Ox kart for one and a half tins (30l) of maize per load in order to transport the harvest back to the house storage bin.

They plant the beans and pumpkin in the same field, the beans at an interval of every five lines between the maize. Beans cost him 20,000 per tin (20l).

Robert works every day, Monday to Saturday, 10am to 5pm, for the past three years and is paid 200,000/month. He is the only operator of the mill. When busy the mill uses 5l of diesel in two days. He charges customers 5000 per tin (20l) no matter what the total volume.

He buys honey (10,000 for 2.5l) so his wives can make Mbote (honey beer). 2.5l of honey makes 20l of beer and they sell 750ml for 1,500. They usually sell about 3-5 bottles a day and a total of about 40l in a month.

His cow is very important to his family as it allows them to plough their fields. He sometimes hires it out in exchange for weeding or harvest labor. He is scared of the cattle diseases that are prevalent in the area though, which include; Tsetse, Black leg disease, Scabies and Foot and Mouth disease.

Household assets are outlined in the table below:

Item	Price	Number	Value
Ox	1,800,000	1	1,800,000
Plough	350,000	2	700,000
Hoes	5,000	6	100,000
Axes	5,000	2	30,000
Beds	~80,000	2	160,000
House – One bedroom		2	

The family expenses include;

A contribution of 1000 per year per child for school teacher's accommodation, for those kids between grade 1 and 7. Children's school uniforms cost 17,000 per year for boys and 25,000 per year for girls. When the maize crop has been insufficient, they spend 20,000 per week to buy 2 tins (40l) of maize. Other expenses include: Washing powder for 9000 per month, washing soap for 20,000 per month salt for 2000 per month oil for about 40,000 per month and if one of the family needs to go to Secheke, to the clinic, it costs about 20,000 for transport costs.

He considers his cow his most important asset he has because it allows him and his wives grow maize in both their fields and reduces labor costs. His job is vital as well, as it provides him with regular income.

KNP GMA Household Level Case Study H

Mumbwa GMA, Kabulwebulwe CRB Catchment Area, Lukanga Village, 2 July 2011

Household of Benson and Jane – Beekeeping and Agriculture

Benson {54 years} and his wife Jane {40 years} were married in 1986. Jane is his second wife. He lives with 5 children, one orphan and a grand child. The dependant is a double orphan. And the grandchild is a baby born from his first daughter who was pregnant when she was at school in grade eight

The children were born in 1989, 1991, 1996, 1998 and 2003. The orphan was born in 1999. The family has been living in Lukanga village since they were born. They occupy a small house made of burnt bricks and a grass thatched house. There two other pole and mud, thatched with grass houses occupied by the children. They have three grain barns for the wife, husband and son. They have constructed sanitary facilities in form of dry and wet combined rubbish pits, one dish rack, and kitchen and toilet

Around the yard they have planted 10 mangoes, 2 paw paws, one lemon and 3 guavas. The fruits are not sold but used for home consumption. Apart from managing the fruits, they also collect wild fruits like paniculata upaca kirkiana. The other livelihood activities are cotton growing, cassava, curry, sweet potatoes, maize and ground nuts. Benson keeps bees in 5 hives which were given to him by DANIDA in 2006. He also gains income from house construction. The family together also burns charcoal for sale.

If they have a good harvest they also sell surplus maize, groundnuts, and cassava. The family members were asked to rank their livelihood activities as a percentage of their overall income, please see the table below.

Livelihood activity	Ranking in percentage	Participation by gender	Purpose
maize	54	both	Home consumption and sale in case of surplus
groundnuts	45	wife	Home consumption
Cotton	30	Husband and wife	For sale
Sweet potatoes	35	both	Home consumption
Fruit growing	5	both	Home consumption
Goat keeping	1	Orphan given by World Vision	For sale for school fees
cassava	4	both	Home consumption
Beekeeping	75	husband	For sale, beer brewing and consumption
Chicken	3	Children and wife	Sale and home consumption
curry	10	wife	For sale
House construction	11	husband	
Munkoyo digging	6	wife	For sale
Honey beer brewing	40	wife	For sale

Beekeeping is their main livelihood activity, primarily during the six months before harvesting. In August to October he goes out for construction works and still comes to harvest honey. He

packs his honey in five liter containers and sells the pure honey at K25,000 each. From five hives he harvests twice per year totaling to 220 liters. The total income per year is K885, 000.

Sometimes Jane makes honey beer which sells for K300,000 per 60 liters

The family grows maize on a 2 hectares land. Jane has her own plot and Benson and his son also have one each. There ususall is not enough maize to sell. Each family member usually grows about 10 x 50 kg bags. This amounts to about K1,150,000.

Cotton is grown on a 2 hectare plot. They harvest 7 bales, weighing 86 kegs each. The out grower company buys at 3000 per kg. During a good harvest the family makes about K5,904,000

The average total income for the family is about K8, 189,000

period	items	total
daily	Food { salt, cooking oil, relish }	7,670,000
Term	School fees	100,000
Annual	Health	2,500
Monthly	Transport	300,000
Annual	Clothes	200,000
Annual	Utensils	150,000
Monthly	lotions	600,000
annual	Donations to school cement	65,000
annual	Chiefs royalties	25,000
monthly	Church donations	40,000
term	Grade nine tuitions	270,000
occasionally	Funeral donation	30,000

Assets

husband		wife		Children/ orphan		Jointly owned	
item	cost	item	cost	item	cost	item	cost
Hoes	90,000	Hoes	45,000				
Shovel	150,000						
Pick	120,000						
Bicycles	700,000			Bicycles	700,000		
beds	250,000						
Stools	100,000						
Axes	50,000						
		Plates	250,000				
		Pots	160,000				
		sickle	25,000				
				goats	240,000		
		chickens	150,000	chickens	100,000		
houses							1,000,000
land							nil
fruits							700,000

obstacles	strategies
Inadequate farm inputs	Plant recycled seeds, less artificial fertilizers,

	and use hand ploughing
Long distance to safe drinking water	Dig scope water wells/ unprotected wells
Long distance to health facilities	Use herbs
Drought	Plant drought resistant crops
HIV/AIDS	Just laughed
Malaria	Sleep under mosquito nets
Human wildlife conflict	Make scares and traps