

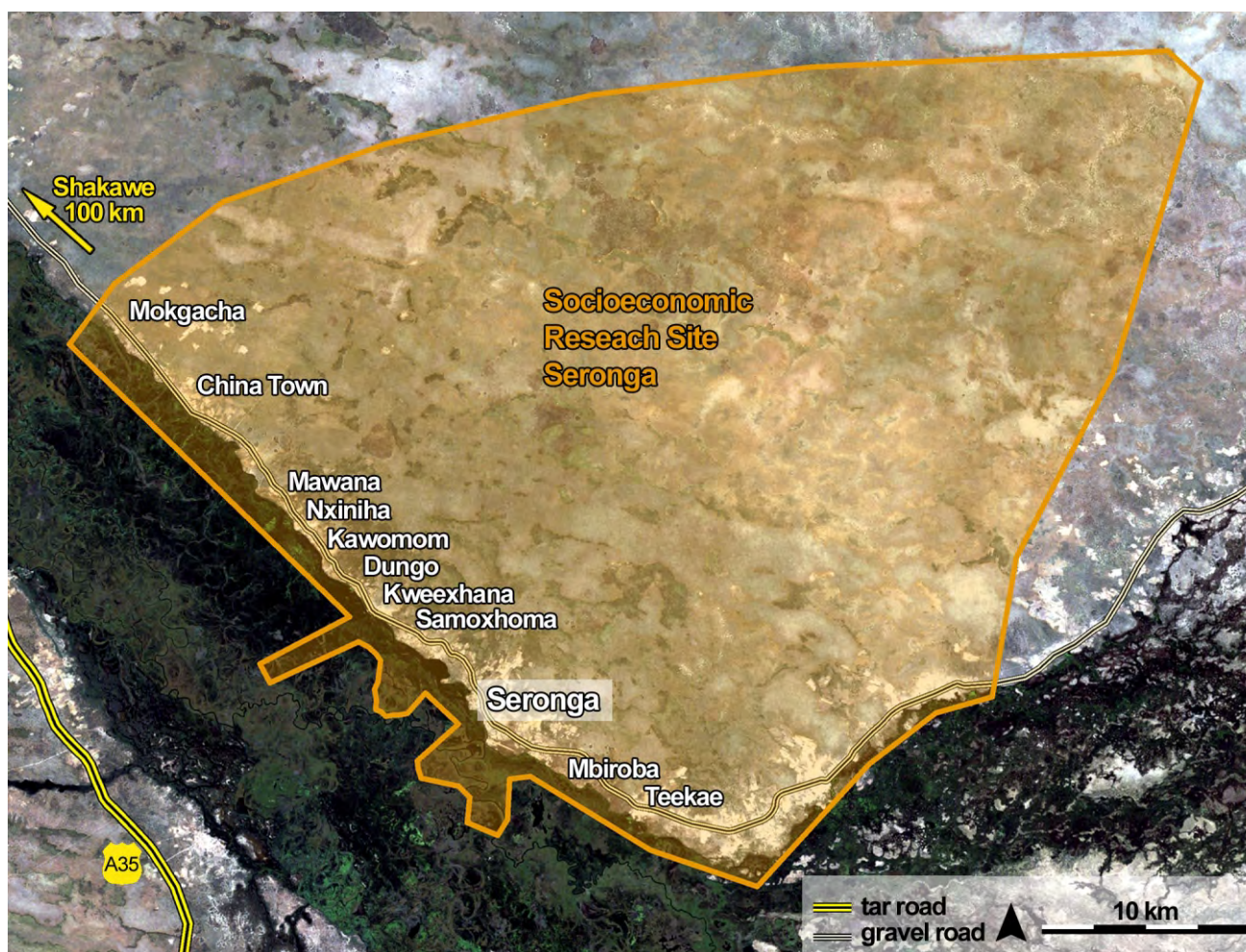
## Seronga - The People

This factsheet draws on data collected between 2011 and 2013. The quantitative data source is the TFO Socio-Economic Baseline Survey (SEBS) which included 326 randomly sampled households in the greater Seronga area (Fig. 1). Data were collected in the village of Seronga as well as in all associated cattle posts (Samoxhoma, Kweexhana, Dungo I, Dungo II, Mawana, Kawomo, Nxiniha, Moggacha, Mbiroba, Teekae). Qualitative data on farming practices were gathered through interviews and focus groups with key informants, especially knowledgeable farmers and men/ women of the community (N=30). A different focus group discussed food collection and consumption patterns (N=6).

**Table 1: General information and key figures for the greater Seronga area.**

<b>Total number of households</b>	<b>Total number of individuals/ population size</b>
943	2,879
<b>Average household size</b>	<b>Size of study area</b>
3	1,473 km <sup>2</sup>
<b>Population density (persons/km<sup>2</sup>)</b>	<b>Ratio of children : adults : seniors</b>
2	0.41 : 0.48 : 0.11
<b>Average age for total population</b>	<b>Median education level adult (age&gt;18) population</b>
28.5 years	Finished junior high school
<b>Dependency ratio*</b>	<b>Sex ratio for total population*</b>
117.2	80.3
<b>Child-woman-ratio*</b>	
464.7	

\* Definition of the indicators in Electronic Appendix



**Fig. 1: Location of Seronga centre and its 10 cattle posts in the socio-economic core site of Seronga (adapted from Eigner 2012). Map designed by Jan Wehberg.**

## Analysis of livelihood strategies

This section presents livelihood strategies of the inhabitants of the core site. The livelihood options in Seronga include regular employment, business (trade, crafting), arable agriculture, livestock keeping (large and small stock), use and/or sale of natural resources, and wage labour. Each household combines these different options to secure their livelihoods,

creating its own specific strategy. The identification of livelihood strategies was based on the six following variables representing livelihood options using cluster analysis as a statistical tool:

- Does the household practice agriculture or horticulture? (Y/N)
- Does the household own any livestock? (Y/N)

- (Per capita amount of) Annual monetary value of natural resource harvest
- (Per capita amount of) Annual monetary value of sold/exchanged/donated natural resources
- (Per capita amount of) Annual cash income from employment
- (Per capita amount of) Annual cash income from private businesses.

### Main livelihood strategies in the Seronga core site society

Although Seronga is characterized by a very remote situation, its recently developed administrative centre brings in new livelihoods options and in particular has introduced cash into this society which, initially relied mostly on local ecosystem services for its livelihoods. The results given in Table 2 show that the Seronga society is diverse and complex.

On the one hand, as an administrative centre a large proportion of the population of Seronga is non-agricultural. A first and small cluster, constituted mainly of very small newcomer households (*1- Highly paid in-migrated employees*), earns very high income (relative to the area) mainly from salaries and makes use of neither arable land nor natural resources. A second group (*2- Low cash income households relying on natural resource use*) consists of a small and rather marginalized group of households of mostly female headship with few livelihood options: they are neither cropping nor keeping livestock and have very little access to cash income. Rather, living in the town centre, they still rely on natural resources for building,

probably due to a lack of alternatives, but less for food. This lower dependency on natural resources and farming activities may be a sign of urbanization of the Serongatown.

On the other hand, the majority of Seronga's households base their livelihoods on agriculture. Within this majority, an important cluster in number is constituted by one third of the households (*3- Crop and livestock farmers*). These are well-off and rather large farming households who have been established in Seronga for a long time, and who possess livestock (including draught animals). Next to them, we find a fourth cluster gathering together poorer farming households without livestock, which is mostly of female headship (*4- Poor farmers*). Both groups earn very little cash from wage labour and rely on natural resources for food and construction. With 60% of the households, they represent the majority of the population.

Finally, we can identify two 'transition' clusters of the population in this classical representation of farming vs. non-farming

households. Both possess livestock, a traditional wealth management option in the region, but are not involved in cropping activities. The first group (*5- Local entrepreneurs with use and retail of natural resources*), the smallest one with 3.5% of households, has been anchored in the region for a long time and makes a living through business activities as well as the collection and retail of natural resources; they use a high diversity of food items. Their livestock consists predominantly of small stock (goats). Typical activities include fishing, gathering and hunting. Furthermore, by capitalizing on their links to and knowledge of wild natural resources, these households appear to be entering the cash society. The last group of households (*6- Local employees with livestock*) is better off and tends to rely on fixed employment for the earning of salaries with which they have invested in cattle, thus engaging in traditional pastoral activities as an opportunity rather than a necessity.

## Characteristics of households in each of the six livelihood strategy clusters

	(1) Highly paid in-migrated employees	(2) Low cash in- come house- holds relying on natural resource use	(3) Crop and livestock farmers	(4) Poor farmers	(5) Local entre- preneurs with use and retail of natu- ral resources	(6) Local em- ployees with livestock	Total sample
<b>Cluster information</b>							
Number of households in cluster	17	73	116	72	9	39	326
Share of households in sample	5%	23%	36%	22%	3%	12%	100%
<b>General household attributes</b>							
Share of households residing in Seronga since less than 5 years	47%	26%	28%	34%	22%	24%	29%
Share of households residing in central Seronga	100%	84%	56%	67%	89%	85%	71%
(Mean) household size	1.2	2.3	4.2	3.4	2.0	2.5	3.2
Dependency ratio*	127.1	136.6	112.8	43.8	8.3	119.5	127.1
Share of households with female headship	12%	65%	44%	73%	13%	32%	51%
<b>Household's mother tongue [share / (n°)]</b>							
Setswana	82% (14)	16% (12)	4% (5)	4% (3)	44% (4)	13% (5)	13% (43)
Sembukushu	0% (0)	30% (22)	26% (30)	26% (19)	0% (0)	21% (8)	24% (79)
Seyei	18% (3)	49% (36)	65% (75)	58% (42)	44% (4)	62% (24)	56% (184)
Sesarwa	0% (0)	4% (3)	3% (4)	10% (7)	0% (0)	3% (1)	5% (15)
Sekgalagadi	0% (0)	0% (0)	2% (2)	1% (1)	0% (0)	3% (1)	1% (4)
Shona	0% (0)	0% (0)	0% (0)	0% (0)	11% (1)	0% (0)	0% (1)
<b>Household welfare</b>							
Share of households where highest level of education among adults does not go beyond "Finished primary school"	0%	46%	45%	63%	22%	32%	45%
Share of households where education level of household head does not go beyond "Finished primary school"	0%	59%	86%	76%	38%	46%	67%
Share of households using modern sources of energy (gas, electricity, solar panel, diesel generator) for cooking, heating, lighting	100%	18%	12%	7%	44%	31%	20%
Share of households using the river as main source of water	0%	16%	43%	26%	11%	15%	27%
Share of households with at least one modern house (no use of local natural resources)	88%	27%	22%	11%	22%	49%	28%
Mean (median) asset endowment (max. 20)*	10.8 (11)	4.0 (4)	5.1 (5)	3.8 (3)	6.2 (5)	6.2 (5)	5.1 (4.5)
Mean (median) days with consumption of meat (max. 30)	25.3 (30)	14.0 (10)	11.3 (7.5)	8.9 (5)	22.9 (27)	15.6 (15)	12.9 (10)
Mean (median) days with consumption of fish (max. 30)	11.9 (8)	8.4 (4)	9.8 (5)	9.5 (5)	14.0 (10)	8.9 (5)	9.6 (5)



	(1) Highly paid in-migrated employees	(2) Low cash in- come house- holds relying on natural resource use	(3) Crop and livestock farmers	(4) Poor farmers	(5) Local entre- preneurs with use and retail of natu- ral resources	(6) Local em- ployees with livestock	Total sample
<b>Household use of natural resources</b>							
Share of households practicing arable agriculture	6%	0%	100%	100%	33%	0%	59%
Share of households owning livestock	12%	0%	100%	0%	67%	100%	50%
Mean (median) number of cattle owned	7.5 (7.5)	0 (0)	16.0 (9)	0 (0)	1.2 (1)	9.3 (5)	13.8 (7)
Mean (median) number of goats owned	2.5 (2.5)	0 (0)	6.6 (4)	0 (0)	5.7 (3)	2.8 (0)	5.6 (3)
Mean (median) monetary per capita value of natural resources harvest (with OECD equivalence scale, in US\$)	\$421 (\$70)	\$640 (\$300)	\$718 (\$400)	\$617 (\$400)	\$16,534 (\$7,070)	\$787 (\$336)	\$1,108 (\$370)
Mean (median) number of wild food resources used*	3.8 (4)	3.0 (3)	2.7 (2)	2.4 (2)	4.2 (4)	2.9 (3)	2.8 (3)
Mean (median) number of natural resources used for building*	1.9 (2)	3.9 (4)	4.2 (4)	4.1 (4)	4.4 (5)	3.9 (4)	3.9 (4)
<b>Household economic situation</b>							
Mean (median) annual disposable per capita cash income (with OECD equivalence scale, in US\$)	\$12,222 (\$10,532)	\$1,418 (\$535)	\$956 (\$381)	\$468 (\$114)	\$8,180 (\$6,925)	\$2,679 (\$1,904)	\$1,945 (\$474)
Mean (median) share of business income in annual disposable household cash income (in %)	1% (0%)	5% (0%)	6% (0%)	8% (0%)	73% (84%)	6% (0%)	8% (0%)
Mean (median) share of salary income in annual disposable household cash income (in %)	99% (100%)	34% (0%)	16% (0%)	10% (0%)	15% (0%)	55% (85%)	28% (0%)
Mean (median) annual per capita income from retail of natural resources (with OECD equivalence scale, in US\$)	\$0 (\$0)	\$3 (\$0)	\$80 (\$0)	\$44 (\$0)	\$3,930 (\$0)	\$7 (\$0)	\$148 (\$0)
Share (number) of households							
with regular access to cash (additional irregular access possible)*	100% (17)	59% (43)	53% (62)	47% (34)	100% (9)	80% (31)	60% (196)
with irregular access to cash*	0% (0)	14% (10)	34% (39)	17% (12)	0% (0)	13% (5)	20% (66)
without access to cash*	0% (0)	27% (20)	13% (15)	36% (26)	0% (0)	8% (3)	20% (64)

\* Definition of the indicators in Electronic Appendix

## The farming system in Seronga

Although an advanced and ongoing diversification of livelihoods can be observed, animal husbandry and arable agriculture remain livelihood sources of central importance for the majority of households in the core site. This can be attributed both to the multi-functionality of livestock keeping (see below) and the role of subsistence farming as a back-up / survival strategy in the face of market im-

perfections (limited access to, or high volatility of, wage labour and consumer-goods markets). However, adverse environmental conditions (high rainfall variability / low soil fertility) make farming a challenging business that rarely covers a household's annual food needs. This situation is aggravated by regular harvest losses due to wildlife, mainly elephants, trampling and feeding on the

fields.

As a quick characterization, farmers in the core site can be described as predominantly subsistence oriented small-holders, practicing mixed and mono-cropping of maize (*Zea mays*), sorghum (*Sorghum* sp.) and millet (*Pennisetum glaucum*) on a few hectares with small livestock herds in a system of semi-permanent rainfed agriculture.

## Facts on the farming system

### Farming system classification

Semi-permanent cultivation (of intermediate permanence).

### Location of fields and settlements

- Stationary housing in clustered settlements, often secondary homesteads at distant fields (cattle posts).
- Smaller fields (average: 0.5 ha) of relatively exhausted fertility near Seronga.
- Bigger fields (2 – 17 ha) deeper in the forest, often younger and thus more fertile.
- Traditional divide into villages with arable farming and cattle posts changing into interspersed land uses.

### Dominant cropping pattern

Mixed or mono-cropping of maize (*Zea mays*) and/or sorghum (*Sorghum* sp.) on loamy soils of higher fertility with a wide variety of secondary crops (beans, water melon, pumpkin, groundnut, ...).

### Complementary cropping patterns

Mixed or mono-cropping of millet (*Pennisetum glaucum*) on sandy soils of low fertility. Typical secondary crops are legumes.

### General farm management characteristics

- Farmers adapt to nature and do not try to adapt nature to the needs of farming.
- Households share the same basic agricultural practices, following diverse but not very sophisticated strategies of soil fertility management and crop rotation.
- Main challenges of arable farming: rainfall variability / severe livestock & wildlife damages to crops – farmers react by reducing effort invested in farming, while farming techniques remain unchanged. Exception: fencing as a key management practice.
- Main challenges of animal husbandry: diseases, limited markets, droughts & predation by wildlife.

### Main farming implements

Manual, hoe-based cultivation with ox- or donkey-drawn ploughs for soil preparation.

### Cultivation/Fallow cycle

- Semi-permanent cropping with very rare and irregular short-term fallows.
- Irregular but occasional extension of arable area.

### Crop rotation

- Diverse rotations exist (irregular vs. regular).
- Rotation possibilities restricted to soils of higher fertility (maize vs. sorghum), poorer soils restricted to millet as staple crop.

### Soil fertility management

current practices insufficient to retain fertility → soil degradation

Most common practices:

- 1) Acquisition of fresh soil by clearing new or extending old fields.
- 2) Herding cattle into fenced field for a few days to fertilise with manure.
- 3) Incorporation of crop residues into soil during ploughing.
- 4) Use of a mold board plough.
- 5) Livestock feeding on crop residues, fertilising to a limited degree with manure.

### Land tenure

- Mainly tribal land tenure, though currently administered by governmental "Land Board".
- Household-specific use rights of fields.

### Livestock economy & management

- Livestock keeping, esp. cattle, an important livelihood source due to its multi-functionality: Draught animal power / social function (prestige, bride price)/risk-coping strategy ("rural bank account")

### Cattle management

- Co-existence of herding and free-range system. Near settlements: kraaling at night.
- Grazing on harvest residues, fallow lands or natural vegetation. No fodder cropping.

### Seronga's "cattle crisis"

Disease-related slaughter of all cattle in Ngamiland province in 1996. Relatively poor households face high challenges in restocking and are thus dependent upon hiring of draught animal power.

## Cultivated crops

**Table 2: Crops cultivated in Seronga core site and frequency among cultivating households (N=189). (Latin names derived according to best knowledge from FAO World Census of Agriculture).**

Crops	Latin name	Frequency (N=189)	% of cultivating households	
<b>Cereals</b>	Pearl Millet	<i>Pennisetum glaucum</i>	156	82.5
	Maize	<i>Zea mays</i>	122	64.6
	Sorghum	<i>Sorghum bicolor</i>	143	75.7
<b>Pulses</b>	Beans & Cowpeas	no specification	155	82.0
<b>Oil seeds</b>	Groundnuts (African groundnuts or peanuts)	<i>Arachis hypogaea</i> <i>Vigna subterranea</i>	119	63.0
	<b>Tubers</b>	none		
<b>Vegetables</b>	Pumpkin	<i>Cucurbita</i> spp.	89	41.1
	Tomatoes	<i>Lycopersicon esculentum</i>	8	4.2
	Chili	<i>Capsicum</i> spp. ( <i>annuum</i> )	4	2.1
	Spinach	<i>Spinacia oleracea</i>	1	0.5
<b>Fruits</b>	Melon (water melon & others)	<i>Citrullus vulgaris</i> & <i>Cucumis melo</i>	169	89.4
	Papaya (pawpaw)	<i>Carica papaya</i>	46	24.3
	Mango	<i>Mangifera indica</i>	1	0.5
	Strawberry	<i>Fragaria</i> spp.	1	0.5
	Bananas	<i>Musa paradisiaca</i>	1	0.5

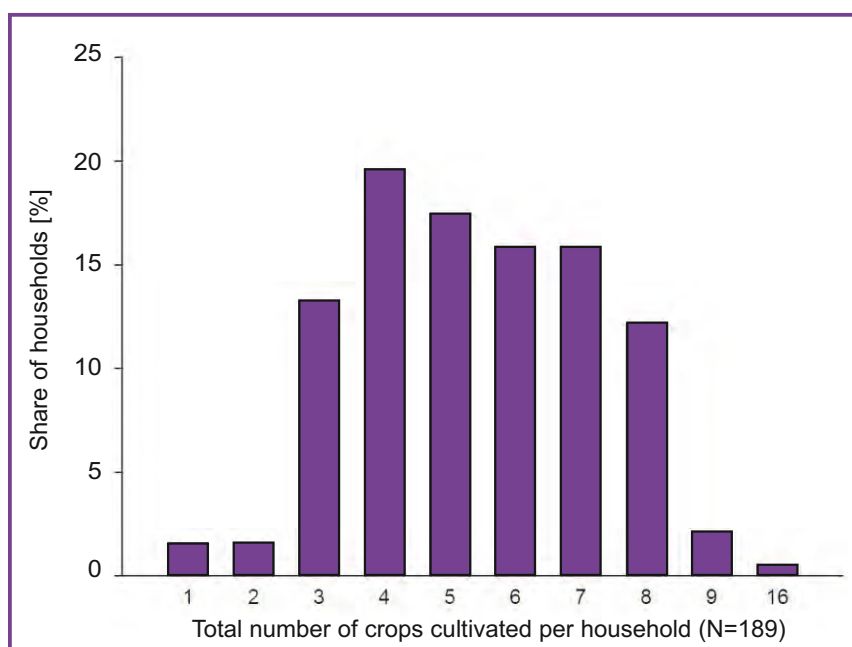
Cultivated crops influence the diversity of the diet of the farming communities, as they constitute the main share of the consumed food products. They can also be a source of income. The data refer to the core site of Seronga where 342 households were interviewed.

Characteristic of Seronga is that only 60% of the population practices arable agriculture. These households cultivate 14 different crops in total (Tab. 2); this excludes the 2 professional gardeners, who cultivate many more). Among these crops, 6 are cultivated by more than 50%, and pumpkin and papaya are also significant. The number of crops one household cultivates varies significantly, from 3 to 8 (Fig. 2). The most important crops for both income and subsistence are millet, beans, maize and groundnuts (Fig. 3). However, only 22 households (12% of those cultivating) sell or exchange crops. This is surprising given the existence of 40% of households who do not produce staple crops and thus must import food from outside Seronga.

The humble production of staple foods as

compared to the potential local demand in Seronga may be partly explained by the difficult conditions for arable agriculture. Birds and elephants are a constant cause of damage to crop fields; this relates to the

location of Seronga in a wildlife- and biodiversity-rich relatively intact natural region. Related losses reduce the efficiency of the work and time invested in farming and increases the risk of production.



**Fig. 2: Distribution among households of the diversity of crops cultivated.**

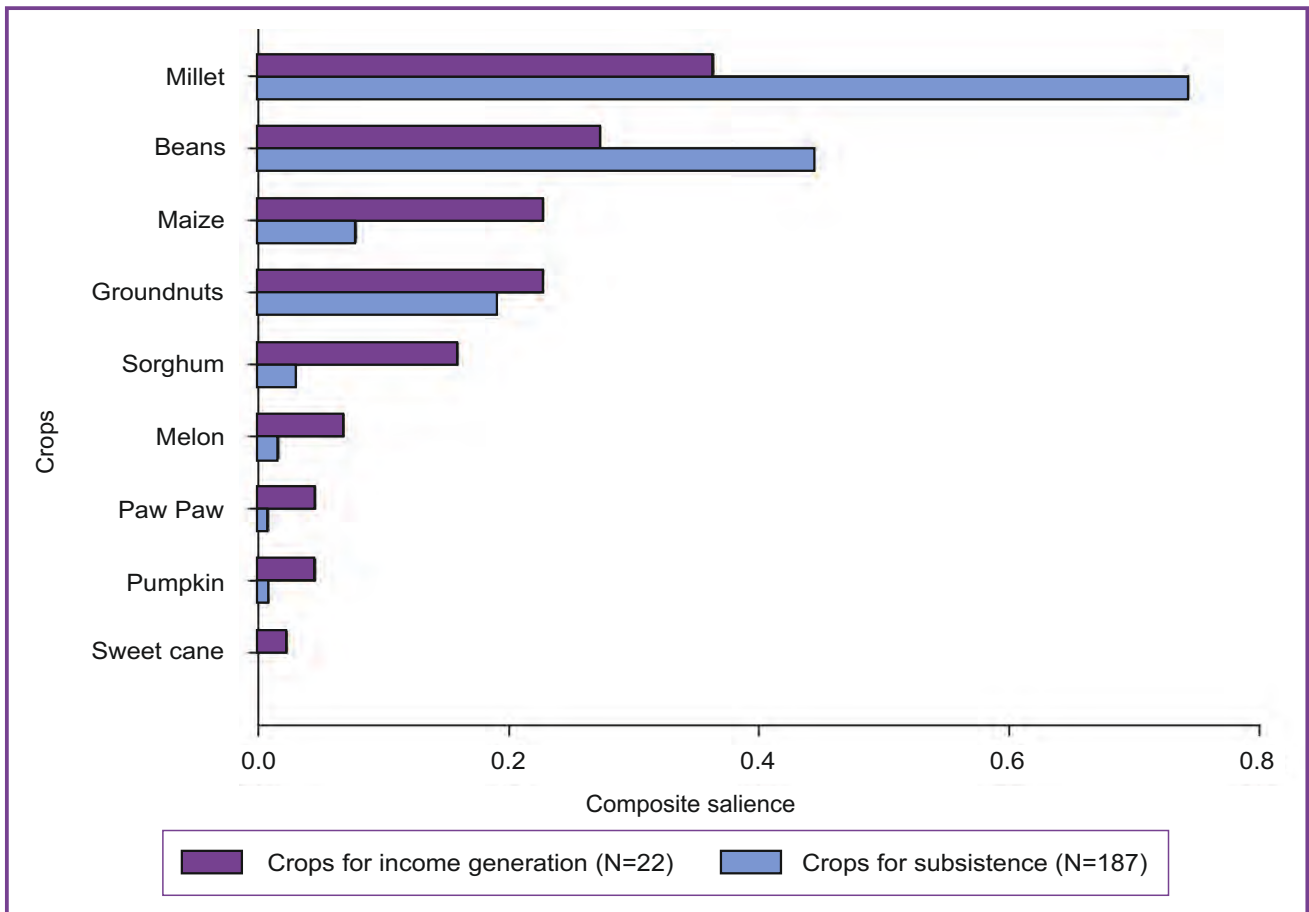


Fig. 3: Most important crops cultivated for income and for subsistence (salience calculated based on ranking and frequency of citation).

## Livestock ownership

Livestock in Seronga consists of cattle, goats, chickens, donkeys and horses but only cattle and goats are considered here. Although livestock keeping is a traditional activity in Ngamiland, livestock activities are only important for half of the Seronga households. Among these, most

households have small herds, with 50% being smaller than 10 cattle or 7 goats. Only 8 households own between 50 and 200 cattle (Fig. 4). This skewed distribution can be related to the 1996 general cattle culling event related to the foot-and-mouth disease outbreak, when all herds were culled.

Herds were subsequently reconstituted, but only by some households due to lack of means. 65% of livestock owners engage in trade but on average trade is proportional to the number of animals owned. Trade takes the form of sales (in two-thirds of cases) or exchange.

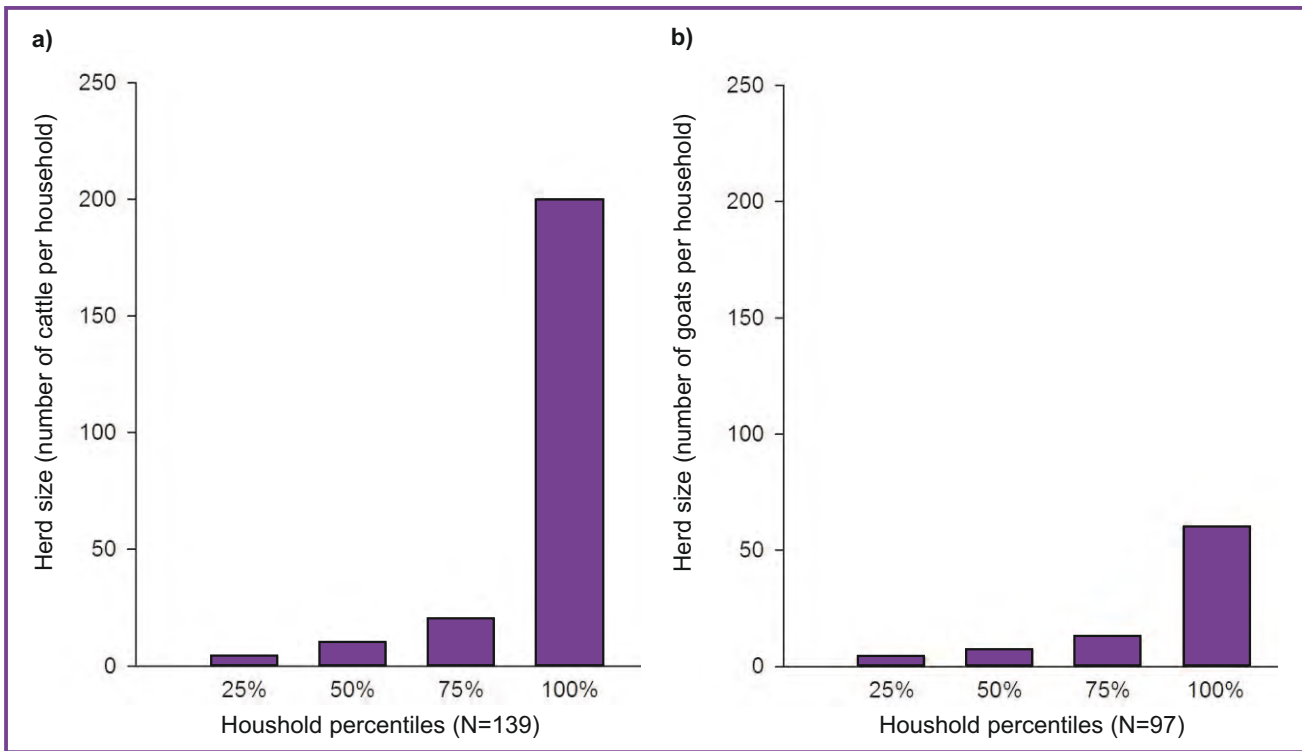


Fig. 4: Distribution of livestock ownership (a: cattle; b: goats).

## Foods availability, provenance and schedule in Seronga

Table 3: Natural resource extraction.

Timber for housing, kraals, and mokoros [kg dry weight per head per year]	73.8
Firewood use [kg dryweight per head per year]	338.7
Fish consumption [kg per head per year]	61.7
Household water use [l per head per year]	3,516.2
Thatching grass [kg dryweight per head per year]	31.3
River reeds [kg dryweight per head per year]	22.8

This section provides a detailed depiction of food consumption patterns in Seronga throughout the year. Seronga is remote and difficult to access. Thus, fresh fruits and tomatoes are only available for retail in two commercial horticultural gardens, which produce very small quantities. Cereals and vegetables are also not necessarily available at the Seronga Co-

operative. For this reason, people depend on purchased food from markets in other large towns, or produce their own. Figure 5 shows that most food items are produced within Seronga and often by each house-hold itself. However, it is interesting to see that even the middle class inhabitants of Seronga (for which the data were collected) consume items

purchased at the market all year round. Importantly, Seronga inhabitants meet about 17% of their food requirements from wild foods collected in the surroundings (Fig. 6; Mmopelwa et al. 2009). These foods are culturally (Marungu et al. 2013) as well as nutritionally characteristic of the Seronga society. Their availability and collection schedule is given in Figure 3.



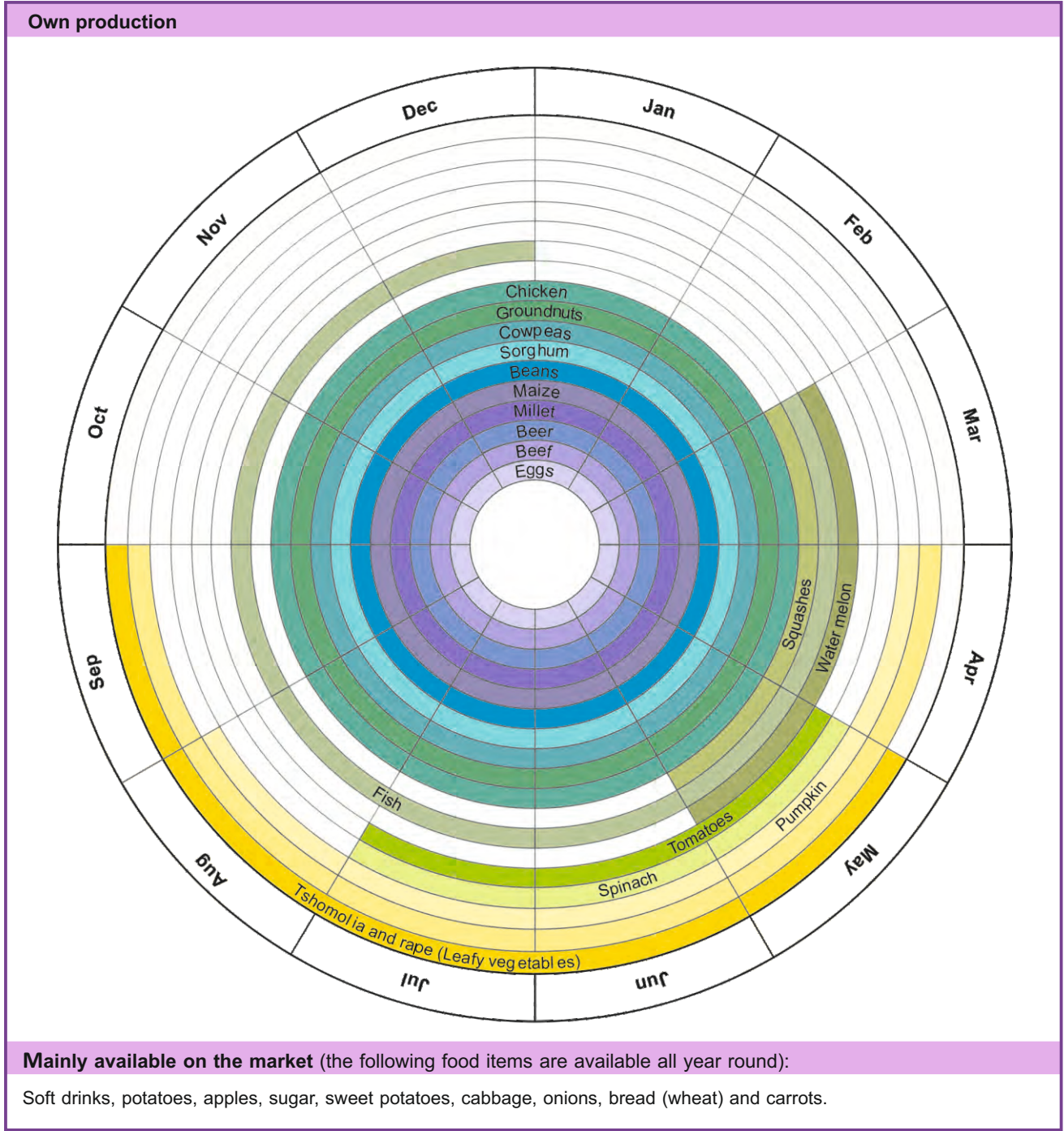


Fig. 5: Food calendar showing the consumption of produced and purchased food items in Seronga (N=6; focus group).



Table 4: Officially registered numbers of livestock killed by wildlife in 2010 and 2011 (Source: Wildlife Office in Seronga, 2011).

		Cow/Heifer	Bull/Oxen/Tolly	Goat	Donkey	Horse	Calf	Foal
<b>Crocodile</b>								
killed	2010	44	20	7	1	12	3	0
	2011	36	16	4	2	11	3	2
injured	2010	7	4	0	0	4	0	1
	2011	7	2	0	1	0	0	0
<b>Wild dog</b>								
killed	2010	35	14	0	1	0	7	0
	2011	7	6	4	0	0	8	1
injured	2010	0	1	0	0	0	2	0
	2011	0	0	0	0	0	0	0
<b>Leopard</b>								
killed	2010	2	1	10	0	0	10	2
	2011	3	1	19	0	0	4	2
injured	2010	3	0	0	0	0	2	0
	2011	0	0	0	0	0	0	0
<b>Lion</b>								
killed	2010	8	4	0	1	1	0	0
	2011	17	9	0	0	0	2	0
injured	2010	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0
<b>Elephant</b>								
killed	2010	3	3	0	0	0	0	0
	2011	5	1	0	3	0	0	0
injured	2010	1	1	0	0	0	0	0
	2011	0	0	0	0	0	0	0
<b>Hippo</b>								
killed	2010	1	0	0	0	0	4	0
	2011	0	0	0	0	0	0	0
injured	2010	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0
<b>Hyena</b>								
killed	2010	2	1	0	0	0	2	0
	2011	1	0	0	0	0	0	0
injured	2010	0	0	0	0	0	0	0
	2011	0	0	0	0	0	0	0
<b>Total</b>								
killed	2010	95	43	17	3	13	26	2
	2011	69	33	27	5	11	17	5
injured	2010	11	6	0	0	4	4	1
	2011	7	2	0	1	0	0	0

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