INDIGENOUS SOLUTIONS TO FOOD INSECURITY

WILD FOOD PLANTS OF SOUTH SUDAN

OXFAM

ACKNOWLEDGMENT

Dedicated to the people of South Sudan and their inherent resilience. May this research give us a deeper understanding of your natural environment and inform future humanitarian assistance.

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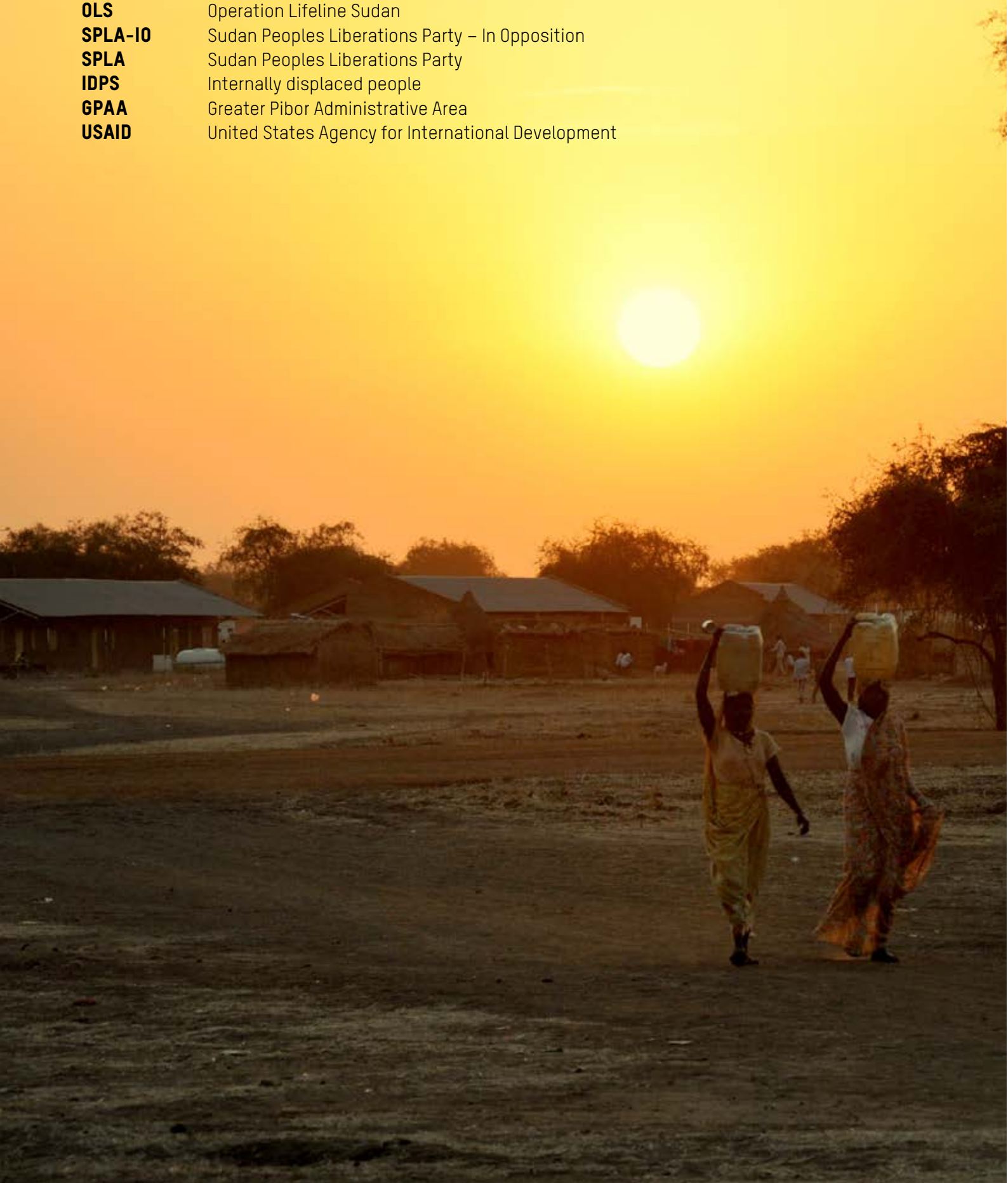
Cover page: Omot preparing food for her family in Melut, South Sudan. Andrea Campeanu/Oxfam

CONTENTS

ABBREVIATIONS

IWFPS	Indigenous wild food plants
OLS	Operation Lifeline Sudan
SPLA-IO	Sudan Peoples Liberations Party – In Opposition
SPLA	Sudan Peoples Liberations Party
IDPS	Internally displaced people
GPAA	Greater Pibor Administrative Area
USAID	United States Agency for International Development



Women waiting in line for food in South Sudan. Andrea Campeanu/ Oxfam.

EXECUTIVE SUMMARY

During times of severe food shortages, alternative sources of food are the only means of survival. When crops fail or are destroyed, markets, houses, livestock and food stores are demolished or stolen, and movement is limited due to conflict, local populations have only two sources of food left; aid and what is locally available in the surrounding environment. The utilization of wild plants, fish and game becomes a primary coping mechanism for people affected by conflict. While the killing of wild game is illegal, and fishing is supported with distributions of tools, knowledge on the role of indigenous wild plants in diets is not well understood. Although vital during times of food shortage, wild plants are also a normal part of diets in South Sudan. Research has found that wild plants are "the nutritional equivalent of- and in some cases are superior to- introduced vegetables and fruits" and their use both diversifies and improves diets.[1] Some wild plants are particularly nutritious and could potentially play a significant role in creating a sustainable source of much needed nutrients in South Sudan.

Further some wild plants also hold economic value and are already traded in local, and even international markets. The domestication or sustainable collection of wild plants with agricultural or economic potential could create alternative sources of both income and food. Distribution of food aid is costly, unsustainable and not always a possibility. The potential for developing or promoting a local, sustainable food source should not be ignored. Utilizing and sharing indigenous knowledge on wild plants, including which ones are edible, how to prepare them and which have economic value, could play an important role in supporting communities. The expansion of the use of wild plants is not an immediate solution to the dire food situation currently found in South Sudan, and should not be promoted as such. However, the humanitarian community should not ignore any potential local solutions that exist. The correct utilization of indigenous wild food plants could play a significant role in improving the lives of people suffering due to conflict and food insecurity.

INTRODUCTION

In 1998 a major famine occurred in Bahr el Ghazal in which an estimated 70,000 people died.[2] Due to a history of exploitation the population was vulnerable to outside shocks, and clashes between warring parties during the planting season along with a drought led to a famine.[3] Armed militias stole livestock, looted grain, burned houses and crops and abducted people. Food relief was slow to come and initially blocked. When it finally did reach people armed groups and chiefs appropriated food aid from the most needy for their own purposes. During this time, as in other famines, people heavily relied on the one resource that was left, wild plants, in order to survive.[4] While normally only a small part of people's diets, during times of hunger, famine or drought wild food sources are often the only coping mechanism people have left. This is apparent in the fact that earlier famines in the 1980s were named after the wild foods that people used to survive such as "the famine in Yirol in 1985, which was called nyok; the famine in 1988 in Rumbek, which was called apat; and the famine in 1986 in Bor, which was called apat."[6]

The importance of indigenous wild food plants (IWFPs) to food security was apparent to actors involved in Operation Lifeline Sudan (OLS). Two workshops were held after the Bahr el Ghazal famine to discuss the potential of IWFPs in Southern Sudan. The first occurred in Kenya the following year, in 1999, and a second followed in 2001. Over sixty people attended the first one, including regional experts on wild plants from Kenya and Ethiopia.

Research on IWFPs in Southern Sudan had actually already begun in 1995 and hundreds of plants had been identified and categorized by the time of the workshops. The report from the workshop includes a sample questionnaire, a sample recording of the Nymphaea sp., commonly known as the water lily (a plant that is once again of significant importance among food insecure communities) and a chart with vernacular names for dozens of IWFPs in Southern Sudan. Many recommendations regarding developing this resource were posited, and the research on IWFPs that had been carried out already was to be compiled into a publically accessible database. Although a second workshop was held a couple years later in 2001, interest in IWFPs among the international community appears to have waned in the following years. Funding for the database ended before it was ever finished or published, despite years of data being collected.

As another man-made food security crisis looms in South Sudan, the role and importance of IWFPs as a food source is once again incredibly relevant. As a result Oxfam commissioned research into the utilization of natural resources as foods both as part of the normal diet of communities as well as a coping strategy in periods of hunger. The goal of the research was to create an introduction to the role of IWFPs as a part of food security mechanisms within South Sudan. Common questions and assumptions regarding IWFPs will be addressed and areas recommended for further research will be identified.

METHODOLOGY

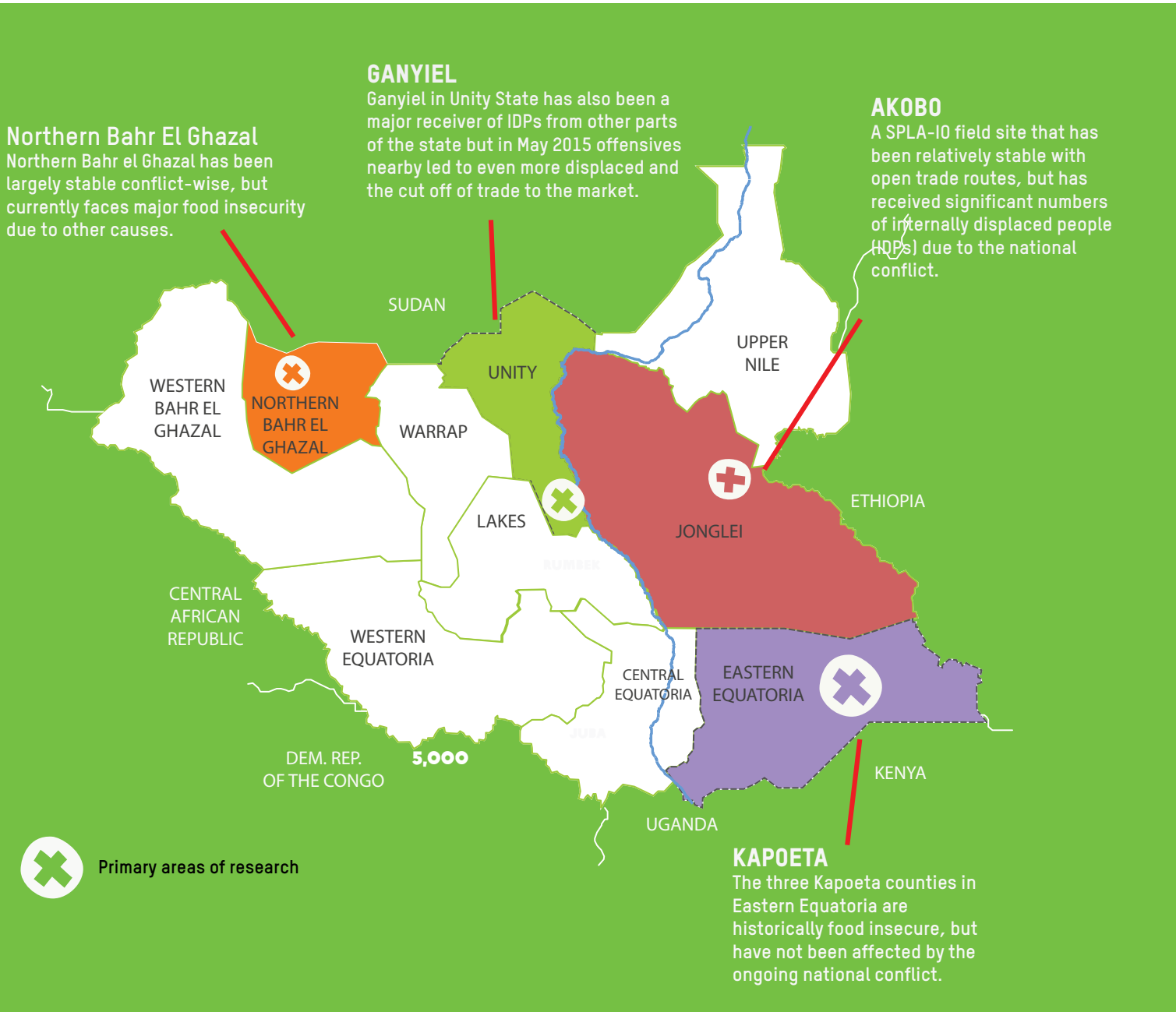
The methodology used for the research was qualitative. The research team, comprised of Michael Arensen and Martin Lubang along with translators/facilitators, carried out semi-structured interviews, focus group discussions and key informant interviews in five field locations between June and August 2015. The five regions were selected due to access, shared historical food insecurity issues, and varied conflict experiences.

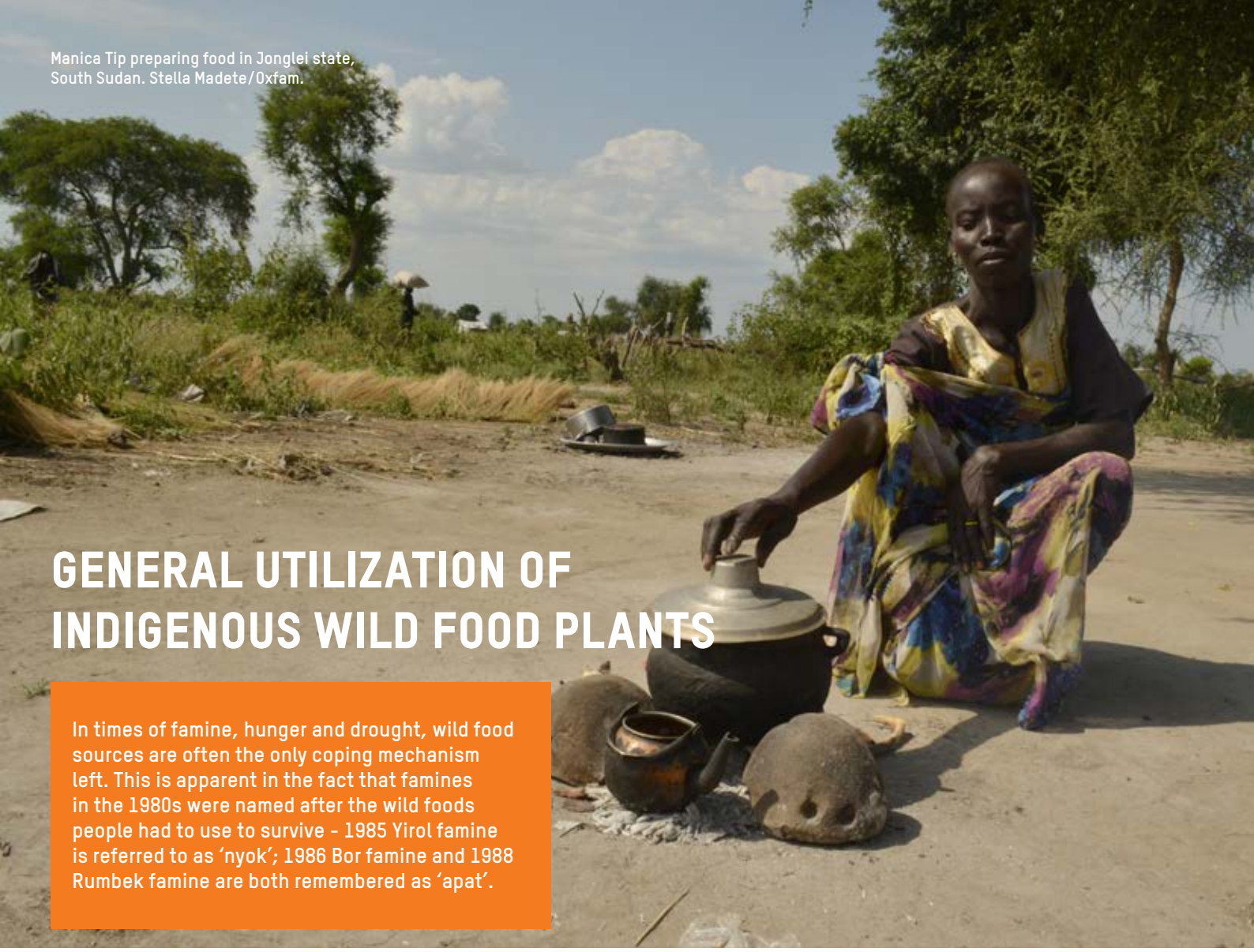
Akobo in Jonglei State was selected as a SPLA-IO field site that has been relatively stable with open trade routes, but has received significant numbers of internally displaced people (IDPs) due to the national conflict. Ganyiel in Unity State has also been a major receiver of IDPs from other parts of the state but in May 2015 offensives nearby led to even more displaced and the cut off of trade to the market. Northern Bahr el Ghazal has been largely stable conflict-wise, but currently faces major food insecurity due to other causes.

Finally the three Kapoeta counties in Eastern Equatoria are historically food insecure, but have not been affected by the ongoing national conflict.

The goal of the research was not a comprehensive study but instead an initial report in order to understand the use of IWFPs by various ethnic groups as a means of identifying both gaps in the knowledge and potential future research that needs to be carried out on the topic.

The research was limited to only pastoralist communities in two ecological zones, the flood plains and the arid zone, as they are historically the most food insecure. Insecurity and weather restricted access and led to research in certain locations being changed or delayed and limited the movement in some field sites. Where mobility was restricted the research team attempted to include people from various parts of the county. The primary limitation was time, as the field research was carried out over a period of five weeks.





Manica Tip preparing food in Jonglei state, South Sudan. Stella Madete/Oxfam.

GENERAL UTILIZATION OF INDIGENOUS WILD FOOD PLANTS

In times of famine, hunger and drought, wild food sources are often the only coping mechanism left. This is apparent in the fact that famines in the 1980s were named after the wild foods people had to use to survive - 1985 Yirol famine is referred to as 'nyok'; 1986 Bor famine and 1988 Rumbek famine are both remembered as 'apat'.

There exist hundreds of types of indigenous[7] wild food plants throughout South Sudan. From only five weeks of field research in 2015 almost 200 wild food plants were identified in five areas[8],and although many are likely repeated entries in different languages or dialects, former long term consolidated research found over 350 different varieties. Many parts of trees and plants are eaten including leaves, fruits, seeds/kernels, roots/tubers, grains, sap, and bark. When available details on the local name, part of the plant that is consumed, time of year it is ripe, taste, preparation, market value, availability, medicinal value, and if it is a 'famine food' or normal food, were collected in the recent research. Where possible the scientific, English and Arabic names were identified and the lists in different languages were consolidated.

The database is by no means comprehensive and when details were strongly debated or not clear the section was left blank. Further complicating the data collection are spelling and name variations between local languages, dialects and researchers. For example, Nuer in Jonglei State have different names for certain plants than Nuer in Unity State, while among Toposa some plants have a different name between locations and even between generations. There can also be age variation in regards to who eats certain wild plants and fruits. Adults identified some plants as 'hunger foods', whereas boys herding goats actually consume the fruit on a normal basis. Interestingly some tasty wild foods were also identified as 'hunger foods' in Ganyiel as they are difficult to find and only searched out when other food is lacking.

Due to the seasonality of many wild plants, a yearlong project is necessary in order to document the tremendous diversity of IWFPs found throughout South Sudan. Furthermore there is a need to verify data collected in the past and consolidate it with more recent research.[9] Despite various complications the initial research found it very clear that people across South Sudan consume wild plants both as part of their normal diets as well as during times of hunger. Amongst the pastoralist groups living in the flood plain zones (Dinka, Murle and Nuer) a general pattern emerged when it came to availability of IWFPs.

Most of the fruits became available at the end of the year or beginning of the dry season. Some lasted throughout the dry season and were relied on heavily until rains returned, like the lalop (Balanites aegyptica), while others were only available for a few months or less. Not surprisingly it is during the times of year when people are most food insecure that they most frequently rely on IWFPs. After the return of the rains many of the edible leaves became available, which are usually used for sauces or as a supplement for grains. During the rainy season the wild grasses and grains were generally available, before the normal harvest season. After the harvest season people's use of wild plants reduced until the end of the year when many wild fruits start to become available again.

People in many communities explained that the use, and knowledge, of wild food plants expands during times of conflict, and therefore hunger, and reduces again during peacetime. Murle stated that people had to learn again about many of the more rarely eaten plants when the community was displaced in the bush during the clashes between SPLA and David Yau Yau in 2012 and 2013. However, generally people in rural areas learn which plants are edible from family, friends or experience. Women and children carry out the collection of IWFPs, often when carrying out the daily errands such as collecting firewood and looking after livestock. When girls are old enough women will often bring them along to collect wild plants with them and to teach them. Children also learn from observing what is cooked and eaten at home by the mother.

Although collection for the cooking pot is primarily women's work, men often know about IWFPs from when they are young boys as they snack on them when herding livestock. Some parents said they taught their children what they can eat in case they are separated in the bush during an attack, but that the first priority usually was finding water. Murle women interviewed also said they teach girls who attend primary school and therefore do not join the trips to collect wild plants.

Importantly, it was found that people who were raised in urban areas often lack knowledge about IWFPs. Young men in one city in Northern Bahr el Ghazal explained they do not know anything about wild food plants as the information was only known by those who live in cattle camps and villages. In addition villages in Aweil inhabited by returnees from Sudan also confirmed they did not know which wild plants could be consumed, as they did not have the plants where they had lived before in Sudan. In case of possible displacement it is these people who are most at risk. If displaced into the bush they are extremely vulnerable, as they do not have the knowledge needed for survival unless they can find someone local who does. Furthermore, social networks are the primary coping mechanism people rely on during times of displacement and food insecurity. Migrants that have moved to cities in other parts of the country might not have the social safety nets others can rely on nor the local knowledge needed to survive without help.

FORMER RESEARCH

During Operation Lifeline Sudan (OLS) significant research was carried out on the potential of IWFPs from 1995 onwards. There were even two workshops held on the topic during that period, one in 1999 and one in 2001 attended by food and wild plant experts from around the region[10]. USAID, Save the Children UK, WFP, CRS, and other organizations collected a large amount of information on over 350 different IWFPs throughout the country[11] , including nutritional data and names in over a dozen local languages. Two researchers in particular, Caroline Gullick and Birgitta Grosskinsky, collected data from different parts of the country and would then consequently return to the field sites to hold workshops to discuss the findings with the population. In reports from the period there is mention of an available IWFP database with all the findings. However, funding actually ended before this database was ever finalized and published and sadly it never existed in full.

A list of plants with vernacular names from various parts of the country was published in the 1999 workshop report, but it was limited to names only. Both researchers were interviewed and believe they still have the original data themselves, but cannot publish or release it unless approved by USAID. If released by USAID, further research on IWFPs in South Sudan would already have over five years of data to use as a baseline. Future research could instead focus on verifying and updating the existing information and filling in the few gaps that are left, rather than starting from scratch again.

The release of the originally collected information on IWFP's in South Sudan is vital to future research on the topic, and would be a major boost towards the development of a comprehensive database while saving years of work.

Below: Martha using a stone to prepare food in Jonglei state. Stella Madete/Oxfam.

NUTRITIONAL VALUE

Research has found that wild plants are "the nutritional equivalent of - and in some cases are superior to - introduced vegetables and fruits" and their use both diversifies and improves diets.

One of the major assumptions about IWFPs is that they do not have significant nutritional value and therefore are only beneficial as a last resort when more traditional food sources fail or as a supplement. However, studies reveal that many IWFPs are not only comparable to domesticated crops; some have even higher nutritional values.[12] Research on wild grass grains found that "their calorific value is frequently greater than that of the cultivated varieties and they tend to be more balanced cereals when the overall nutritional value is taken into consideration."[13] Indeed earlier research on grass grains from Southern Sudan by Grosskinsky in 1997 showed a range of 310-391 kcal/100 grams, which is comparable to sorghum.[14]

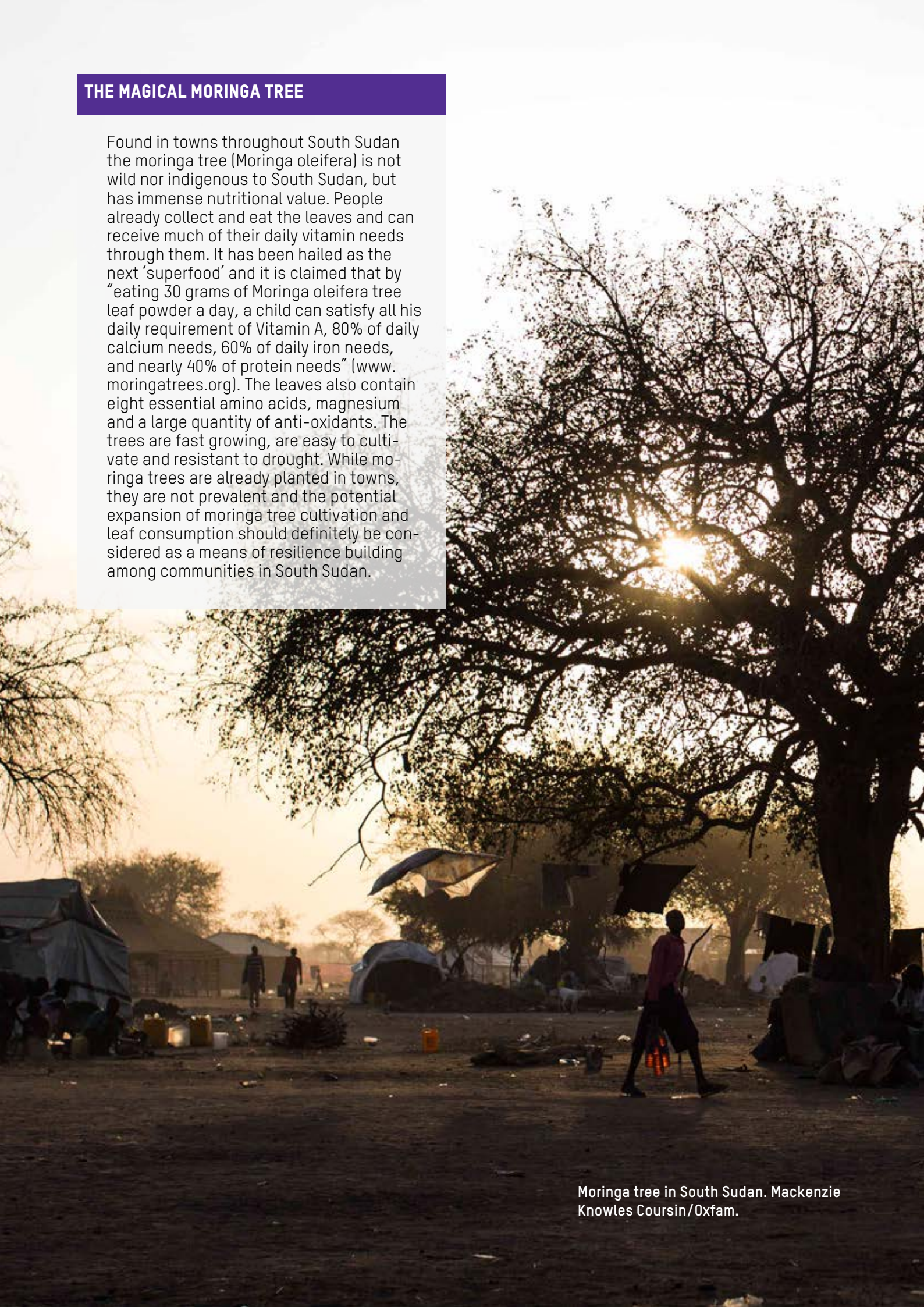
The most heavily relied on IWFP in South Sudan is Balanites aegyptiaca also known as the lalop or heglig[15] in Arabic. During the annual dry season period, people groups collect the Balanites aegpytiaca fruit and leaves. IDPs interviewed who had fled to Akobo town from as far as Bentiu and Malakal relied almost exclusively on the lalop during their travels across the country. Four different parts of the tree are used; the leaves, fruit skin, fruit kernels, and fruit flesh are all edible and nutritious. The skin of the fruit is often pounded into a powder, which is used for porridges, while the fruit flesh is eaten directly. The leaves are boiled, while the kernels require the most preparation, as they are bitter when eaten raw. Some ethnic groups dry the kernels, while others also boiled them, sometimes multiple times, to get rid of the bitter taste. After they are boiled these kernels are then eaten straight, cooked or pounded into a powder that is used for various purposes. IDPs in Unity State reported that during hunger periods they also boil and eat unripe lalop fruit. The results of the nutritional analysis of the kernels from the Balanites aegyptiaca were even more impressive than grass grains. Research by Malaisse and Grosskinsky found a range of 514 to 567 kcal/100g, which is impressively high.[16]

Aside from the calorific values, the utilization of IWFPs also improves diversity and balances the diet. A nutritional assessment mission in Bahr el Ghazal during the famine in 1998 by WFP was surprised by the fact that while the "nutritional status of much of the population is characterized as marasmic, calorie-deficient malnutrition [...] feeding centers have not reported instances of other types of nutrition deficiencies such as scurvy, vitamin A deficiency, pellagra, severe iron anemia or goiter."[17] Based on discussions with female head of households regarding their reliance on particular wild food plants at the time, and studies on the nutritional value of these wild foods, WFP concluded the wild foods fulfilled the micro-nutrient levels people needed, despite the beneficiaries being calorie deficient.[18] Further Grosskinsky points out "it has been demonstrated that more stable populations in other countries, which have become dependent on imported cereals, show a preference for introduced vegetables with lower nutrient quality. As consumption of fruit and leafy vegetables decline, the consequent reduction in vitamins and minerals results in nutritional deficiency disorders."[19]

In other words, people who utilize wild foods as a normal part of their diet can actually have healthier diets than those who exclude them. Research found that the majority of rural people interviewed collected and ate IWFPs throughout the year, including when they had food stores.[20] Despite people's use and the proven nutritional value of IWFPs, their role in people's diets is assumed to be of little consequence. Instead past and current research proves the opposite- that IWFPs not only play an important role in diversifying diets and as a source of micro-nutrients, but even as a source of calories both in normal daily life, and times of hunger.

THE MAGICAL MORINGA TREE

Found in towns throughout South Sudan the moringa tree (Moringa oleifera) is not wild nor indigenous to South Sudan, but has immense nutritional value. People already collect and eat the leaves and can receive much of their daily vitamin needs through them. It has been hailed as the next 'superfood' and it is claimed that by "eating 30 grams of Moringa oleifera tree leaf powder a day, a child can satisfy all his daily requirement of Vitamin A, 80% of daily calcium needs, 60% of daily iron needs, and nearly 40% of protein needs" (www.moringatrees.org). The leaves also contain eight essential amino acids, magnesium and a large quantity of anti-oxidants. The trees are fast growing, are easy to cultivate and resistant to drought. While moringa trees are already planted in towns, they are not prevalent and the potential expansion of moringa tree cultivation and leaf consumption should definitely be considered as a means of resilience building among communities in South Sudan.



Moringa tree in South Sudan. Mackenzie Knowles Coursin/Oxfam.

Firewood is often used to prepare food in South Sudan. Mackenzie Knowles Coursin/Oxfam.

PREPARATION

It is often assumed that the collection and preparation of IWFPs is both time-consuming and laborious, which undermines the potential of IWFPs as a greater source of food. However, current and past research shows that while certain wild foods do require serious preparation before becoming edible, most of the species requiring significant preparation are only consumed in times of famine.[21] Importantly, though, the majority of IWFPs are not famine foods and are consumed as a normal part of people's diets. Only 20% of IWFPs names collected in Akobo were identified as purely famine foods, and there was even a smaller percentage among the IWFPs identified in Toposa and Murle areas.

In addition wild foods only require labor during the harvest/collection stage, unlike cultivated plants that require the clearing of fields, sowing of seeds, and the clearing of weeds, along with the time consuming process of keeping away birds and animals. Further there is the potential of a poor harvest due to unpredictable weather, insects or birds, or insecurity. While some wild grass grains, such as wild rice, are difficult and time consuming to harvest, the period that they ripen in South Sudan is before the main agriculture harvest. As a result people have time to collect wild grains since there is no overlap, or conflict of interest, with the normal harvest time.[22]

When there is not a great food shortage women often collect edible plants while doing other work, such as gathering firewood, or send the children out to collect them instead. Children herding livestock frequently collect and eat wild plants and fruits. It is during times when IWFPs are relied on exclusively, as they are now in parts of the country involved in conflict or recovering from it, that the time and labour used to collect and prepare IWFPs becomes considerable. Women in Pibor, Ganyiel, and Akobo, for example, have to travel two to three hours one way to areas where IWFPs could be found and collected. All three locations are food insecure and people identified wild plants as the primary food source among the community,[23] which increased competition over the IWFPs found near the population centers. Nuer women in Ganyiel usually collect certain wild foods, such as yiil (water lily seeds), gop and bauw, in bulk and store them for the hunger period later in the year.

However, due to food insecurity among the local population and the hosting of IDPs, this year they have been unable to create any food stores.[24] In addition to the physical labour and time used, the required movement of women to areas far away raises protection concerns, especially in conflict areas. Displaced populations, such as the IDPs in Akobo, are at particular risk as they do not know the local area or places to find wild foods nearby.

Despite this, according to interviews conducted in June 2015, many of the IDPs who had arrived in Akobo only the day before had left to the bush at five in the morning to look for firewood and wild plants to collect. Others were too afraid to travel to the bush in a new area and instead had to rely on what food they could beg from the host community or find nearby.

Importantly, preparation acts not only as a means to make certain foods palatable or non-toxic, but also can improve, or reduce, the nutritional value or digestibility of foods. Certain micro-nutrients (especially iron and calcium) need to be combined with other foods or prepared in a certain method to be usable by the human body.[25] The content of certain vitamins in foods, such as Vitamin A and C, can be reduced if cooked for a long time over high heat or left to dry in the sun.

Alternatively malting or fermenting foods can lead to easier digestion, increased flavor, and even increase nutritional value as well as make the nutrients easier for the body to absorb.[26] More research on the various preparation methods used for IWFPs could reveal whether certain foods require more cooking to reduce toxicity, less boiling to ensure the vitamin levels remain high, or alternate methods altogether. Along with the collection and sharing of indigenous knowledge on IWFPs between different ethnic groups in South Sudan, improved preparation techniques could play a significant role in improving nutrition and reducing risks due to the consumption of IWFPs.

ECONOMIC VALUE

Some wild plants hold economic value and are already traded in local and international markets.

In order to recognize the potential value of IWFPs one needs to also consider the economic value, not just the nutritional value, as many can be sold or exchanged in markets across the country. In addition to collecting and selling firewood, grass and charcoal women also collect and sell wild plants such as lalop, ardeeb (Tamarindus indica) and 'lulu' or shea nuts (Vitellaria paradoxa) in the market. Wild fruits and seeds are most commonly sold as they can be kept much longer than greens, but women sold leaves collected from the bush in markets as well. The value of each product varies according to supply and demand but in Akobo and Kapoeta markets an oil tin of lalop is worth 20 SSP, or exchanged directly for grains. In Northern Bahr el Ghazal the trade is even more established and some stores sell lalop seeds by the fifty-kilogram sack for 300 SSP each. Tamarind pods, mokading and kudera (both cultivated and collected greens) were sold for 1 or 2 SSP per handful. Importantly certain wild plants might not be sold in town markets, but are of value in villages where they are traded. For example in Dengjok, Akobo the keye plant (Nuer) has a blue flower and is prized for its excellent smell. It is added to foods or can be exchanged for grain with neighbors.

Further in Ganyiel market it was found a lack of money among people meant that koat, bauw, gop and thoa were instead exchanged with other food commodities.

The greatest potential for expanding the utilization of wild plants in South Sudan, as well as the greatest risk for over-exploitation, is in creating products demanded by the international market. With hundreds of variations of wild plants more research is needed analyzing their potential economic value. Currently the shea nut holds the most obvious international market value as the nuts are already used in beauty products around the world. In 2000 the French NGO MEDIC created a women's cooperative called Lulu Works Trust. It began to create shea butter products under the name Lulu Life, rather than shipping the nuts abroad for processing elsewhere.[27] The profits go back to the women who produce it locally, so that the community are benefiting from their natural resource.

Development projects expanding the utilization of IWFPs, like Lulu Works Trust, could be of huge benefit to local communities. However, clear laws and policies on natural resources, including tree/plant and land tenure, need to be established and enforced to stop the over-exploitation of such products as well as ensure that local communities benefit from their own resources. The development, promotion, and sustainable expansion of products made from local resources, such as wild plants, could become an economic driver in South Sudan.

PERCEPTIONS IN THE MEDIA

The vast majority of IWFPs are consumed on an annual basis, with only a small percentage relied on purely as famine foods.

References in the international and local media on the use of indigenous wild food plants in South Sudan are almost exclusively linked to stories of starvation and desperation. INGOs raise awareness to the plight of people in South Sudan, and the need for more funding, by sharing how people are eating water lilies (Nymphaea sp.) and lalop (Balanites aegyptiaca). This type of rhetoric can lead communities to associate the consumption of IWFPs with poverty or desperation. Rather than acknowledge the important role IWFPs can play in diets, youth in Ganyiel were found to be less interested in consuming them due to the negative perceptions they have heard from the media. This was also the case fifteen years ago as Caroline Gullick complained about the media's negative portrayal of wild foods in a report from 2000.[28] The impression readers get is that wild foods are only consumed out of desperation. In reality the vast majority of IWFPs are consumed on an annual basis, with only a small percentage relied on purely as famine foods.

The Balanites aegpytiaca and Nymphaea sp. are the most commonly referenced IWFPs, but neither are purely famine foods and both are consumed even during times of food security. In fact some people interviewed claimed to even prefer them to both cultivated and distributed foods.

This is not to say that people who have been relying on water lilies in Unity State are not facing major food insecurity. However, more nuanced indicators for famine should be used instead rather than just the consumption of IWFPs. Considerations such as how much people's diets are composed of IWFPs compared to other sources of food; which IWFPs are being consumed; how much people usually rely on IWFPs at that time of year; how much energy is used collecting and preparing them and the normal usage of IWFPs within each community, all need to be considered as famine indicators. Importantly, variations exist not only between food economy zones but also within ethnic groups and counties. For example, some plants, as well and insects such as termites, are consumed by Murle in Gumuruk, but not in Pibor, while Toposa in Kapoeta East eat certain fruits other Toposa do not.

The media and humanitarian community need to be careful so that they do not only reference the utilization of wild food plants in a negative light as it discourages their use and importance. The value of wild plants, forests, grasslands and trees should be recognized aside from as sources of charcoal or timber or as a food source during times of desperation.

"The fact that people are still eating them in such conditions is more a testament to their resilience to adverse environmental conditions and the likelihood that starvation would have set in much earlier. It would give a somewhat different impression if it were reported that 'Though the situation is very serious the wild foods people are now living on have sustained them for sometime; it is a pity there are not more of them.' This may start to raise questions about why these foods have been available when all else has failed and why there are not more of them, and what could be done about it in the future"[29] Caroline Gullick.

STIGMAS

Past research found that traditionally the consumption of wild foods in South Sudan is perceived as food for poor people and therefore of low status. Wild foods were not given to guests, and if there was limited food women and children would consume IWFPs while the men would consume the prestigious foods, such as millet or sorghum. The belief that "eating wild foods is something done by the destitute in normal times" is widespread, but research carried out by Gullick overwhelmingly contradicted the statement.[30] Instead all socio-economic groups were found to consume wild foods in normal times, and it seems more likely that the lack of recognition of the role of IWFPs has led to limited research on the topic.[31]

Furthermore the foundations for the stigmas towards IWFPs began during the colonial era, when priorities were placed on agricultural crops that had value on the international market.[32] The current prioritization of certain introduced crops, rather than indigenous crops that might be more suited to the terrain and have historically held more importance in local diets, is a consequence of this history. Indigenous knowledge of the rural and uneducated is often held in low regard, which includes the utilization of IWFPs. Research in the 1990s on the use of IWFPs found that there were strong negative perceptions against the use of IWFPs among some educated South Sudanese as it is seen as backwards. Instead priority was placed on increasing mechanized farming as a way of addressing growing food security needs.

Importantly the current research in 2015 did not find that perceptions regarding the use of IWFPs were as negative as research from fifteen to twenty years ago, with the exception of some groups in Northern Bahr el Ghazal. Instead local government officials were generally positive and supportive about expanding research and the utilization of IWFPs as a food source. People, including some educated elites interviewed in urban areas, were open about the use of IWFPs rather than ashamed. Out of dozens of interviews only some people showed embarrassment regarding the consumption of IWFPs, mostly those from urban areas who associated the use with poverty or lack of education.

The change could be down to a few considerations: access to rural areas is now easier than during OLS; the people interviewed did not hold the same stigmas as people interviewed in the past; the translators used were all from and grew up in the local rural communities, while in the past this was more rare; reliance upon IWFPs in the recent past has made them more socially acceptable; or the negative perceptions regarding the use IWFPs have changed in the past fifteen years.

While some stigmas did exist regarding wild foods, they were related to particular foods rather than in general. For example, Nuer women in Dengjok believe that pregnant and weaning ladies should not eat leafy greens like akuor (Leptadenia hastata) until their child reaches six months old, as their consumption creates stomachaches.

However, lactating mothers in Northern Bahr el Ghazal were encouraged to eat more akuor as it is believed to enhance milk production, although expecting mothers still were recommended to avoid bitter IWFPs. In addition Nuer in Akobo did not eat termites as they believe they make one sick, but in many other parts of the country they are consumed. Interestingly Murle in general would not eat them, but some people from Gumuruk did enjoy them. Although not a traditional food for Murle, people from Gumuruk had learned to eat them from other communities, showing that cultural taboos on certain foods are not static and diets are adaptable.

Overall it is positive that stigmas regarding the use of IWFPs were not found to be as strong as they were in the past. This will make it easier to collect and share indigenous knowledge on wild plants and foods from around the country. Further the finding that certain people had adapted the use of historically stigmatized foods from other people groups proves that the introduction of new wild foods is both possible and can be can be used as a means of diversifying diets.

RISKS

There are risks associated with the utilization of IWFPs that must be considered and mitigated. Wild plants face many of the same risks as cultivated crops, but without any potential means to protect them. Unpredictable weather, insects, birds and disease could wipe out harvests of wild plants that people expect to depend on. Further the fact that most wild plants are not centralized into certain areas makes them harder to monitor in case of destructive conditions. However, indigenous plants have actually been found to be much more resilient to local weather conditions, such as flooding, than imported variations.[33] The domestication of wild varieties, or the distribution to farmers of local varieties of seeds rather than imported ones, could help diversify crops and reduce the negative impact of shocks.

One of the most significant risks is the potential depletion of wild plants due to over-use. An older woman from Akobo claimed that when she was young she could find IWFPs only twenty minutes walk from the village. However, today due to expanding population numbers, the cutting down of trees for firewood and charcoal, and current dependence upon IWFPs for food security, the same woman now has to walk two to three hours away to find them. It also needs to be remembered that wild foods might be available, but not accessible, due to limited movement or lack of equipment. For example, people in conflict areas risk violence if they need to travel far to find food and therefore all the plants nearby might be depleted. Alternatively people might have a river full of fish nearby but no fishing nets or hooks to catch them.[34] While the solution of distributing farm tools and fishing equipment is common, it is also possible to push for peacekeeping forces to escort women to areas where they can collect wild foods or firewood.[35]

Encouraging people to consume more IWFPs requires they have the necessary knowledge regarding preparation and how to ensure the sustainability of the resource. Some of the wild plants eaten during famines are actually toxic and can kill people who do not use the necessary preparation techniques or time. An excellent example of food only eaten in times of famine is a wild tuber, called leew in Nuer or awale in Murle, which can be poisonous if not extensively prepared before being eaten.

The tubers must be boiled for between twelve and twenty-four hours to make them edible. Some Murle women also explained that they only used clay pots when they prepare it, as cooking pots made of metal would be ruined as they kept the bitter taste. Variations of wild yams seem to be the most risky IWFP in South Sudan if not prepared correctly. During times of hunger people attempt to reduce the time of preparation of certain wild foods, which can have disastrous results. Biong identified three different cases of people becoming sick, or even dying, due to under-prepared wild foods in 1998 alone.[36] Increased consumption combined with reduced preparation time led to three deaths in Lopit, more than twenty-six deaths in Lohutuk and Imehejek villages, and eleven deaths in Lalanga village with 119 people being treated at the local medical center.[37]

Further long-term research and education is a must before organizations encourage the use of IWFPs. People raised in urban areas, or in other countries, are likely not to have the necessary knowledge of edible IWFPs or preparation techniques, and could become sick or even kill themselves if they do not employ proper preparation methods. Further the risk of over-depletion of the resource means that environmental impact studies are necessary to ensure there is an understanding of any consequences before encouraging potential expansion of consumption, collection or production of any highly nutritious or marketable IWFPs.

WILD PLANTS AS MEDICINES

In addition to nutritional and economic value, respondents were also eager to discuss the medicinal value of many wild plants. While the actual medicinal benefits of the identified plants could not be verified, the perceived value to the communities is significant. The limited time frame of the research meant that the myriad natural remedies people use could not be collected in-depth in addition to IWFPs, but future research on both the veracity of the claims and the potential value, or harm, to patients is highly recommended. Despite not talking to traditional healers, local Toposa, Dinka, Nuer and Murle community members identified treatments for malaria, worms, yellow fever, coughing, joint pain, epilepsy and even scorpion stings. The list has been added to the end of the IWFP annex for medical organizations or potential future research into the topic.

A young man folowing his cow home at sunset in Upper Nile State, South Sudan. Andrea Campeanu/Oxfam.

WILD ANIMALS AS FOOD[38]

Wild animals are also a supplement to certain communities' diets, particularly the Murle. Despite current South Sudanese laws banning the killing of wild animals, Lou Nuer, Murle and Toposa all named various wild antelopes, birds and other animals that they eat if they are able to kill them without being caught by the wildlife services. Many of the larger animals, such as giraffe, which Murle believe to be the tastiest meat as well as a treatment for arthritis, are rarely eaten or even seen in the past few decades, however. The influx of guns combined with the significant food insecurity of the population during the second civil war likely wiped out significant amounts of wild animals, or led them to migrate far away from human settlements for survival.

The major migration of both the white-eared kob (kajac in Murle)[39] and the tiang (dorongwa in Murle) through Murle territory continues still though, and both animals are relied on by parts of the community during the dry season. The white-eared kob migrate past Pibor in December/January on their annual migration northeast towards Ethiopia while they follow the rains, and they return again in June. The tiang migrate east and west towards the higher ground between Gumuruk and Bor in the rainy season and back towards the Pibor River in the dry season, passing Gumuruk on the way. Historically the white-eared kob would migrate through Pibor town itself, where Murle men would kill hundreds of them with spears while they crossed the river. In recent years the migration has moved to the southern side of town but still passes nearby. The migration then continues north and the Anuak and Nuer also have the migration pass through their areas. The wildlife branch of government banned the hunting of wild animals in the last few years and would arrest those who were caught hunting wild game. However, conflicts have changed the enforcement of the rules and both SPLA-IO and the GPAA governments have not been enforcing the bans on the killing or sale of wild animals. In the Akobo and Pibor markets the selling of white-eared kob was a daily occurrence in June, and local restaurants and INGOs cooks were also using the meat. A leg of a white-eared kob sold for between 45- 50 SSP alone, and an entire animal was worth 300 SSP, making the selling of game meat a lucrative business.

While the Lou Nuer and Toposa said they eat or sell the meat of any wild animals killed, the overabundance of white-eared kob and tiang meat due to the migrations means that the Murle store much of it. People first add oil and salt to the meat to keep away flies before drying it in the sun, although some people boil it first.

Alternatively when no salt was available due to a lack of market accessibility people instead just boiled the meat or dried it near a fire. Some meat can be kept in strips but much of it is then pounded into a powder that they store for the upcoming dry season, although Murle claim it can last up to two years if needed. It is added to soup or fried as a way of supplementing the diet for the annual lean period and is also used for long journeys. Men traveling to Juba to sell cattle also use it for the journey as it is light and is not clearly identifiable as wild meat so one was less likely to get in trouble for it. Although the use of game meat are traditionally an important part of the Murle diet the laws in place to restrict the killing of wild animals play an important role in the protection of an important natural resource.

The current lack of enforcement by the GPAA and SPLA-IO is worrisome, especially regarding allowing the open trade of illegal animal products in markets. While the protection of wild animals is not going to be of the highest priority in the current context, it is important that pressure is put on the respective authorities to enforce the laws and remind them of their importance. The international community should also be careful not to increase demand for wild game meat by consuming it unwittingly in their field sites and should speak to their cooks about ensuring it is not on the menu.

TERMITES AND HONEY

In addition to IWFPs and animals, insects and insect products can also play a role in food security amongst communities in South Sudan, particularly since they often have market value. One of the most common products collected is honey, which is collected only by men and frequently sold in markets as a means of supplementing income due to its high worth. Women also identified honey as something women long for when pregnant and so send their husbands to collect it for them. Much like IWFPs communities identified certain areas where honey can be most easily found, usually where there are many trees, such as near Burmath in Akobo County.

Men use smoke to calm the bees before taking the honey. Although the Nuer do not collect or eat honey in the rainy season as they believe it has diseases, the Murle and Toposa collect honey year round. A jerry can of honey can sell for as much as 60 SSP in Akobo, while a 500ml bottle is 10 SSP. Murle youth from Nanaam even sold honey in the Akobo market in the last dry season thanks to the ongoing peace agreement between the communities. Interestingly, Toposa respondents identified three types of honey that varied depending on which type of insects produced them and where they were found- in trees, the ground, etc. All three variations were identified as tasting similar and were of similar market value.

Termites, commonly called 'white ants' in South Sudan, are deemed particularly tasty to certain ethnic groups in the Equatorian states and can even be given as a gift. In order to collect them people light grass on fire on a dark night over a small hole, ideally near a termite mound after a heavy rain. This draws the termites to the light where they lose their wings and are then collected from the hole below.[40] They can be cooked and eaten or pounded into an oily paste and are a good source of oil, protein, as well as vitamins.

GILLED AFRICAN LUNGFISH

Murle also identified that during times of hunger there is an available fish even after the rivers dry up that they call gunjagoon (believed to be the gilled African lungfish, or Protopterus amphibius). Even when there is no water in the dry season the fish aestivate (similar to hibernate) under the mud in riverbeds waiting for the rains to return. Murle claim the fish make an 'oop' sound and people who know what to listen for can find their location underground by the noise and a very small hole. However, people have to be careful when digging them up as they have sharp fins that can hurt a person. The fish are long and skinny, so some people will not eat them as they remind them of snakes, while others complained about their smell and strong taste. Although they are not popular enough to be marketable, they are a potential source of food even in times of drought. Lungfish can aestivate for up to a year.

Below: Sun dried fish in Akobo, South Sudan. Alison Martin/Oxfam.

ALTERNATIVE COPING MECHANISMS FOR FOOD INSECURITY

Social Networks

Aside from food aid and the collection of IWFPs, beneficiaries identified various coping mechanisms in times of food insecurity. The most common support is from social networks, family, friends and your community. Among some people groups in South Sudan kin is culturally identified as those you share food with. Through blood or marriage it is this extended family network that people primarily go to for help in times of food shortage. This includes both family nearby and family abroad, who are expected to help through the sharing of food or the sending of financial support. Grains were often shared and neighbors were all invited when livestock are killed for food in times of food shortage. Many people interviewed in Akobo relied on others who had received distribution as well. IDPs with no social networks or ration card also beg food off of the host community or those who have received food aid. In addition within age-system societies[41] individuals also have the ability to reach out to age-mates for help, although family is the primary support network. As communal support is the primary mitigation mechanism employed in South Sudan, people who have migrated to cities or areas where they have weak social networks or few family are especially vulnerable in times of hardship. Combined with the reduced knowledge regarding edible wild plants that is often found among the urban, those facing food insecurity in cities, or who are displaced from urban areas to the bush, are at a much higher risk than others.

Both Toposa and Murle respondents explained that people can 'borrow' a bull from those who have livestock in times of need. Family is not expected to pay back gifted livestock, unlike others. Neighbors, friends and even strangers were able to borrow a bull, but were expected to pay back a female calf in the future. The 'loan' could last a long time and if the debtor died before the debt was settled the family instead took on the debt. In addition in Murle culture a man can pay a down payment of cattle to the parents of a young girl as a means of 'booking' her to be his future wife until she is old enough to be married.[42]

A Murle woman pointed out that this could be used as a coping mechanism for those who have young daughters but no livestock for food. Families can commit a daughter to someone with cattle in exchange for an initial down payment of bride wealth. This will give them livestock for food as well as expand their social networks during times of food insecurity.

Migration

Migration was found to be a coping mechanism for the populations in Akobo and Pibor in the past few years. People move to stay with family in places with food, although women pointed out that is challenging if one has small children or elders to take care of. During the clashes with David Yau Yau and the SPLA in 2012 and 2013 many Murle migrated to Juba as well as Ethiopian and Ugandan refugee camps. Since the start of the national conflict Nuer from across SPLA-IO controlled territory have migrated to locations perceived as safer or across international borders.

Akobo has been a primary destination for IDPs from SPLA-IO controlled areas, with IDPs coming from as far as Bentiu and Malakal.[43] Food insecurity in Akobo has led many IDPs to continue to refugee camps in Gambella, Ethiopia, where they can receive the guarantee of food rations. Food pressures on the host community in Akobo have reached the point that they also have moved family to refugee camps. One fisherman who was interviewed sent his three wives and children to the camps due to the food shortage in Akobo. He stayed behind in Akobo to watch his mother and father and relied on fishing for food. Security was not perceived as a risk in Akobo as he claimed if the new WFP food aid coming to Akobo includes his family he will bring them back from the camps in Ethiopia. However, some host community members who were interviewed had fears that they would not receive ration cards due to corruption. Despite cultivating the lack of seeds meant that without food aid he did not believe they had enough food to support his family. If food aid was not forthcoming the fisherman would take his mother to join his wives in Ethiopia.

Amongst agro-pastoralists in South Sudan the accumulation of livestock increases social mobility. Crispin Hughes/Oxfam.

RAIDING AND SELLING OF LIVESTOCK

Amongst agro-pastoralists in South Sudan the accumulation of livestock increases social mobility, wealth, social networks through marriages, and food security. As a result the pressure to increase herds or replenish lost livestock due to disease, conflict, raiding or drought often leads to raiding. Partially due to the introduction of semi-automatic weapons in recent decades raiding has become increasing violent, and civilians have become frequent targets along with the livestock. Respondents in many areas identified cattle raiding as a coping mechanism in times of famine, but both Murle and Toposa communities also admitted to a reduction in raiding due to strict enforcement of the rule of law by the current local governments. Despite this the significant rewards of raiding will mean the very desperate, as well as criminal elements, will continue the practice, even if on a lower scale than in the past.

Due to their social importance, the selling of livestock among pastoralists is often identified is as a sign of major food insecurity, as they are generally disinclined to do so. While the selling of cattle can be a sign of desperation, these days it is less the case than in the past. Attempts by various governments to include the huge herds of livestock in South Sudan in the international livestock market over the past century generally failed, as people prefer to keep cattle rather than sell them. However, this has slowly begun to change, and a local trade in cattle now exists. A large ox can be sold for as much as 2500 SSP in Pibor, while others take livestock to bigger markets to sell, such as Juba. Traders now register their names, the number of cattle and their colors and patterns with local authorities before moving with them. This acts as a means of taxation for the local administrations as well as an insurance of sorts, in case they are robbed along the way. When food insecure pastoralists will occasionally sell a bull in order to purchase grain, or will kill a bull for meat, this is only with select animals. Certain bulls have more social value than others, such as name bulls, those used for bride wealth, or cattle that are perceived as especially beautiful due to horns or other pleasing attributes.

These cattle are not sold or killed and in some cases young men said they would be willing to fight to the death rather than lose a name bull in a raid. Pastoralist societies in South Sudan still hold livestock in the highest social regard, but small changes in the trade mean that the selling of cattle itself does not directly conflate to food insecurity by the seller as it might have in the past. In order to accurately use the selling of cattle as a famine indicator research should also consider the type of cattle being sold, the amount, and the number left in the herds.

TRADE

The majority of respondents who identified as being primarily reliant on wild plants for food sold wild plant products as well. The most common goods being sold were firewood, grass, and charcoal, in addition to the commonly traded wild food plants such as lalop. Much like the collection of IWFPs the work of collecting from the bush is perceived as primarily women's work. Due to general market inflation the market prices in Pibor were found to have doubled or even quadrupled in the first six months of 2015, as the women who collected the items raised their prices to match the cost of food inflation. Interestingly the price of firewood in Kapoeta recently bottomed out due to a recent government regulation stopping the brewing of local liquors. Demand for firewood drastically dropped and the price went from 10 SSP/bundle to only 2 SSP, undermining the selling of firewood as a means of supplementing incomes among Toposa women. Murle women were also collecting bark of the wungno tree used as local rope called baro. These trees are further away and are more labor intensive to collect than firewood, but the financial rewards are also greater. After an eleven-hour day, including wading through thigh high water, two women were able to collect 37 bundles of rope, which they can sell for 1 SSP each.

RECOMMENDATIONS

- Encourage USAID to release the original information on Indigenous Wild Food Plants (IWFPs) collected in the 1990s and early 2000s;
- Carry out long term research to verify, update and consolidate the former USAID funded information with more recent research with the goal of creating a consolidated database on IWFPs in South Sudan;
- Identify the IWFPs with the greatest nutritional values as well as economic and agricultural potential;
- Consolidate South Sudan research with other databases on African wild plants;
- Encourage the potential expansion of consumption, collection or production of any highly nutritious or marketable IWFPs, but ensure that environmental impact studies are conducted before doing so;
- Identify both customary and national laws which relate to ownership, utilization and protection of natural resources such as IWFPs, including tree and land tenure;
- Carry out research on processing methods of IWFPs and potential to improve them in order to reduce toxicity and increase nutritional value;
- Include indigenous knowledge on IWFPs and the importance of protection of the resource as part of both formal and informal education across South Sudan;
- Promote awareness about the potential and value of IWFPs with communities and government in order to ensure protection and management;
- NGOs and government actors should be advised to consider the prevalence of IWFPs, and where they are sourced, before developing land use plans or new structures;
- Improve awareness among INGOs and media about the importance of acknowledging IWFPs as part of normal diets rather than referring to them only in negative terms as an indicator of famine;
- Promote the possibility of indigenous solutions to nutritional deficiencies and enhancing diets;
- Include information on the potential value of IWFPs in both nutrition and agricultural programs and trainings to communities;
- If certain IWFPs are found to hold significant economic potential, research needs to be carried out to ensure solutions are found for the primary challenges of increased demand: sustainability, scale, processing, marketability and market accessibility;
- Press the government to develop and enforce existing policies and laws regarding the protection of plants and trees in order to put a stop to the destructive patterns of the charcoal industry;
- Press the Greater Pibor Administrative Area (GPAA) and SPLA-IO administrations regarding both the killing and trade in wild game meat found in their markets;
- Humanitarian organizations should create policies banning the use of wild game meat and ensure field sites are both aware and following the policies, particularly in SPLA-IO and GPAA areas where wildlife laws are not currently being enforced.

REFERENCES

1. Gullick & Grosskinsky, Exploring the Potential of Indigenous Wild Foods Plants in Southern Sudan, 1999. pg 4
2. Biong, "Famine in the Sudan: Causes, Preparedness and Response" pg. 8 (1999)
3. Biong, "Famine in the Sudan: Causes, Preparedness and Response"
4. Biong, "Famine in the Sudan: Causes, Preparedness and Response"
5. Ibid
6. Ibid; nyok is Dinka for Commelina beneghalensis and apat is Dinka for Ipomea sp.
7. It is recognized by the research team that a few of the plants in the report were introduced to South Sudan decades back and are therefore not indigenous. In particular, the Moringa tree is neither wild nor indigenous, but due to its high nutritional value it has been included.
8. See separate 2015 IWFP food chart for details.
9. The use of the linguistic alphabet would ensure spelling and pronunciation variations do not exist between researchers.
10. Gullick & Grosskinsky, Exploring the Potential of Indigenous Wild Foods Plants in Southern Sudan, 1999. Kenyatta & Henderson, The Potential of Indigenous Wild Foods 2001.
11. As this was before independence in 2011, the research was carried out throughout areas that are now divided into South Sudan and Sudan.
12. Grosskinsky, Paper 3 "Nutritional Contribution of IWFPs" in Gullick & Grosskinsky, Exploring the Potential of Indigenous Wild Foods Plants in Southern Sudan, 1999.
13. Ibid, p. 23
14. Ibid
15. The balanites aegyptiaca is found at the top of the separate 2015 IWFP chart. It is called lalop or heglig in Arabic, thou in Dinka and Nuer, konye in Murle and nyeronyit in Toposa.
16. Ibid
17. Hudacek, A. "Nutritional Assessment Mission South Sudan." EMOP 5826.01 WFP. Nov. 1998, p.13
18. Ibid
19. Grosskinsky, Paper 3 "Nutritional Contribution of IWFPs" in Gullick & Grosskinsky, Exploring the Potential of Indigenous Wild Foods Plants in Southern Sudan, 1999..p. 21.
20. The major exception being people who reside or were raised in urban areas, or returnees from the north or other countries. See General Utilization of IWFPs.
21. Find more under the risks section for more about high preparation famine foods.
22. Gullick, "A Brief Investigation of the Stigmas Surrounding Wild Foods in Southern Sudan" found in,WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-2000. Vol 2. pg 76
23. Food distributions take place in both Pibor and Akobo, however people interviewed claimed that the distributions did not meet the needs of the entire population due to either corruption by local government or limited registration.
24. Both gop and bauw also have economic value in Ganyiel, so the current needs means people cannot store them for food, or economic needs, later on.
25. Grosskinsky, Paper 3 "Nutritional Contribution of IWFPs" in Gullick & Grosskinsky, Exploring the Potential of Indigenous Wild Foods Plants in Southern Sudan, 1999. pg 22
26. Ibid
27. For more about Lulu Works see: http://www.lulu-life.ch/about-lulu-works,10.html
28. WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-2000. Vol 2. pg. 82.
29. WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-2000. Vol 2. pg 82-83.
30. De Waal quoted in WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-2000. Vol 2. pg 78.
31. WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-2000. Vol 2.
32. Jiggins 1989 referenced in WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-2000. Vol 2.,pg 79
33. WFP & Save the Children UK, An Introduction to the Food Economy Research in Southern Sudan 1994-1998. Vol 2. pg 21
34. Interestingly Murle said that one of the ways the community managed to find food during their displacement due to conflict in 2013 was to use mosquito nets as fishing nets.
35. Although politically challenging to put in place, there is precedence for this type of protection escort. After pressure from protection agencies the UN peacekeeping mission in Darfur, UNAMID, sent escorts with women from IDP camps when they went to collect firewood.
36. Biong, Paper 2 "Role of IWFPs in Food Security and Early Warning Systems: The Case of the 1998 Bahr el Ghazal Famine," in Gullick & Grosskinsky, Exploring the Potential of Indigenous Wild Foods Plants in Southern Sudan, 1999., pg 16.
37. Ibid
38. Fish also play an important part of diets but due to the limited timeframe of the research were not included. However, for one unusual example, see box 1.1.
39. The tiang is an antelope from the hardebeest family. The white-eared kob migration has been better documented than the tiang, but both migrate in herds estimated in the hundreds of thousands. The annual migration is estimated to be the second largest land mammal migration after the Serengeti.
40. A video of people collecting white ants in Mundri has even been posted online: (https://www.youtube.com/watch?v=U1rxgbjIFPM).
41. The Toposa and Murle are both age-based societies, where age-sets play a major role in social identity.
42. This was found to not be possible among Toposa, as respondents explained that cattle were only exchanged when the marriage occurred, not before.
43. Arensen, "Historical Grievances and Fragile Agreements: An Analysis of Local Conflict Dynamics in Akobo" South Sudan Humanitarian Project. 2015.

ANNEX: WILD FOOD CHART JUNE – AUGUST 2015

The names collected were matched as best as possible with Appendix 8 "List of Vernacular Names from Various Areas of Southern Sudan" from the Wild Foods of SS Workshop 1999. However, a long term study verifying both the original data and the recent field research is highly recommended. Any corrections to the chart are welcomed.

#	Scientific Name	English	Arabic	Nuer	Murle	Toposa (sin/plural)	Dinka	Used Part of Plant (and color when ripe)	When available	Taste	Preparation	Eaten alone or with other foods	Hunger or Normal Food	Market Value	Nutritional Value	Medicinal Value	Availability
1	Balanites aegyptiaca	Desert date; Soapberry tree	Lalop or Heglig	thou	konye	nyeronyit/ ngeerony	thou	skin of fruit, fruit, leaf, and seed	Nov-April	Depends on part of plant- seed is bitter, fruit is sweet	Skin is pounded into powder which is used as base for porridge, fruit is eaten direct usually, shell of seed is broken and seed dried and later boiled for four hours to reduce bitterness. Seed then eaten direct by some ethnic groups after boiling or frying. Murle pound fried seeds into flour and turn into flat bread. Leaves also eaten. Fruit also soaked in water to make juice or to add to porridge.	Both, depending on the part of plant it can be eaten with grain or other foods or direct.	Normal (Eaten normally in dry season, which is usually time of hunger- but eaten even if food exists)	In Akobo and Kapoeta markets one veg oil tin sells for 20 SSP, 2 SSP/cup. Also exchanged for grains. In NBeG there are stores that sell thou seeds- one tin is 5 SSP and a 50 KG sack is 300.		Nuer use the lalop soaked water for a juice as well as a malaria treatment. Also seeds used as treatment for high blood pressure.	Common
2				kudera	kudera			leaves	Rainy season	some people claim bitter, others not bitter	boiled	mixed with other foods if they exist, otherwise eaten alone	Normal				Common
3	Portulaca quadrifida		Lagab el Hummar, Um Mamleikha	wor	anyuer			leaves	Rainy season	good- added to foods for flavor	boiled	mixed with other foods (such as pumpkin flour or stew or porridge) to add flavor, but also eaten alone if nothing else available	Normal				Common
4				tiltil				leaves	Rainy season	bitter	boiled, sometimes multiple times to remove bitterness						Common
5	Amorphohalus laxiflorus			leuw (leew)	awale		leeth	root	Rainy season	very bitter	boiled for 12- 24 hours. some people even only use clay pots as the bitterness can stay in metal pots. If not prepared long enough can poison people.	alone	Hunger				
6				kaya				(the skin of the balanite aegyptiaca fruit)	Nov-April	bland	pounded and then add water						
7	Vigna sp.	wild bean	akuem	Waar, Cholliel jok, Dulgaak, Gaak, Amichour, Nyangkwaj ong, Piin,			Adulgaak, Gaak, Aquem	leaves	Rainy season	not bitter	boiled	cooked with soup or mixed with other leaves	Normal	can sell in market			
8				rumchikur (thial in Unity)				leaves	Rainy season	not bitter	boiled	mixed with other leaves or direct if nothing available	Hunger				far away
9				belagok				leaves	Rainy season	bitter/tastel ess	boiled long time		Hunger				
10				chumar				leaves	Early rainy season	good		added to soups for taste	Normal				far away
11				budbud				fruit	Oct/Nov	bitter	boiled alone						

Scientific Name	English	Arabic	Nuer	Murle	Toposa (sin/plural)	Dinka	Used Part of Plant (and color when ripe)	When available	Taste	Preparation	Eaten alone or with other foods	Hunger or Normal Food	Market Value	Nutritional Value	Medicinal Value	Availability
Nymphaea sp.	waterlily		Tual, Kei, Guet	nyaro		Gor, Abeeth gor, Kei, Diany, Agwi	root/tuber	primarily end of rainy season (people said it is around in isolated pools)	good	boiled short time only		Normal				found in remote pools in the dry season, but commonly found in late rainy season when water levels are high. In dry season can also find roots without the pads.
Nymphaea sp.	waterlily		Yiil				seed		good	boiled short time only		Normal				
			guan				root/tuber	available later in the year (water plant)		To prepare it for consumption, remove the cover, put it into water for two days. After that you cook it for 3 – 4 hours and make sure it is well cooked otherwise it is poisonous and can kill.		Hunger				found in swamy areas
			lep				grain (like rice)	August-Sept								
			leff (phiot in Unity)				grain	available near rivers in October								found near rivers
Moringa oleifera	moringa (not indigenous or wild)		thayat	chap			leaves and seeds	year round	bland	boiled		Normal		Extremely high nutritional value- High in vitamins A and C, protein, calcium and iron	Roots are boiled or soaked in water for a day then then the juice is drunk as a malaria treatment. Also used for fever by Murle.	
	red chilli		chede	barabara			fruit	Rainy season	hot/peppery (good)	pound fruit and seeds and mix with salt	added to foods for taste	Normal	Yes- sold in markets for 1 SSP a handful		Used as cough treatment- pounded and mixed with water to drink.	domesticated as well as collected from the bush
	wild tomato variation?		bandoor				fruit	Rainy season		remove skin and boil	mixed with fish soup	Normal				some people cultivate it, but usually found in forest
	wild groundnut		dongpiny				nut			fry the nuts without oil and mix with ash then cook to turn dry and yellowish. Alternatively they dry them in the sun as a means of preparing them for storage.		Normal				
Adansonia digitata	baobab	tabaldi	dhouny (doin)				fruit	dry season	sweet	eat direct		Normal				
			gadugede				leaves				mix with sorghum					
			babro				leaves			boiled	eaten direct or mixed with beef (especially liver)	Normal				
			keye				leaves (plant has blue flower)	Rainy season	smells very good	boiled	mix with sorghum or kisera	Normal	valuable- can be traded or sold in the village			rare

#	Scientific Name	English	Arabic	Nuer	Murle	Toposa (sin/plural)	Dinka	Used Part of Plant (and color when ripe)	When available	Taste	Preparation	Eaten alone or with other foods	Hunger or Normal Food	Market Value	Nutritional Value	Medicinal Value	Availability
25	Amaranthus sp.	Pig weed, Amaranth, Bush greens/Amaranth, African spinach	Lissan el Tair Saghi/Kabir, Fiss el Kalb/tamalaika	Diong, Murnyadhut, Cuolwiethou, Combok, Buoba, Mokading			Amokading, Amokadiong, Amokatied, Kuedekude, Guet	leaves	Rainy season		boiled	mix with sorghum or kisera	Hunger				
26				koch				small brown fruit	Rainy season	sweet	eat direct		Normal				
27				joch				brown, guava like fruit	dry season	sour	eat direct		Normal				
28				buach				fruit that is black when ripe (looks like strawberry) found on a vine	Rainy season	sweet and sour	eat direct, most commonly by children		Normal				
29				tuok				gourd- like a small pumpkin- red when close to ripe, yellow when ripe.		sweet							difficult to collect- usually use stick to knock to the ground
30				lotlot				small cucumber like fruit - red when ripe	Rainy season		eat direct						
31	Lannea schimperi		Amzak, Atab-hassu Ghallub				Dukit, Gumbel, Akoncit	small yellow fruit									
32	Sclerocarya birrea	Marula	Akamil, hemaidai/ gummel	Kamel, Omel, Gumbel			Gummel										
33				karab				a black or red fruit - looks like wild date	dry season	sweet	eat direct						
34				kuol-nyath				thorny green and yellow fruit			eaten direct						
35				luiy				green fruit on large thorny tree	year round	tasteless	eaten direct when unripe and green by children		Hunger				
36				tumbur				root/tuber	year round	sweet if enough water (rainy season), bitter in dry season	Remove skin, then eat direct		Normal				Found in the ground in forests but difficult to find, especially in dry season as leaves fall off so hard to identify
37				long				Flat, round root	year round	sweet if enough water (rainy season), bitter in dry season	Remove skin, then eat direct						Hard to find in dry season as leaves fall off so hard to identify
38				dolgak				root/tuber	year round	sweet							Found in wet places near swamps
39				path (bulrush)				white root	year round	tasteless	Eaten direct or cooked						
40				luach (sap from luor, nguer and thep trees)				gum/sap (yellow, red or white)	dry season	sweet, sour or tasteless	Cut the bark of the tree and leave it for some time for the sap to form - then you can eat direct		Hunger				
41				nyadanar				leaves	Rainy season	tasteless	boiled		Normal				
42				gum				leaves	Rainy season	bland	boiled	add to soups	Hunger				

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43	Ziziphus sp.	Buffalo thorn; wait a bit; Indian plum; Christ's thorn	nabuk	bwoa	gul	nyekaale /ngakaalio	lang	yellow, round small fruit	dry season/winter	very sweet	eat direct or pounded and turned into cake	if pounded for storage then mixed with animal fat for eating or turned into porridge	Normal				found everywhere, particularly near swamps
44	Cordia sinensis			nyot		nyedome/ ngidomo	Akoc, Akuei, Akoy	red round small fruit (two types- short and tall one)	dry season for tall one, short one year round	a bit sour and a bit sweet	eat direct or dry then pound	sometimes boiled and mixed with soup with either animal blood or milk. Also mix pounded fruit with dried pounded meat.	Normal				Kapoeta East mostly like it- found tall one near water, small one in dry areas
45	Tamarindus indica	Tamarind	ardeeb	koat	motang	nyepederu/ ngapederu	cuei	long brown pod	Nuer claim Oct/Nov, but available in Pibor in June, though.	sour and sweet	remove shell of pod and add to water for juice or add sugar and make sweets	added to porridge	Normal	sold in market- 1 SSP/handful in Pibor, while in NBeG 10 can be sold for around 5 SSP.			
46	Berchemia discolor					nyemeyan/ ngimeyana		yellow small fruit	winter fruit	sour	eaten direct or dried and then pounded	mixed with other foods	Normal				found in remote areas, particularly with clay soil (mostly in Kapoeta north)
47						nyesimaran/ ngasimarana		brown small round fruit- flesh only eaten	Aug-Oct	sweet	eat mostly direct, but also dried and pounded into powder	powder mixed with other foods	Normal				available everywhere, but particularly found near wet or swampy areas
48	Grewia tenax	Small leaved cross berry	ummageda, gadein, gaddem	Poor, Porpor		nyengomo/ ngingomo	Apoor, Apormundy	Two types- red and yellow- very small round fruit	winter fruit (Dec-Jan) but also again at end of dry season in April/May	very sweet	eat the fruit direct but remove seeds. Flesh also dried and stored. Also soaked in water which makes water yellow or red and sweet. Children eat the fruit and skin but throw away the seed	Boil the colored water and mix with flour. Also can mix with milk or blood.	Normal	Yes, can sell for 30 SSP/oil tin or a cup of purpur juice costs 5 SSP		Treatment for low blood pressure	Clay soils for yellow fruit, while loam soils for red fruit
49	Grewia villosa	Mallow raisin	tamr el abid, tukku, mutrak			nyepongae/ ngapongae	Bath	Two types- red and yellow- small round fruit (similar and same preperation but slightly larger than nyengomo)	winter fruit (Dec-Jan) but also again at end of dry season in April/May	sweet	eat the fruit direct but remove seeds. Flesh also dried and stored. Also soaked in water which makes water yellow or red and sweet.	Boil the colored water and mix with flour. Also can mix with milk or blood.	Normal				
50	Balanites orbicularis					nyebei/ ngibeyo		red fruit	dry season	bit sweet	eat direct but not swallowed- chewed then spit	eaten direct or boiled in water to make water red- mix seed with sorghum and eaten together	Normal				near town and in the bush
51	Balanites glabra		lamat			nyalamae/ ngalam		orange fruit	June	very bitter/sour- (compared to lemon)	eat fruit but not skin or seed	sometimes diluted with water				made into porridge and used as treatment for malaria	found in the bush
52						nyedelet/ ngideleta		leaves and white fruit	dry season	both bitter	pound the seeds and turn into powder	mix with animal blood- available now but rarely eaten	Hunger				
53						nyereng/ ngerengo		leaves- eaten when small bush	year round	sour	boil and eat alone		Hunger				found in the bush

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54						nyeglae/ ngigilae		leaves, flower (red and white) and root	flowers available in rainy season, tubers year round	leaves and flowers are sweet, tubers are sweet but remove skin	first they collect the flowers, later in the year they eat the roots		Normal				found in the bush
55		honey	asal			nyau/ ngauwa				very sweet			Normal	yes- 10 SSP/ 500 ml bottle, or 60 SSP jerry can			
56		SPLA name is "big bean tree"				nyedapal/ ngidapala		yellow fruit	dry season	seeds very bitter when raw, fruit not bitter	Fruit chewed, not swallowed. Cook seeds before mixing with ash then boil for 3-4 hours. After cooking eat direct or pound to powder.	powder mixed with animal fat					
57	Ficus sycomorus	Sycamore fig, Wild fig	Gameiz, abu leban	ngop		nyechoke/ ngachokio	Ngaap	red fruit	dry season (Jan-Feb)	sweet	eat whole fruit direct (too much hurts your stomach)		Normal				tall tree found near rivers
58						nyesokon/ ngisokona tree (but fruit is called nyepurukume/ ngipurukumio- name brought by Turkana to Toposa)		brown/red very small fruit	April-May	sour	eat direct, but chew only, not swallowed (although kids might swallow)					Branches used for tooth brushing as well	
59						nyakaamit/ ngikaamita		honey variation from small bees/flies (sweat bees?)		sweet	eaten direct		Normal	yes- same as honey			found in ant hills or inside trees
60		white ants/termites			konga	nyekongat/ ngikong			Rainy season	oily	fried and eaten direct or with oil- also pounded into oily paste			in some locations			
61						nyeburi/ ngiburio		honey variation produced in the ground by small black bees (ground bees)		sweet	eaten direct		Normal	same as honey			found in the ground
62	Grewia tembensis					nyegomoit/ ngikumoita		red/brown small fruit	winter (Dec/Jan)	sweet	eaten direct- spit seeds but swallow the rest						big tree found near rivers
63						nyemidangor/ ngimidanoria (alternatively new name is nyepuipui/ ngipupuya)		red small fruit	beginning of rainy season	very sweet (like raisins)	eaten direct						found in hills
64						nyepunakapo/ ngipunakapo		red small fruit		sweet	eat direct						found in hills
65						nyekenene/ ngikanenei		red fruit	Rainy season	very sweet	remove skin and eat direct or dry and pound into powder	powder mixed with animal fat					found in mountain areas
66						nyakurikuri/ ngakurikurio		roots of small vine (like potatoes)	Rainy season	bland but good	remove skin and eat direct					used as anti-venom by some people	found everywhere, but children have collected most of those nearby the villages
67						nyekolese/ ngukolesa		yellow fruit on vine with small thorns	Rainy season	good							desert areas
68						nyepumpum/ ngipumpumo (Kapoeta East only)											

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69	Vitellaria paradoxa (formerly Butyrospermum paradoxum nilotica)	Sheabutter nut	lulu		kingiroc	nyetingiroi/ ngitingiroi	rak	yellow/green fruit	Rainy season	very sweet	Directly eat the sweet skin of the fruit. Collect the seeds and dry them and remove the seed from its hard cover. Fry the seed until it changes to black in colour, grind the seed and boil. Carefully, remove the oil that will come out of into a container and throw away the residues.			yes- ripe fruits and oil sold. Used for cooking and moisturizer. 600ML of oil goes for 18-25 SSP in NBeG			found in mountains
70						lokileakom (alternatively nyelepanit/ ngilapanto)		green flower like okra, leaves	dry season		leaves boiled (Kapoeta south only)						found where it is wet
71						nyekabokor/ ngikabokoria		unedible red big fruit- eat the fist size roots- like potatoes (foxes can smell and dig it up to eat)	dry season	very sweet	white skins peeled and red roots eaten direct						
72	Hyphaene thebaica (?) or H. compressae	Duom Palm; Gingerbread Tree	Dom	tuwa		nyeturukoit/ nguturuko	atuek	fist size coconut (tall palm tree)	dry season								
73						nyetete/ ngiteteya		brown/red small fruit on big tree	winter fruit	sweet	eaten direct						found everywhere
74						nyemimae/ ngimimae		yellow small fruit	dry season	sweet	eaten direct						found in flat bush or clay areas
75	Borassus aethiopum	Fan palm	Dileb	Akot, Noor, Donnor, Ciiy, Agep		nyadukanait/ ngudukana		red fruit	?	sweet	split shell and chew and spit out inside						fruit found in rivers- not indigenous but floats down river (lots found in Kidepo Valley in Northern Uganda- so perhaps source?)
76						nyelacha/ ngilachayin		root/tuber	Rainy season	bitter							found in mountain areas
77						nyelokiloki/ ngilokilokio		root/tuber	Rainy season- small in dry season	tasteless	eat direct						found in mountain areas
78						nyekidichokait/ ngikidichoka (alternatively: ngikidicha)		green fruit- finger size	Rainy season	very sweet	eat direct						found in bush
79						nyengaimo/ ngingaimo		yellow fruit size of big toe	Rainy season	very sweet	Eat direct but don't swallow- chew and spit						found in mountain areas
80						nyekamongo/ ngikamongoi		leaves	year round	good	chop, boil and use as sauce	mix with animal intestines or eat with sorghum					found alongside rivers
81						loungorot/ taloungorot		leaves (like rocket)	Rainy season	very sweet	chop, boil and use as sauce	mix with animal intestines or eat with sorghum					
82						nyelamat/ ngilamata		yellow, small round fruit	Rainy season	sour	can eat direct but remove skin. Also can soak in water to make juice for drinking.	Juice also mixed with animal blood or milk					
83						nyerut/ nguruto		yellow fruit- toe size, roots	Rainy season	good, but roots only eaten in hunger	Fruit eaten direct but skin removed and seeds spit out. Roots chewed only, then water is drunk and water then tastes good		Roots are hunger food, fruit normal food				

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84						nyangolebong/ ngangolebongia		leaves	Rainy season		dried then pounded to powder	mixed with grains or eaten direct if none					
85						lorakimak/ talorakimak		leaves- name literally means "killing old women" as an old woman ate it and died once	Rainy season		boiled and becomes sweet	sometimes mixed with meat or eaten direct	Hunger				found in bush
86						nyekaleruk/ ngikaleruko		yellow plum size fruit with spikes	June	bitter	remove skin and seeds and eat flesh direct. Dry seeds, then pound into powder.	Mix seed powder with animal fat.				malaria treatment	
87						nyedaldal/ ngidaldala		red fruit on vine, leaves also eaten	Rainy season (leaves eaten early season, fruit available later)	tasteless	chop, boil and use as sauce	mix with animal intestines or eat with sorghum					
88						nyakaletelete/ ngikaleteletei (alternatively: ngiletio)		small green/purple leaves, small yellow fruit		tasteless	chop, boil leaves & fruit together and use as sauce						
89	Grewia bicolor					nyakali/ ngakalio (different to 31- spelled with 'a' compared to 'aa')		yellow fruit		sweet	eat direct						
90						longolekou/ talongolekou				bitter	Not eaten, just used for medicine- pounded and mixed with water for 20 min, then drink					treatment for yellow fever and malaria	
91	Aloe sp.	aloe vera				nyechukua/ ngichukua		leaves		bitter	also soak in water					malaria treatment	
92						nyekodese/ ngikodesa		yellow fruit with small thorns found on a vine	Rainy season	two types- one bitter, one sweet	peel off skin, eat direct						found far away- often eaten by boys looking after animals
93						nyechaka/ ngichakain		big yellow fruit	Rainy season	very bitter			Hunger			treatmet for cough and jaundice and malaria for people, and livestock wounds as well- mixed with water and drink- can make you vomit	
94						nyeyarobos/ ngiyarobosa		leaves	Rainy season	tasteless	chop, boil and use as sauce	mixed with other foods					Men claim they didn't used to eat but learned in wartime from Lutuko
95						nyengirib/ ngingiriba		small (1 cm) red fruit from a big tree	dry season	sweet	Remove seeds but then either eat direct or dry then pound into powder	Mix powder with animal fat	Normal				
96						atajale/ tatajale		leaves	Rainy season	tasteless	chop, boil and use as sauce						
97						nyekoropat/ ngikoropae		leaves on grass like plant	Rainy season	tasteless	chop, boil and use as sauce						
98						nyakaleruk/ ngikaleruko		yellow plum size fruit from small vine	Rainy season	bitter/tastel ess	seeds very bitter initially- but dry them for three days, then pound them into tasteless paste	paste then mixed with animal fat or milk				treatment for jaundice	

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99						lokeretin/ talokeretin		big leaves	Rainy season	tasteless	chop, boil and use as sauce	added to milk to make butter as well					
100						nyeosinkaikenyit / ngioskaikeny		leaves	Rainy season	tasteless	chop, boil and use as sauce						
101		gooseberry				lodokoro/ talodokoro		yellow/orange fruit		sweet	Not eaten by Toposa, although eaten elsewhere. Instead used as medicine only.					fruit used for anti-venom for scorpion stings- gets rid of pain	
102						shuman/ ngishumania		small red fruit		sour	boil with water, changes water color to red- remove the seed	mix the water with animal blood					
103						nyenangait/ nginanga		small white germinated seeds	Rainy season	very sweet	eat direct						seeds that fall on the ground in the bush germinate and these are then eaten
104						nyepeet/ ngipeeto		tree bark								treatment for yellow fever- tree bark is pounded then soaked in water for 1-2 hours. The drink is then given to the patient to drink and is used to bath them as well.	
105						nyeusugu/ ngiusug		tree bark with small black fruit								medicine for stomach- dry and pound bark of tree or fruit then boil with water or milk and then give to patient	
106						nyekapangiteng / ngikapangitenga		bark of roots from big tree		very bitter						treatment for worms- root bark is pounded then soaked in water. The drink is then given to the patient	
107						nyetola/ ngitolain		leaves and roots from grass like plant		very bitter						treatment for malaria- either dry first then pound, or pound fresh. Then add to water and drink after ten minutes	

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108						loporiang/ talaporiang		roots of tree (snakes often live there)		bitter						treatment for epilepsy (reduces fainting)- roots dried or left fresh, then pounded and added to water for three hours	Found around rivers
109						nyetulele/ ngatulel		roots of tree								treatment for joint pain and headaches- roots are pounded and soaked in water for three hours then drunk	Found around rivers and swamps
110					nyandwac h			small grain	dry season (Nov-Feb)	good but oily	fried or pounded and turned into a porridge		Normal				Collected by ants in the rainy season and then collected by women and girls in the beginning of the dry season. Only found in greater Gumuruk.
111					tarenchen gulu			leaves and roots		very bitter			Normal			treatment for malaria- both pod and leaves pounded and soaked (or boiled if in hurry) in water before drinking	
112		smaller water lily			kurum			roots/tuber	Rainy season	good, but not as tasty as nyaro (larger water lily)			Normal				More difficult to find than larger water lily
113					karachole n			seed of small water lily	Rainy season	tasteless	pounded and eaten direct	added to milk to give flavor	Normal				
114					manaj			white fruit on grass like plant with small thorns		very sweet	pounded and made into porridge with milk- very tasty		Normal				Only found in Nanaam area of Pibor- men claimed they have to tell women to collect it as they have no self control not to eat all of it.
115					kurubuk			red fruit found in early morning	dry season	sweet			Normal	sold in market			Found near Gumuruk- in Tangajon area
116					ngaton			root/tuber		very bitter	must boil for 3-4 hours then let it cool down		Hunger				

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117					inyichikoro			small weed like plant (literally translates in Murle to 'son-in-law' as one cannot get rid of it and it keeps returning after you try pulling it out)	Rainy season	tasteless	chop, boil and use as sauce		Hunger				
118					gogoch			leaves	Rainy season	tasteless	chop, boil and use as filler only		Hunger				
119					dolo			fruit	March/April	very oily and bitter	boil it for one day then eat fruit, before taking seed and pounding it into a powder to use for porridge		Hunger				
120					nyobaj/nyoba			big root/tuber	Rainy season	tasteless	wash and eat direct		adults only eat during hunger periods, but children eat normally				eaten by boys when herding animals
121					ngachafurech			small tuber	Rainy season	tasteless	wash and eat direct		adults only eat during hunger periods, but children eat normally				eaten by boys when herding animals and leaves eaten by livestock
122			geden		gemenyo			small red fruit/seed		good and filling	eaten direct		Normal			given by doctors to those with blood issues as it has many vitamins	eaten mostly by boys when herding livestock- also found in Khartoum
123					vorenye			small red or yellow date size fruit	winter	bit sweet and sour	eaten direct		Normal				eaten by boys when herding animals
124					monej			red fruit from big tree	winter	very sweet	eaten direct		Normal				also found in Juba and Malakal
125					moloto			brown fruit	Oct-Jan	sweet	eaten direct		Normal				trees found near water and river banks
126					chunkal			yellow fruit	Rainy season	sweet and sour	eaten direct		Normal			used for medicine by some, not food	found around Boma, not Pibor
127					gorocho			green long fruit	Rainy season	sweet and sour	eaten direct		Normal				found around Boma, not Pibor
128					kelero			red fruit	June-August	sweet	eaten direct		Normal				Found around Gumuruk, Pibor and Lekuongole
129					laboboch			big red fruit found on vine that grows on trees	August-Sept	sweet	eaten direct		Normal				found everywhere, including in MSF hospital in Pibor
130					kordawich (also called malon)			root/tuber like potatoes	Rainy season	tasteless	peel skin, then eaten		Normal				
131					langira			very small grain	August-Sept	good	cut the grass, then scrape off the grain. Then rub between hands to make husks fall off before pounding and mixed with water		Normal				
132					natudungchen			short grain	June-July	good	pounded and mixed with water to turn into porridge		Normal				

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133					olot			wild rice- larger than market rice	August-Sept	good	dried first, then rubbed to remove husks, which are sharp and can cut your throat. Children are warned to be careful with them. Then either boiled direct like rice or pounded.	mixed with milk and butter and perhaps tamarind if available	Normal				
134					imaj			a small fruit the size of grain	December	good (tastes like rice)	pounded and then mixed with milk		Varies				available everywhere
135					korbole			leaves (plant has flower)	Rainy season		boiled	mixed with other foods if they exist, otherwise eaten alone	Hunger				found along riverbanks
136					aiyo			beans (wild bean vine)			open the pod, remove the beans then boil. Cannot eat raw		Normal				
137					boitot (also called nyat)			vines (not leaves or roots)	Rainy season		eaten direct		Hunger				grass like plant found around rivers
138	Acacia seyal		tale		eroc (tree with red bark)			gum/sap (mutul in Murle)	dry season	varies	eaten direct and sometimes boiled						
139					beliet			gum/sap (mutul in Murle)	dry season	varies	eaten direct and sometimes boiled						
140					bolen			red fruit	August-Sept	little sweet	eaten direct						found all around on high ground
141					vilil (tree)			green fruit (called *loron*)	Rainy season	sweet and sour	eaten direct						
142					loto			orange fruit	winter	sweet and sour	eaten direct						Found everywhere
143	Azadirachta indica	neem (not indigenous or wild)						yellow fruit	winter	sweet and sour	eaten direct (mostly by children)					Treatment for malaria	
144							Lac	small brown fruit	year round	very sweet	eaten direct		Normal				
145	Diospyros mespiliformis	Jackal berry, African ebony/ Monkey guava	Abu Sebela/ lolumbe, abu sebala	cum			Cum	small brown fruit	dry season	Sweet	remove seeds then eat direct		Normal food, but green unripe fruits eaten during hunger periods				found in forest
146							Kuel	red fruit	All year round	Sweet	When ripe eat direct but when unripe and green fruit, pound the fruit, boil then add milk to eat (sour when unripe)		When ripe is normal food when unripe it is hunger food				
147							Melat	yellow fruit	Rainy season	Sour	Eat direct- spit out seed		Normal				
148							Kunyuk	brown fruit (when ready to pick)	Rainy season	Sweet	Remove fruit when brown, then put in pot and cover for maximum of four days. Fruit will change color to black, when it is ready to eat. Then eaten direct.		Normal	Yes, in Maper 20- 30 fruits are sold for 1 SSP			common
149	Borassus aethiopum	Coconut (borassus palm?)					Tuuk	yellow/orange fruit	Rainy season	Sweet	In order to eat the fruit, hit it on a stone until it becomes soft. Eat the outer flesh and the hairy – like fruit. Throw away the seed after eat all the flesh.		Normal				
150							Ludo	red finger size fruit	Rainy season	Sweet	eat direct		Normal				

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151							Akondok	fruit	June-July	Sweet	Pound fruit to remove skin, then soak in water for two days to remove bitter taste. "Kombo" (locally prepared sodium sulphate) is added and then boiled together. Eaten with sauces. Alternatively boil throughout a day changing the water to speed up the process.		Hunger				
152							Apam	red fruit	Rainy season	Sweet	Remove many seeds then eat direct		Hunger				Found far away, so despite being sweet only eaten when hunger.
153							Dikiit	red/brown fruit	Dry season	Sweet	Eat direct		Normal				
154							Akudi	brown fruit	Rainy season	Sour	Remove cover and add tamarind juice to eat- when eaten alone it is believed to cause heartburn		Hunger				Rocky areas.
155	Dactyloctenium aegyptium	Crowfoot grass, Egyptian grass, Couch grass	Um Assabi, Koreib	Muothyiai, Gop			Akuadha, Akudo, Akut, Aquoth	grass with small seeds	Rainy season		To collect it, use a wet gourd or a sauce pan so that the seeds can stick on it. Dangle it across the ready seeds and they will remain in the sauce pan/gourd.Fry it on fire, take it out and dry. Pound and winnow it to remove the waste. Either grind or pound seeds into flour. When not prepared, it is grey but after preparation, it becomes white.			It is also sold in the market with a malwa costing roughly 10 SSP.			
156							Akoon	yellow long fruit	Dry season	Sour	Remove the cover to get its red seeds. Mix with tamarind juice. At this stage, it is ready for consumption. It is generally sour because of the tamarind juice. When eaten without the tamarind juice, it is believed to cause bodily swelling.		Hunger				
157							Ajuet	red small fruit	Dry season	Bitter	Boil it for three times each time removing and adding new water. Put it in water for some time and boil again. At this stage, it is ready to be eaten with any kind of food		Hunger				
158							Apor	red fruit	Rainy season	Sweet	Eat direct		Normal				
159							Kec	big green fruit	Rainy season	bitter/tasteless	Boil the fruit until it changes colour to brown and is soft. Open the fruit and remove the seeds. Dry seeds, then fry them before pounding until it changes to powder. Add it to flour when making ugali/posho. The skin of the fruit can also be eaten. Boil the skin of the fruit; leave it for 3-5 hours. Squeeze out the water to remove the bitter taste.		Hunger				
160							Nyibuth	small red fruit	Dry season	Bitter	Remove the four seeds, boil seeds five times, removing and adding water in each occasion to remove the bitter taste. Put it in water again for five days after which it will be ready for consumption. If it is not well prepared, it can kill.		Hunger				
161							Joc	brown fruit	Dry season	Sweet	Eat direct						
162							Apiath	red fruit	Rainy season	Sweet	Eat direct						

#	Scientific Name	English	Arabic	Nuer	Murle	Toposa (sin/plural)	Dinka	Used Part of Plant (and color when ripe)	When available	Taste	Preparation	Eaten alone or with other foods	Hunger or Normal Food	Market Value	Nutritional Value	Medicinal Value	Availability
163							Atony	red fruit		sweet	eat direct		Normal				
164							Mafara	fruit		bitter							
165							Abiec	green fruit	January		Remove seeds, pound fruit and collect inner white seeds. Pound white seeds into flour.		Hunger				
166							Annet	leaves	April	Bitter	Boil three times carefully squeezing out and adding new water in each occasion. After the third time, add ingredients like animal fat, etc. and it will be ready to be eaten.		Hunger				
167							Nguit	leaves	Rainy season	Good and strong smell, normal taste	Boil direct and add ingredients		Normal				
168							Machuwar	leaves	Rainy season	Normal	Pound then boil and add ingredients						
169							Anyuwer	leaves	July-August	Normal	Boil direct and add animal fat						
170	Leptadenia hastata			Nomloc, Mankuor, Nyakajok			Akuor	leaves	All year round	Normal	Boil direct and add groundnuts or sesame oil. Eat with posho/ugali.		Normal	yes			
171							Ayak	leaves	Rainy season	Normal	Boil direct and add butter		Normal	yes			
172							Ajuet	leaves	All year round	Bitter	Boil the leaves for some time, pour out the first water and boil again. Add salt and other ingredients like animal fat when available. When the first water is not poured out, it is bitter and can kill whoever consumes it.		Hunger				
173							Apor	leaves	Dry season	Normal	Boil direct and add salt	Eaten with posho/ugali	Normal				
174							Kec	leaves	April	Bitter	Boil the leaves three times- removing and adding water in each occasion. This removes the bitter taste. Pound and add butter and it is ready for consumption.		Hunger				Common
175							Ukuero	leaves	Rainy season		Boil direct and add ingredients		Hunger				
176	Senna sp.		Sim el Dahib, afun	rier			Akier	leaves	Rainy season		Boiled, then pounded and add ingredients		Hunger				
177							kurwec	leaves	Rainy season		Boil direct and add groundnut oil		Hunger				
178							Ngana	root/tuber	Rainy season	Bitter	Dig out the long white roots, cut them into smaller pieces, take to the river and leave it in the water for 4 – 5 days in order to remove the bitter taste. Remove it from the water and dry. Pound it in to flour and use it for making posho/ugali. If not put in to the river it is very bitter.		Hunger	Spoonful sold for 1 SSP			
179							Ndawa	root/tuber (described as green yam)		Sour	After digging it out of the ground, remove some of the skin and put in water. Get tamarind leaves, boil and filter out the water and add to the roots to eat.		Hunger				
180							Amorok	root/tuber (like grey sweet potato)	Rainy season	Tasteless	Eat direct		Normal				

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181							Keyi	root/tuber (looks like onion)	Dry season	Bitter	Remove the roots, put on fire and when properly heated, peel off outer layer and eat. Alternatively, boil and when properly cooked, leave it to cool and peel off the outer layer and eat.		Normal				Found near water
182							Bargo	root/tuber (looks like large ginger)	Rainy season	Bitter	Boil in water, pound it then put in a pot for about three days for fermentation. It is bitter when not well fermented. Dry it and pound again. Cook like posho/ugali. When pounded it is white and when cooked it is yellow. If not well cooked it can kill.		Hunger				
183							Modo	white root/tuber		Tasteless	Remove root, boil and eat						
184							Lieth	root/tuber	All year round	Bitter	Remove outer layer using a knife. Cut into small pieces and pound. Get hibiscus petals and boil with it. When it is readily cooked, take out petals and eat. It tastes sour due to the hibiscus, however, when it is not prepared with hibiscus it is bitter.	Hibiscus petals	Hunger				common
185							Abuk	root/tuber (like grey sweet potato)	Rainy season	tasteless	Eat direct		Normal				
186							Madol	black roots	Rainy season	tasteless	Boil the roots with ash, after some time remove and clean. Put in water for one day and eat.		Hunger				
187							Adukan	white roots	Rainy season	Bitter	Boil for one day changing water three times. Cut root into pieces and put into water for three days. After this, it is ready for consumption and is sweet. If it eaten without putting it in water for three days, it is bitter and can make someone dizzy.		Hunger				
188							Aruaja	root/tuber	Rainy season		Collect roots, remove outer layer using a knife and cut into smaller pieces. Boil the smaller pieces with ash for 24 hours adding and removing water at intervals. When it is completely boiled, remove the smaller pieces, wash with water and shea nut oil, then eat.		Hunger				
189							Akuatha	Small green seeds	Rainy season	Good	Remove the seeds into a container, fry and pound in order to remove the outer layer. Remove particles and then pound the grey seeds into flour. Use it for preparing ugali/posho.		Hunger				Found along rivers
190							Bath (same name as fruit?)	Bark of white tree			Soak in water and then add to sauces. Also dried for storage.						

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191							Bel	Root		bitter						Treatment for malaria and stomach pain. Pound root, soak in water for some time, then drink.	
192							Dheot	Yellow Root		bitter						Treatment for malaria	
193							Achier	leaves		bitter						Malaria treatment. Leaves boiled and cooled, then drunk	
194							Angony	root								Treatment for bloody diarrhoea. Pound roots, add milk then drink.	
195							Linger	bark and root								Treatment for malaria and stomach pain. Pounded, added to water and left for some time, then drunk.	
196							Adhot	roots, bark and leaves								Treatment for malaria, typhoid and stomach pain. Roots are soaked in water for some time, then drunk. Leaves and bark are boiled, then cooled then drunk.	
197							Amuth	bark								Treatment for stomach pain. Bark is boiled, left to cool before drinking	
198							Akotuok	roots								Treatment for joint pain and 'rotuba.' Roots are ounded and left in water for thirty minutes then drunk	
199							Peny	roots								Treatment for stomach pain. Clean roots, then soak in water for some time. Take out root particles and drink.	

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200							Goroth	fruit								Treatment for cough, flu and vomiting. For cough chew small bitter seeds, swallow water from it and then spit out. For flu put fruit on fire, cover yourself with sheet and inhale the smoke. For vomiting dilute fruit with hibiscus, then add salt and drink.	
201							Auwiu	root								Treatment for diarrhoea. Root is pounded and diluted in water and drunk.	
202							Autip	roots								Treatment for malaria. Roots diluted in water and left for some time, then drunk.	

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