



SWM SUSTAINABLE WILDLIFE MANAGEMENT PROGRAMME



Towards sustainable wildlife management

An in-depth study for the
promotion of community
conservancies in Zambia
and Zimbabwe

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Funded by the
European Union

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VIII. THE FOOD SYSTEM

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Introduction

Results presented here are backed by the activities conducted under activity R4.1.A2 “Qualitative survey on household consumption in rural and urban areas and on outside home consumption” of the SWM Programme in KaZa. They contribute to a better understanding of the levers of change (identified in the theory of change, see Chapter II) for improving local food security and reducing the consumption of wild meat. This chapter describes the food consumption patterns of the Tonga people living near conservancy areas: Wards 3, 4 and 5 in Binga District (Mucheni Community Conservancy [MCC], Zimbabwe), and Nyawa Chiefdom found in Kazungula District (Inyasemu Community Conservancy [ICC], Zambia). Food consumption patterns include practices for purchasing, preparing and sharing food, and the social and cultural values that contribute to frame these patterns. Special focus was given to wild meat and other wild products.

Materials and methods

A socioanthropological approach to food consumption was adopted (based on the methodological guide by Figuié and Lepiller, [in prep.]). Data were collected using an ethnographic perspective, and employing a mix of qualitative methods to gather information from a wide range of perspectives, including observing and interacting with the stakeholders of the local food system. This methodology was intended to overcome, as far as possible, the difficulty in studying activities that are largely illegal, i.e. wild meat consumption.

From April 2019 to September 2020, the SWM Programme in KaZa implemented the following activities:

- a desktop review of secondary data available on wild meat consumption in Zambia and Zimbabwe (and reported in Lepiller and Dutilly [in prep.]);
- in-depth face-to-face interviews with: a) experts on the Tonga people in Binga, Harare and Bulawayo, and with local authorities in Binga and Nyawa (38 interviews); and b) with members of rural households, mainly women in charge of preparing food (30 in Mucheni CC and 6 in Inyasemu CC);
- Focus group discussions (FGDs) with youths, hunters, women in charge of preparing food, the elderly, and heads of households (eight focus groups in Mucheni CC and four in Inyasemu CC); and
- participatory observations were strategically made in households (kitchen and garden) and market areas.

During these FGDs, interviews and participatory observations, there were several themes: agricultural and economic activities, hunting activities, food, cooking and eating activities (including a quick 24-hr recall survey in Inyasemu CC) (reported in Chileshe and Lepiller [in prep.] and Figuié *et al.* [in prep.]). In Mucheni CC, food diaries are currently being collected from among a set of 30 households, for further quantitative analysis; these are only mentioned here in some preliminary results of this study. Additionally, a quick survey was conducted in September 2020 for a rapid assessment of the COVID-19 impact (20 interviews in Mucheni CC). Participatory observations and in-depth interviews involving one member of the team belonging to the community (Luzibo Munsaka, a Tonga researcher from Binga) had the advantage of breaking down the barrier between interviewers and interviewees and increasing the reliability of the collected data. Data have been collected with the agreement of the communities. Women have been over-represented in the sampling since they are key informants when it comes to studying households consumption.

A. The foodscape

Before addressing the food patterns at household level, it is necessary to highlight the main characteristics of the local foodscape. A foodscape is defined by the local food production areas, the food distribution infrastructures and the local food policies and communication/advertising strategies (Foodscapes, 2020). The key results presented here are based on information collected mainly in MCC but many features are common with ICC. What are the features of the local food space that influence the household food consumption in the KaZa site?

A.1. Key results

A.1.1. An important deficit in the local production of staple food

In the SWM Programme site in KaZa, local food production is limited. Poor soils and relatively low and erratic rainfall (below 450 mm in MCC, 600–700 mm in ICC) make crop production risky and difficult. Yields are low (less than 200 kg/ha for maize in Ward 3 of Binga) and irregular. Most areas have high deficit in staple food production (except Lusulu in Binga RDC, which is said to be the breadbasket of the district, but most grain production is sent to Binga town and Bulawayo). In 2015, the production of cereals in Wards 3, 4 and 5 of MCC covered respectively three, four and seven months of the population's consumption (WFP, 2016). Data obtained by the SWM Programme team in KaZa showed that the situation has since worsened: the reserve of cereals produced at home covers the households' consumption from two or three months in the poorest households to five months in the wealthiest ones. Local purchasing power is low (the poverty rate in the three wards of MCC is around 87 percent (WFP, 2016) and 57 percent in the Southern Province of Zambia where ICC is located [Central Statistical Office, 2016]). Food aid programs, from the government and NGOs, are essential to cover the local deficits in cereals.

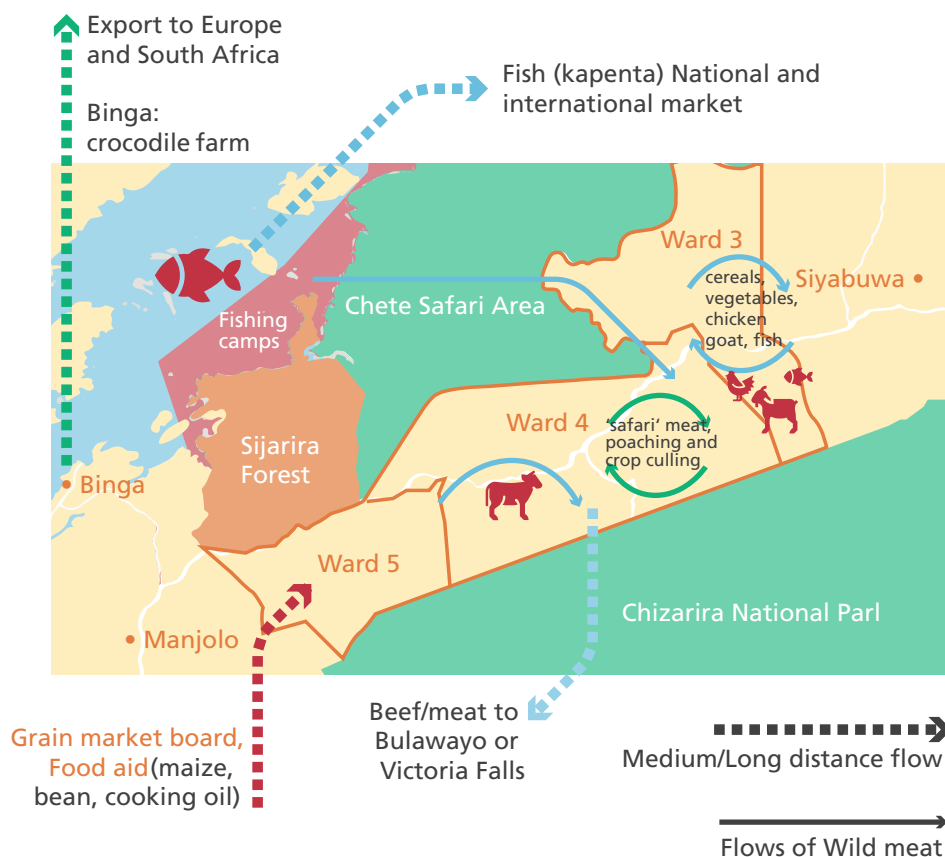
Home gardening (in particular sweet potatoes, okra, black-jack (*Bidens pilosa*), rape, cowpea, pumpkin, eggplants, papaya, banana) is a woman-led activity accessible for households living alongside lowlands and riverbanks. It is an important way to complement and diversify diet (mainly from May to July), and to provide income through local and short-distance trade.

A.1.2. Low meat production, less attractive and "export-oriented" market

Farm animal ownership is widely practised but the production of cattle-based food is very low in the KaZa site and contributes little to local consumption: in Binga Rural District, cattle supply a local farm-to-farm market of living animals mainly used for savings or as draught power. Cows are sold when cash is needed, to foreign collectors supplying the meat market of Bulawayo and Victoria Falls, and to a lesser extent the consumers in Binga town (there is a slaughterhouse in Manjolo, see Chapter VII). Beef is locally consumed only for social events (see below), as goats and chickens are the main sources of local meat consumption, except for poor households, where these animals play the role of savings and are exchanged for cereals during the lean season or are sold to collectors.

Fish production is important in Lake Kariba, which supplies 90 percent of the Zimbabwean national market, mostly with kapenta fish (*Limnothrissa miodon*), often too expensive for local consumers in Binga Rural District. Local fish consumption mainly relies on artisanal home fishing and on trade by communities living close to the lake (e.g. Mujele Fishing Camp).

Figure VIII.1: Main food flows in Binga Rural District, Zimbabwe (Source: Authors)



Wild meat is hunted and consumed locally (see Chapter V). It comes from safari areas (some hunters only look for the trophy and the meat of the game is distributed to the personnel of the safari or to the heads of the neighbouring communities), crop culling (organized by the authorities in retaliation for crop destruction or injury to people) and poaching. Wild meat from poaching is consumed by the family hunters. It can also be sold or bartered but this is risky and not so lucrative (poachers asking for too high a price can be reported by potential buyers). Small animals like rodents, insects or worms are also collected for food by various family members (children, women). There is also a crocodile farm in Binga town whose production is exported to South Africa and Europe.

To sum up, and as shown in Figure VIII.1, availability of animal-based food (meat and fish) is limited in Binga Rural District. A significant share of the production is traded on more attractive markets with better-off consumers (Bulawayo, Victoria Falls for cattle, the whole country for kapenta fish and even Europe for crocodile meat). In Nyawa, Zambia, the availability of wild meat seems to be greater, through illegal hunting, in less dense areas and those next to the game management area (GMA). Commercial trade can also occasionally occur on the main roads.

A.1.3. Self-subsistence as the main objective of most households and food aid as a necessity to overcome the deficit in the local production

As mentioned above, the local food market is weak and food commercialization infrastructures

are limited to Binga (one to two hours' drive from Wards 3, 4 and 5) and Nyawa Centres. The network of dirt roads is not all-weather and the prices of transportation are dissuasive. However, some rural families, among the wealthiest, go once a month to Binga town for different reasons and take this opportunity to buy food, including fish and meat. Some rural business centres, which are poorly stocked, are convening points for some shops and occasional street vendors offering manufactured food at relatively high prices (compared to prices practised in Binga town for example) such as sugar, cooking oil, drinks, vegetables and fish. Young people may occasionally be found there, offering to catch wild animals on demand, in order to buy internet credit cards or other goods.

Households are poorly integrated into the market economy. For the majority of households in KaZa, food self-sufficiency is the main objective, since employment and income opportunities are rare (limited, for instance, to employment in safari areas, production of clay tiles, carpet making). Home consumption mainly relies on home production (with very low yield), bartered food and food assistance (Table VIII.1). No differences were found between the two sites at this stage of the study, which a planned quantitative survey based on food diaries may confirm or deny. Households with draught animal power can cultivate maize and cotton as cash crops (confirming that cattle ownership is not only a form of savings, but is also a productive asset, and an indicator of wealth, much more than a source of proteins). Remittances (from men working away from home in gold mines) are another source of cash used to buy food, but with the consequences that many households are headed by women and have limited labour force. Food gifts are common among households to support the most vulnerable (with maize or beans) or to honour those with specific status, e.g. traditional chiefs.

Table VIII.1: Main sources of food for households in MCC and ICC (Source: Authors)

Food items	Food sources				
	Home production	Bought or bartered	Food assistance	Gift	Distribution from safari, cropping, etc.
Maize grains	x	x	x	x	
Sorghum	x	x		x	
Maize meal		x	x	x	
Beans and lentils			x	x	
Cowpeas	x	x		x	
Domestic Vegetables	x	x		x	
Cooking oil		x	x	x	
Meat and fish	x	x		x	
Wild meat and fish	x	x		x	x
Wild fruits	x	x			
Wild vegetables	x				

A.2. Way forward

Despite the importance of livestock in the KaZa area (see Chapter VII), meat production is low, and is mostly traded on more attractive markets. An increase in the local livestock will not necessarily increase the production of meat (due to the numerous other functions of livestock), and will not necessarily affect local consumption of meat, due to the limited purchasing power of most households. These findings suggest that:

- Farmers lack investment capacity to invest in agriculture and livestock. In addition, any investment is very risky due to drought, flood, diseases and wildlife attack, as well as market instability. Any attempt to increase local production of sources of meat, fish or other sources of protein needs to target risk reduction (e.g. malnutrition). A first step could be to support free vaccination of livestock to reduce the high burden of infectious animal diseases.
- Supporting cattle ownership will benefit the production and productivity of cereals (through draught power), and the local income of the better-off households (and to the male income). Supporting goat production will benefit local savings and food consumption. Supporting chicken production will directly benefit the consumption of the poorest households (by home meat consumption, or by increasing their capacity to barter or sell chicken for cereals).
- The development of an “alternative supply chain of protein” should not compete with existing ones, but should target support of the vulnerable stakeholders among existing ones. As an example, the sale of dry fish brings a complementary income for poor households. Supporting fish production and trade should not exclude these stakeholders to the benefit of wealthier ones with stronger capacity (economic, technical and social) to invest in new economic activities.

B. Household food patterns

As presented above, local food production is low, food markets are incipient, and local consumers have low purchasing power. What is the consequence for the local food diet? How do households manage to obtain food adapted to their needs and to their tastes?

B.1. Key results

B.1.1. Scarcity of food

The SWM Programme site in KaZa is mainly populated by Tonga people. Food consumption among the Tonga people has changed significantly since their displacement from the Zambezi River in the late 1950s for the construction of the Kariba Dam on the Zambezi River (Tremmel, 1994). Though this past period was hard with a high burden of infectious diseases and child mortality, the Tonga people remember their living on the riverbank of the Zambezi as a period of great affluence, in particular due to their easy access to fish, wild meat and wetlands. Nowadays, food consumption is characterized by scarcity for most households. Food insecurity affects up to 88 percent of the households (ZimStat, 2012; Central Statistical Office, 2016) and the area has been highly dependent on regular food aid for many years. Most households can only afford two meals or even one meal a day during the long lean season (from October to March). Only 20 percent have three meals a day all year long, and 32 percent never do (Table VIII.2).

The type of products consumed also varies with households' wealth: the poorest households consume cereal husk, wild vegetables and insects, while the wealthiest have cereals (maize and rice) and regular consumption of meat or fish, tomatoes, onions and cooking oil, and drink tea and sorghum beer. Food aid (maize, beans and lentils, cooking oil) is distributed in most households with elders, or during the lean season, and during special disastrous events (droughts, flood, etc.). At Christmas, households seek to improve their meals by adding, as far as possible, meat, bread and larger quantities of cooked beans.

Table VIII.2: Number of month(s) in the year with at least three meals a day in MCC (n = 60 respondents) (Source: Authors)

	Number of month(s) in the year				
	0	1 to 3	4 to 6	7 to 9	10 to 12
Number of households	19	3	8	7	23 (including 20 with 12 months)
% of households	32	5	13	12	38 (including 33 with 12 months)

B.1.2. Low diversity of the diet

Diets of most households are predominantly based on cereals, especially maize (*nshima* or *sadza*) and vegetables, and rarely include animal products (Table VIII.3). Although households own domestic animals, many households keep them for ceremonial or other special occasions rather than for food. Households seem to rarely eat animal by-products because milk is mainly reserved for feeding young animals and eggs for hatching. In other words, diets are poorly diversified.

In ICC, when asked questions such as "In your view what is a good meal?", "In your view what does a good meal consist of?", and "How often do you have such a meal?", all participants explained that a good meal is comprised of *nshima*, meat – goat, fish, beef, chicken, guinea fowl, pork – and a vegetable. Nearly everyone said they rarely have such meals or only on special occasions such as Christmas or social events.

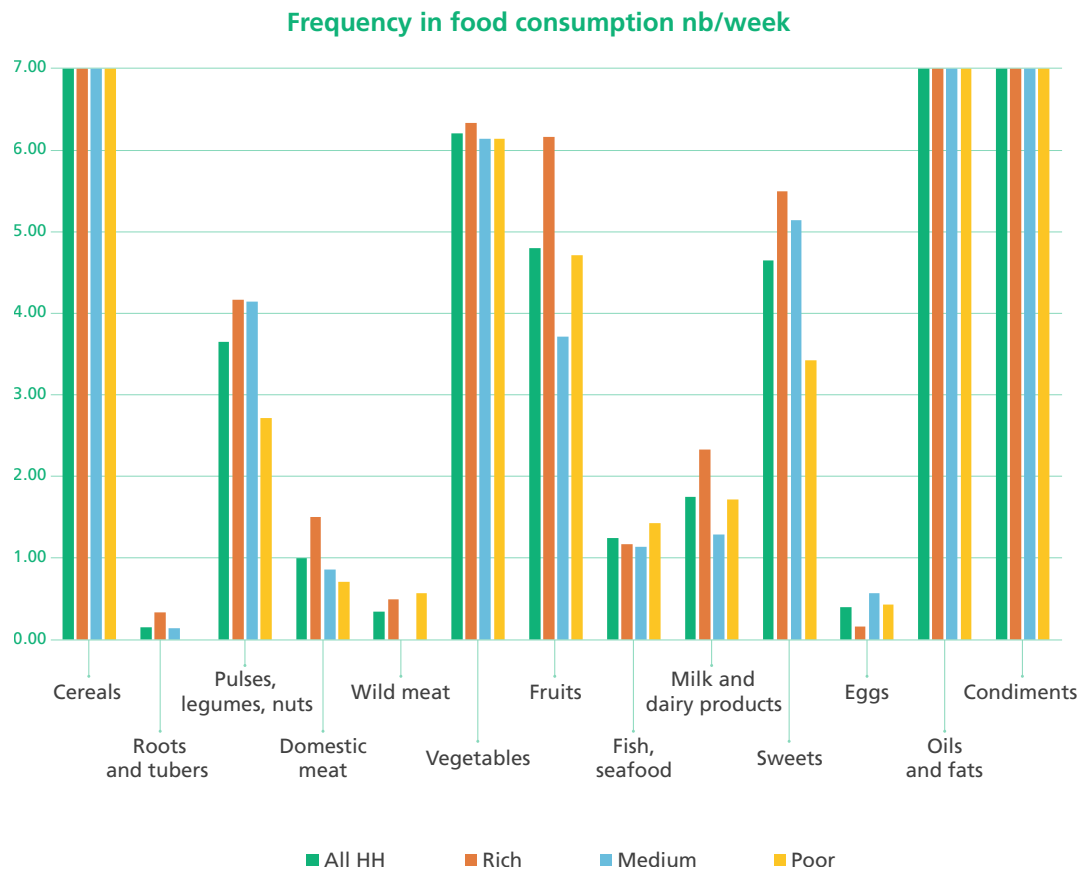
Table VIII.3: Description of a food day in MCC (very similar in ICC) (Source: Authors)

Meal	Local name	Place	Composition
Breakfast (morning food)	<i>Mbusyabulo</i>	Home	porridge with pumpkin or tamarind
Lunch	<i>Chisusulo</i>	Home/Field/ School	<i>sadza</i> , vegetables, pulses, <i>mahewu</i> (fermented drink)
Dinner	<i>Chilalilo</i>	Home	<i>sadza</i> , (meat), vegetables

B.1.3. Frequency in food consumption

By participating in the life of a small sample of households, the project team was able to record the frequency of consumption of the main food groups in MCC (Figure VIII.2). These

Figure VIII.2: Food consumption frequency among wealth groups in Binga District, wards 3 and 4 (n = 20 households (HH), February–March 2020) (Source: Authors)



observations confirmed the importance of cereals and vegetables as the basis of the daily diet. Meat consumption was limited and varied according to households. The average, once a week, hides disparities: only eight out of the 20 households had consumed meat during the week of the survey (from one to four times a week). Classification of the households according to their wealth status indicates that meat consumption was higher in wealthy households.

Consumption of wild meat was limited (0.35 day in a week on average, that is, approximately once in 3 weeks) and hides disparities: three out of the 20 households had consumed wild meat during that week (from two to three times a week). It includes insects (9 records), toads (4 records), squirrels (1 record) and tortoises [*Testudinidae*] (1 record). To be noted that a food item can be recorded many times in the same day. This consumption has to be interpreted in the seasonal context: the observations were conducted in February/March, during the rainy season, when insects are more abundant. This confirms the interest in studying the seasonality of food consumption.

This set of data covers the composition of 420 meals, including breakfast, lunch and dinner. It was recorded during seven sequential days in 20 households in MCC, in February and the beginning of March 2020. Households are classified using the criteria for wealth group profile (WFP, 2016).



Figure VIII.3: Meal preparation in KaZa (KaZa, Zimbabwe) (©Brent Stirton/Getty Images for FAO, CIFOR, CIRAD, WCS)

B.2. Way forward

Food security is an issue for the majority of the households in the SWM KaZa site. The problem is quantitative (reduced number of meals during the lean season) and qualitative (low diversity of food). These findings suggest that:

- Protein deficit is not the only problem to address in terms of food security. Protein-energy malnutrition (PEM) is probably widespread.
- Food production is limited in the area. In addition, as most households have low purchasing power, food accessibility is another main issue. The attempt to increase local food production must target the local population as consumers but also as producers, with the aim of increasing the income, and then the food purchasing power, of the poor households.
- The production of alternative sources for home consumption needs to target the lean season (September to March). Food conservation, through drying, is the only accessible technology at household level.
- Potential for increasing home production in the most insecure households is limited by their lack of assets (e.g. draught power), labour force (e.g. female-headed households) and sensitivity to risk. Propositions aiming at increasing home production of food could first target the securitization of the current activities.

C. The role and place of wild products in food habits and culture

Food is multifunctional: eating brings nutrients but also pleasure; sharing meals is a social activity; food habits and taboos are part of the cultural identity. Women are in charge of preparing food (Figure VIII.3) and are thus key stakeholders in the decision-making process. They have to manage the trade-off between the different functions of food. In such a context, what are the different functions of wild meat and fish?

C.1. Key results

C.1.1. Wild meat and fish as key elements of the local culture

Meat is highly valued in Tonga culture. Its consumption symbolizes wealth, as serving meat is a way to honour a guest. Among the different types of meats, wild meat from large mammals is highly valued, at least among elders, nostalgic for old times. Wild meat is seen as more natural than the meat from medicated and vaccinated farmed animals. Meat from large game is supposed to bring strength for whoever consumes it, reflecting the magic thinking according to which “you are what you eat”. In addition, despite some cases of anthrax due to the consumption of sick hippo meat, people do not seem to fear zoonotic diseases from wild meat. Nowadays, for elders, meat preference goes in the following decreasing order: wild meat > cattle > goat > fish > chicken. Youth preferences seem less homogenous.

Fishing is also very important for the Tonga people, not only as a source of food but as part of their cultural history, when Tonga people, before being displaced for the construction of the Kariba Dam, were “the People of the Great River”. The elephant also has high cultural value; it symbolizes the memory of the Tonga people, and the important role of the female in the elephant herd is supposed to reflect the organization of the matrilinear Tonga society.

The comprehensive inventory of the local food items (Table VIII.4) and of the local recipes compiled in the project study (Figuíé *et al.*, in prep.) shows that wild meat (including rodents, birds, reptiles, amphibians or insects) and wild fish contribute significantly to the local food culture. There are numerous taboos (e.g. taboos on fish associated with the River God, the Nyami Nyami, or on the mother’s animal totem) and magic thinking (e.g. women eating crocodile meat would be protected from attacks while fishing) related to the consumption of wild animals. This indicates that the cultural role related to the consumption of wild meat and wild fish transcends the sphere of food culture and is part of the whole culture.

Nearly all parts of the animals are consumed (except for the skin, intestines and blood of some animals) and only few species are considered disgusting (such as donkeys and dogs). Meat is never consumed raw. It is boiled before being fried. The ideal rarely achieved, from the point of view of the population, would be to kill a goat per month, a chicken per week and to have fish the other days. The meat of a goat can feed the family for several days and is then sun-dried for conservation.

Table VIII.4: Food groups and main food items consumed in MCC (Source: Authors)

Food groups	Main food items of this group
cereals	maize, sorghum, millet, sesame seed
vegetables	okra, black-jack, chourmolia, rape, "giant vegetable", pumpkin, butternut, onion, tomato, leafy vegetables (<i>nyevhe</i> , cowpea leaves, pumpkin leaves)
meat, poultry and offal	chicken, goat, guinea fowl, beef
fish	bream, jackson's corner, tigerfish, catfish (<i>mubondo</i>), tilapia (<i>tuchele</i>), mackerel
pulses, legumes and nuts	cowpea grain, groundnuts, bambara nuts
root and tubers	sweet potatoes
fruits	banana, pawpaw, mango, citrus, watermelon, guava
milk and dairy products	cow milk
eggs	chicken eggs
oils and fats	industrial oil, local animal fat and vegetable oil
sugar	industrial sugar, honey, sugar cane*
condiments and drinks	traditional (maize and sorghum) and industrial beers, tamarind, tea
wild meat	impalas, wild pigs, porcupines, insects (locusts, caterpillars), rodents (mice, rats), birds (quails, quelea), worms (<i>vungu</i>), bullfrogs, squirrels, rabbits, cap hares, tortoises/ mountain tortoise
wild fruits**	<i>nkula</i> , baobab fruits, tamarind, <i>mndoza</i> , <i>shuma</i> , <i>tsubvu</i> , <i>nsthovwa</i> , <i>inji</i>
wild vegetables**	wild okra, amaranth, <i>Corchorus</i> , spp., <i>Bidens pilosa</i> , <i>zakalanda</i> , <i>syuungwa</i> , <i>syalundu</i> , <i>bbonko</i> , <i>tende</i> , <i>kandongondo</i> , moringa, baobab leaves, <i>chisyu</i> , <i>namunywa</i> , <i>munsale</i> , <i>matanga</i> , <i>telele/mudele</i>
wild mushrooms**	<i>tsuketsvuke</i> , <i>firifit</i> , <i>nzeve</i> , <i>ndyu</i> , <i>boowa</i>
wild tubers**	<i>makuli</i> , <i>gompelgombe</i> , <i>mwanja</i> , <i>sozwe</i> , <i>kabombe</i>

*From a sugar plantation in Ward 4.

**The vernacular names of the wild food reported here are the names reported by the respondents. The identification of the respective specie(s) with their scientific name has been initiated but is still in progress.

C.1.2. Decrease in wild meat contribution to the daily local diet

In the past, meat of small wild mammals was consumed daily, farmed animals were killed and shared at social events (wedding, funerals), and large game was reserved for special ceremonies (such as hunters' ceremonies). Nowadays, wild meat is consumed more rarely. Its cultural importance contrasts with the current daily practices. A first approximation indicates that wild meat represents around 26 percent of the meat consumption (Table VIII.5). Moreover, the consumption of wild meat is restricted to small animals such as insects and toads. The frequency of consumption is limited, around once in three weeks, but with high diversity among households (up to three times a week).

Table VIII.5: Share of wild food in food consumption in MCC (n = 60, self-reporting) (Source: Authors)

Share (% , annual average) of wild food	Wild meat	Wild vegetables	Wild fruits
wild/total (wild and domestic)	26	54	69
minimum	10	30	50
maximum	50	90	90

Diversity is also found within households. There is a gender issue in accessing the product of hunting: when small animals are killed or when prey is scarce, the hunters tend to cook, share and eat them outside the household, meaning that the rest of the occupants of the household, especially women and young children, do not benefit from this nutritional intake. Women and children are more likely to have access to the small prey that they have collected themselves, like rodents, small birds, toads and insects.

Fish consumption (wild fish) remains relatively more accessible and fish is consumed more than once a week. Fish is also a currency for exchange: in Binga, 1 kg of bream or tilapia can be exchanged for 5 kg of grains (maize) or for 1 kg of beans, 1 cupful (300 ml) of mackerel or catfish for 2 cups of any other food item, especially mealie-meal (a kind of liquid porridge).

C.2. Way forward

Like any food, wild meat and fish fulfil various functions (nutritional but also cultural) and these vary according to the species consumed. Moreover, the consumption of wild meat and fish has evolved over time. Regarding large game, whose consumption could be more problematic from a conservation perspective:

- The drivers of its consumption are numerous: in particular, pleasure (taste), sociability, cultural identity, health (nutrition and safety) and economic (cost). Wild meat is unanimously valued among the people because of its good flavour, because it is free of chemicals and medicines and because it is considered “free meat” (meaning that it does not represent a loss of capital, in contrast with domestic meat). Substitutes for wild meat need to fulfil these different functions.
- The consumption of wild meat has evolved locally over the past decades: wild meat consumption has decreased (with the reduction of hunting activities) and local consumers have already developed alternatives through livestock.

In order to support alternatives to wild meat consumption, the SWM Programme in KaZa needs to draw on existing “functional equivalents” of wild meat in the local culture:

- Beef is highly valued and can replace the social function of wild meat.
- Goats and chicken (and beans from food aid) replace the nutritional function of wild meat, and its role in a barter economy.
- Globally, animal-based foods can be substituted for each other as ingredients of the sauce that accompanies the core food, mostly *nshima*, but (dried) fish is particularly useful in enhancing the flavour of a sauce.
- “Neglected” wild meat, like rodents, birds and insects, is used as a substitute for common game species for access to low-cost food (its consumption also has a function of crop protection).

What seems to have no substitute is the cultural function of wildlife associated with hunting activities and wild meat sharing. The SWM Programme in KaZa must support the cultural life locally, which could be done by associating occasional hunting in the conservancy areas with cultural activities or events, valuing the wildlife knowledge of the elders. The conservation of wildlife needs to embrace the conservation of the related culture.

D. Food and nutritional insecurity: coping strategies

Food insecurity is a main issue for most households of the SWM Programme site in KaZa. In MCC, 79 percent of households are food insecure compared to the national average of 42 percent. Most households rely on food aid during the lean season, but they also develop coping strategies. What are these strategies? What is the role of animals and wild resources in these strategies?

D.1. Key results

D.1.1. Major role of wild fruits and vegetables

The majority of fruits and vegetables consumed locally are wild: wild fruits and vegetables, tubers and mushrooms are an important source of food that greatly improves the diversity of the diet. They represent around 60 percent of the total fruits and vegetables consumed annually and even up to 90 percent in some households (Table VIII. 5). They bring diversity to the cereal-based diet and contribute to nutritional security.

The inventory of the local recipes shows the importance of wild resources. Those are found in more than half of the recorded recipes: wild meat but also, and mainly, vegetables and mushrooms, wild fruits (used for the preparation of many beverages), nuts (including for preparing cooking oil), tubers and honey.

The consumption of wild tubers is limited. Wild tubers, like gompe and mwanja in Binga Rural District, were said to be a last resort since their consumption is risky. Consuming wild tubers requires skills to distinguish the poisonous from the edible ones, and to prepare them in a safe manner. These skills and knowledge are part of the local food culture, and are indicators of a culture of food scarcity. Nowadays, this knowledge is under threat and young people, with fear of failure, prefer to refrain from eating them. Mushrooms are also potentially dangerous foods and only experienced women are counted upon to gather them. Wild fruits are important, for preparing beverages as mentioned, but also for boys and girls who consume them on their way to school; their consumption, though high, is probably underestimated.

D.1.2. The role of wildlife as a safety net confirmed by the COVID-19 crisis

Nationwide measures to limit the spread of the COVID-19 virus have significantly affected food availability and food prices in remote rural areas such as KaZa. The COVID-19 crisis confirms the essential role of wild resources in coping strategies, by supplying households with alternative sources of food and income. As declared by one of the traditional local chiefs in MCC: "We, the Tonga, have a past and this allows us to survive COVID-19. We have our own foods, which we use instead of your modern ones. That is what we are doing now. We have the forests, and the hills and these valleys, and they contain different foods."

Fishing activities have intensified, partly because school lockdowns have meant children have more free time. Probably for the same reason, catching birds has also become more common. "The birds make a difference and so we are grateful for the birds" declared one respondent. According to local authorities, the hunting of impalas, duikers and bushbucks has increased, in particular at night with dogs, as has the number of hunters. Poaching has increased during the COVID-19 pandemic: the recorded wildlife crime rates are eight times higher than for the same

period in the previous year. Hunting not only supports the food consumption of the hunter's family and community, but also generates income and helps to supply the local market with meat: one can buy a whole carcass of impala for USD 12, or two hind legs for USD 4. More worrying still, hunting has extended to rare species, such as a leopard trapped recently in Binga.

D.1.3. Indirect role of livestock ownership on food security

As stated above, meat availability at the farm level is more dependent on home-raised chickens and goats, and cattle do not contribute directly to household consumption. It however supports farm production, as cattle supply the households with draught power, produce low cost manure for cereals production and thus directly contribute to increasing farm productivity (Scoones *et al.*, 2010). Selling ploughing and transport services can also be a substantial source of income. Selling or bartering farmed animals is also an important way to access staple foods.

Livestock also provides a secure form of savings, and probably the most secure and accessible form of long-term investment in unstable economic contexts (Bennett *et al.*, 2019). Animals are sold during difficult periods when there is a need for cash. In the poorest households, chickens support this savings function: they are bartered locally for cereals. Unfortunately, regular epidemics (e.g. Newcastle disease) and wildlife attacks compromise the resilience of the household, and any efforts to intensify livestock production.

D.2. Way forward

Wild products (meat, fruits and vegetables) and domestic and wild animals are essential to the resilience of the households and to face the numerous constraints they have to overcome (ecological constraints, climatic events, lack of infrastructure, limited access to the work market, regular economic and financial crisis, COVID-19 pandemic, among others). Therefore, households' food security is highly sensitive to changes in access to wild areas and wild resources. Consequently:

- It is necessary to assess if the current consumption of small species (e.g. birds, squirrels, rodents, insects) is a threat to endangered species and needs to be more regulated or not.
- The development of the conservancy areas must not jeopardize access to wild fruits, vegetables and small species, since they are essential to support food diversity.
- Consideration should be given to a more detailed regulation of hunting of small species, in order to avoid criminalizing an activity that exists *de facto* and that plays a role in the nutritional health of the inhabitants.

E. Lessons learned and recommendations

The results show that the four dimensions of food security are problematic in KaZa: availability of food, access to food, safe and healthy utilization of food, and stability of food availability, access and utilization.

Local meat availability is limited and is decreasing. There is no available comprehensive local statistic to assess the local livestock size and the meat production (agricultural statistics are mainly available for vegetable products). Nevertheless, according to local informants, the

livestock population is decreasing due to repeated shocks (droughts, epidemics). Other sources (Fewes Net, 2020) confirmed that many households have had to sell their animals as coping strategies to face repeated crises (economic, sanitary).

Food poverty is expected to increase in the area due to the increasingly poor macroeconomic conditions, consecutive droughts, and continued COVID-19 impacts.

Therefore, the challenge for the SWM Programme in KaZa is not just to increase the availability of meat that needs to be produced locally to address the local current need and to support the increase in the population. The main issue is to make it accessible to a population whose purchasing power and capacity for home production is highly limited. This requires ambitious support for local economic development. Moreover, as the market infrastructure is very limited, supporting the local production also requires supporting the market chains, from production to consumption.

According to the M&E framework of the SWM Programme in KaZa, there are two main objectives involving Result 4:

1. By the end of 2023, 80 percent of the households in the community conservancies are consuming three balanced meals per day throughout the year

Indicator: number of balanced meals per person and per year.

Means of verification: annual survey report. Regarding this first objective, and in relation to the number of meals per day, the study findings show that today, in Binga, only 20 percent of the households have three meals per day throughout the year (and 32 percent never do). Regarding the balance of the diet, they suggest that the quantity consumed at each meal is limited: indeed, to face scarcity, households first tend to limit the quantity consumed per meal, before reducing the number of meals. Moreover, the description of a food day shows that the diet is cereal-based and food diversity is limited, suggesting that the meals are not balanced.

2. By July 2023 “non-wild meat” meals represent 90 percent of households’ habits

Indicators: (i) percentage of meals per month that include domestic meat, fish and forest food and; (ii) percentage of households practising sustainable extraction/collection/hunting/fishing.

Means of verification: consumption survey at baseline and endline.

The SWM Programme in KaZa findings show that currently, according to the surveyed households, wild meat represents 26 percent of their meat consumption on average in the year (and non-wild meat represents 74 percent). They also show that the category “wild meat” covers a high diversity of items (from large mammals to worms), and that the reduction in the consumption of some of these items should not necessarily be an objective. Consequently, this objective should be refined to focus on decreasing the consumption of large wild mammals and be rephrased as: By July 2023, “large wild mammals” meals represent less than 10 percent of household meals.

There is a need for further information. The ongoing socioanthropological study provides a broad understanding of the foodscape, food habits and food security issues. Some of this information needs to be completed for Nyawa. The implementation of a large quantitative survey is recommended to identify more precisely the socioeconomic profile and the

localization of the households that need to be targeted by the SWM Programme in KaZa. The socioanthropological research provides a strong basis for the implementation of such quantitative study (already in progress).

The quantitative survey (baseline and endline) needs to have the following objectives:

- Investigate how household characteristics (i.e. demography, wealth, ethnicity, employment, localization) correlate with household wild meat consumption.
- Estimate how wild meat contributes to household food security (frequency, 24-hr recall).
- Determine the provenance of wild meat consumed (i.e. own-caught, bought from traders/markets, eaten as part of a village ceremony, etc.).
- Analyse the variation of wild meat consumption among the households.
- Analyse the variation of wild meat consumption among the members of households (men, women, children).
- Analyse the variation of wild meat consumption during the year (two contrasted seasons).

In relation to the first objective, it is recommended to assess the balance of the diet (rather than the balance of the meal as suggested by M&E framework of the SWM Programme in KaZa), based on the calculation of an individual food diversity score (ACF, 2011), for different individuals within a household (male, female, children).

In order to produce an annual survey of the situation, the implementation of a permanent observatory of a small sample of households with regular collection of their food diaries is suggested. This observatory will be used to monitor trends in food consumption and livelihoods during the time of the project. Moreover, this observatory will be useful to provide prompt answers to questions addressed by other Results (e.g. detail on fish consumption developed in Result 3) or for quick assessments of potential unexpected events (e.g. COVID-19 impact).