THE IMPACTS OF IMPROVED GOAT HUSBANDRY AND AQUACULTURE ON LOCAL FOOD SECURITY AND CONSERVATION IN SIAVONGA DISTRICT, ZAMBIA

Assessment conducted by Munich Advisors Group for the African Wildlife Foundation

September 2013

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AWF Case Studies on Food Security and Conservation:

THE IMPACTS OF IMPROVED GOAT HUSBANDRY AND AQUACULTURE ON LOCAL FOOD SECURITY AND CONSERVATION IN SIAVONGA DISTRICT, ZAMBIA

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[1] Brian McBrearity of the African Wildlife Foundation provided editorial and factual inputs to the report that are not necessarily attributable to the main author.

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Table of contents

List of Figures and Charts

FIGURES

CHARTS

ACRONYMS

AWF	African Wildlife Foundation
CBO	Community Based Organization
CLAA	Community Livestock Auxiliary Attendant
DRC	Democratic Republic of Congo
FCR	Feed Conversion Ratio
ft	Feet (measure of length)
g	Grams
GART	Golden Valley Agricultural Research Trust
ha	Hectares
IBA	Important Bird Area
kg	Kilogram
KIC	Kupfuma Ishungu Cooperative (which manages the Chiawa Bream Farm)
km	Kilometer
lbs	Pounds (weight measure)
m2	Square Meters
mi	Miles
MRF	Mabel Reeder Foundation
oz	Ounce
RRA	Rapid Rural Appraisal
SGPMC	Simamba Goat Production and Marketing Cooperative
SMS	Short Message Service (colloquially, a Text Message)
US$	United States dollar
yd	Yard (measure of length)
ZNFU	Zambia National Farmers Union
ZMW	Zambian kwacha

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Executive Summary

The African Wildlife Foundation (AWF) works in the Zambezi landscape to support local community development with goals of preventing unsustainable land use and protecting wildlife and its corridors**.** To provide the economic incentives to employ good conservation practices, AWF worked with local communities in the Siavonga District to create sustainable, economically viable solutions that improve livelihoods and are at the same time rooted in conservation.

These case studies focused on two small initiatives in the District: goat production and aquaculture. This report assesses the resultant outcomes of these two small initiatives in terms of community engagement, food security, and the protection of wildlife and wild lands.

In the Simamba community, AWF aimed to capitalize on the available large herds of goats owned by farmers and to demonstrate that goats can be utilized as a reliable source of income to provide significant contribution to their livelihood. Voluntary goat farmers came to form the Simamba Goat Producers and Marketing Cooperative, which was formally registered as a cooperative in August 2010. Through extensive training and distribution of improved breed specimens, all provided by AWF, the participating farmers are now able to increase their output from goat rearing in a sustainable way. The goat program has resulted in farmers understanding the value of goat husbandry as an income-producing endeavor, and through the increased income, unsustainable means of generating income (i.e. charcoal production) have reduced, improving the conservation impact of the local community.

Aquaculture is another sustainable initiative to secure livelihoods, as pollution and over fishing of the Kafue River are threatening the river's ecological integrity. Crop cultivation, due to the climate and wildlife, can only be implemented with limitations.

To encourage aquaculture uptake as a source of both additional animal protein and additional income, AWF provided training to the members of the Kupfuma Ishungu Cooperative, which operates the Chiawa Bream Farm. The training–executed through the Department of Fisheries–focused on both the business management and technical aspects of operating an aquaculture business. Though smaller in scale, the fish farm has generated income for the local community, and reduced the unsustainable fishing pressures on the local river systems.

While both these programs have shown success in the local communities, challenges do remain. Marketing—including access to markets, access to market information, and necessary volumes—is a consistent challenge for local communities, given the transport networks and lack of information dissemination. Supplies of inputs, and continual technical advice, have also limited the potential of these operations.

However, as challenges do remain, these two small AWF initiatives have shown that business development initiatives, when properly aligned within a proper conservation context, can improve both livelihoods and the very ecosystems on which those lives depend.

Introduction

CONTEXT

Siavonga District is part of the Lower Zambezi Area Management Unit according to the Zambian Wildlife Conservation Area categorization and as such is endowed with rich wildlife resources dominated by elephants. These semi-arid conditions, the generally poor soils, and the previous history of tsetse fly infestation render it difficult for local communities to sustain livelihoods on crop production and large livestock production. As a result of these challenging conditions, communities were reliant upon poaching, sale of charcoal and other non-sustainable practices as their sources of income.

Introducing alternative economic incentives and new sources of food production, in exchange for conservation, would help provide incentives for local communities to participate in conservation. To facilitate this linkage, the African Wildlife Foundation designed two relatively small initiatives aimed at supporting livelihoods while protecting strategic natural areas.

The two initiatives described below fit into an overall AWF program in the Lower Zambezi landscape, which included activities in five core strategic priorities for AWF:

- Species protection
- Land and habitat conservation
- Conservation enterprise
- Training and capacity building
- Policy dialogue

Initiative: Improved Goat Husbandry and Production

The Siavonga district is prone to food insecurity, partly due to erratic rains. The unpredictable weather patterns mean that cultivation of rain-fed crops by local communities is almost impossible. Because of the limitations of agriculture, communities have resorted to unsustainable land-use activities, including charcoal production, quarry stone crushing, and shifting cultivation. Experience also shows that many farmers cannot wait for a full (or several) cropping seasons before reaping the benefits of conservation agriculture. Thus, the introduction and production of short lifecycle livestock such as goats, chickens, pigs or guinea fowl is key in these rural communities. In consideration of livestock, goats are the most resilient and adapt very well to the harsh climatic conditions of the Zambezi Valley. However, local farmers have

not considered them as an alternative source of livelihood, but rather consider cattle to be a status symbol for wealth.

The question that faced AWF was how to introduce commercialization of goat production to the Simamba Chiefdom to create this alternative source of livelihood and mitigate some of the unsustainable land use practices.

To achieve this, AWF assisted members of the local communities that own large populations of indigenous goats through the piloting of a breed improvement exercise. The program focused on raising the quality and size of meat goats, improving revenues from the goat production, and ultimately reducing tendencies to engage in unsustainable livelihood practices (i.e. charcoal production).

As part of the initiative, AWF has also started to assist in finding markets through which the community can sell the goats at competitive prices.

Initiative: Improved Aquaculture Production

Zambia is currently the 8th largest producer of captive-reared fish in Africa with an average production 0.8 kg per person per year. Aquaculture accounts for 12% of Zambia's total fish production and has experienced significant increase since 2005.[2]

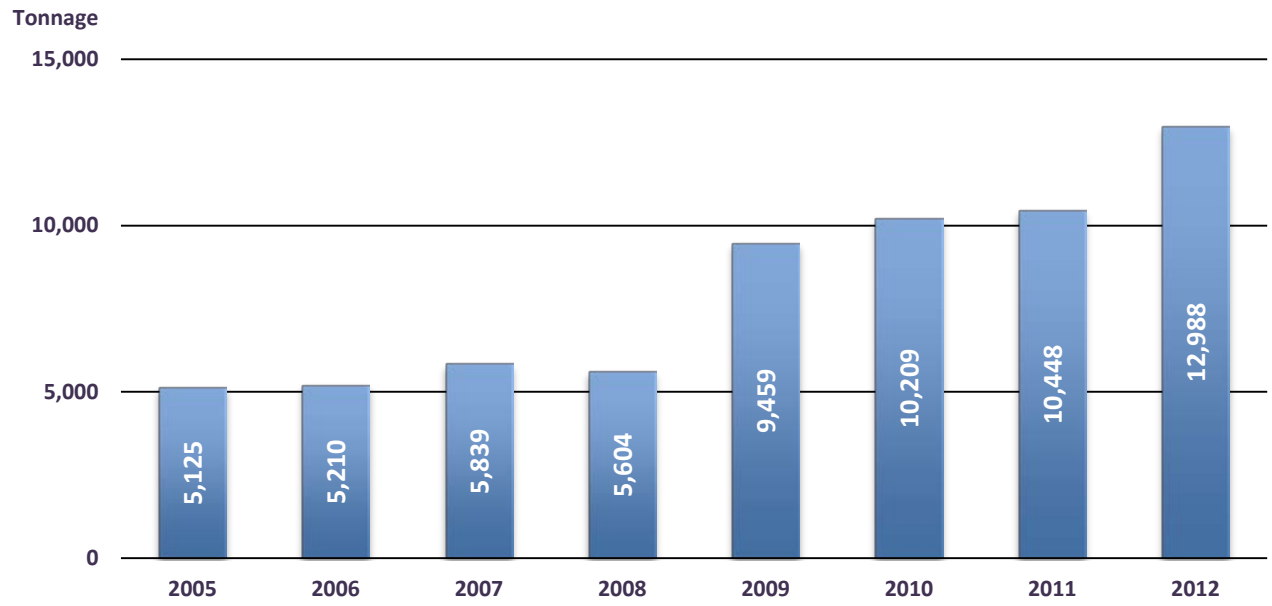

Chart 1: Zambia Aquaculture Production 2005–2012

[2] Source: Department of Fisheries Annual Report 2012

AWF provided training support to a fish-farming cooperative in Chiawa, which is also supported by the *Mabel Feeder Foundation* through a private tourism business entity called "Explore Africa".

Constant human—wildlife conflicts generally reduce the livelihoods prospects for the people of in the Chiawa area. Fishing pressures on the local Zambezi and Kafue Rivers was reducing the local populations of fish to unsustainable levels. AWF looked to support the fish farming cooperative as one option to promote income generation through aquaculture, with the expected impacts of reducing human wildlife conflicts and reducing the fishing pressures on the river ecosystems.

STUDY METHODOLOGY

This report is a result of a one-week Rapid Rural Appraisal (RRA) carried out in the project area from the 3rd to 8th June 2013. The study investigated the target groups through open-ended discussion interviews with the beneficiary representatives and other stakeholders who served as key informants.

The discussions focused on the goals of goat and fish production and marketing systems of the target groups. The inquiry, in form of case studies, sought to reveal the target groups' knowledge and adoption of best production and marketing practices resulting from AWF's interventions. Together with the representatives of beneficiary communities, the inquiry also explored changes required to achieve expectations and fill identified gaps in the production and marketing systems now in place in a move towards commercialization. The ideas from discussions with target populations and a number of stakeholders form the basis for the recommendations for future production and marketing initiatives.

Background of the Project Area

LANDSCAPE AND CLIMATE

Siavonga District[3] is located in the Southern Province of Zambia. The district covers an area of 3,413 km² (1,318 mi²) and is bordered by the Kafue and Zambezi Rivers in the north and east, Gwembe and Mazabuka districts in the west and northwest.

To the south, the district shares an international boundary with Zimbabwe on Lake Kariba and along the Lower Zambezi River up to its confluence with the Kafue River.

The district is characterized primarily by an escarpment zone, which drops sharply from the plateau in the North to the valley area that is now largely covered by Lake Kariba. The Zambezi and Kafue Rivers border the northeastern area of the valley. The valley has an altitude that ranges from 600 meters (1,970 feet) at its peak to 400 meters (1,310 feet) at the intersection of the Kafue and Zambezi rivers (the northeastern boundary with Lusaka province). The climate within the project area is greatly influenced by altitude. It is generally warm and dry most of the year. The mean annual temperature is 25°C (77°F). The area traditionally experiences one long rainy season per year.

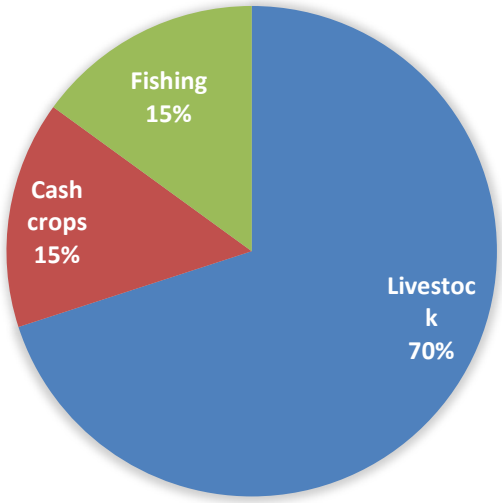

Chart 2: Source of Household Income in Siavonga

Rainfall begins in the middle of November and lasts until mid-March. However, being in a rain shadow, the area belongs to Agro-Ecological Region 1 (those geographic areas where average annual rainfall is between 650 and 850 mm (26 and 33 inches)). Mean annual rainfall in this District is 650 mm (26 inches). Rainfall is always erratic and generally insufficient for most field crops. Dry periods lasting up to three weeks during the rainy season are quite common, affecting the production and harvest of rain-fed crops. The dry season starts in April and lasts until the onset of the rainy season in November.

[3] Recently, a new district of Chirundu was curved out of Siavonga. The delineation process is however still in progress.

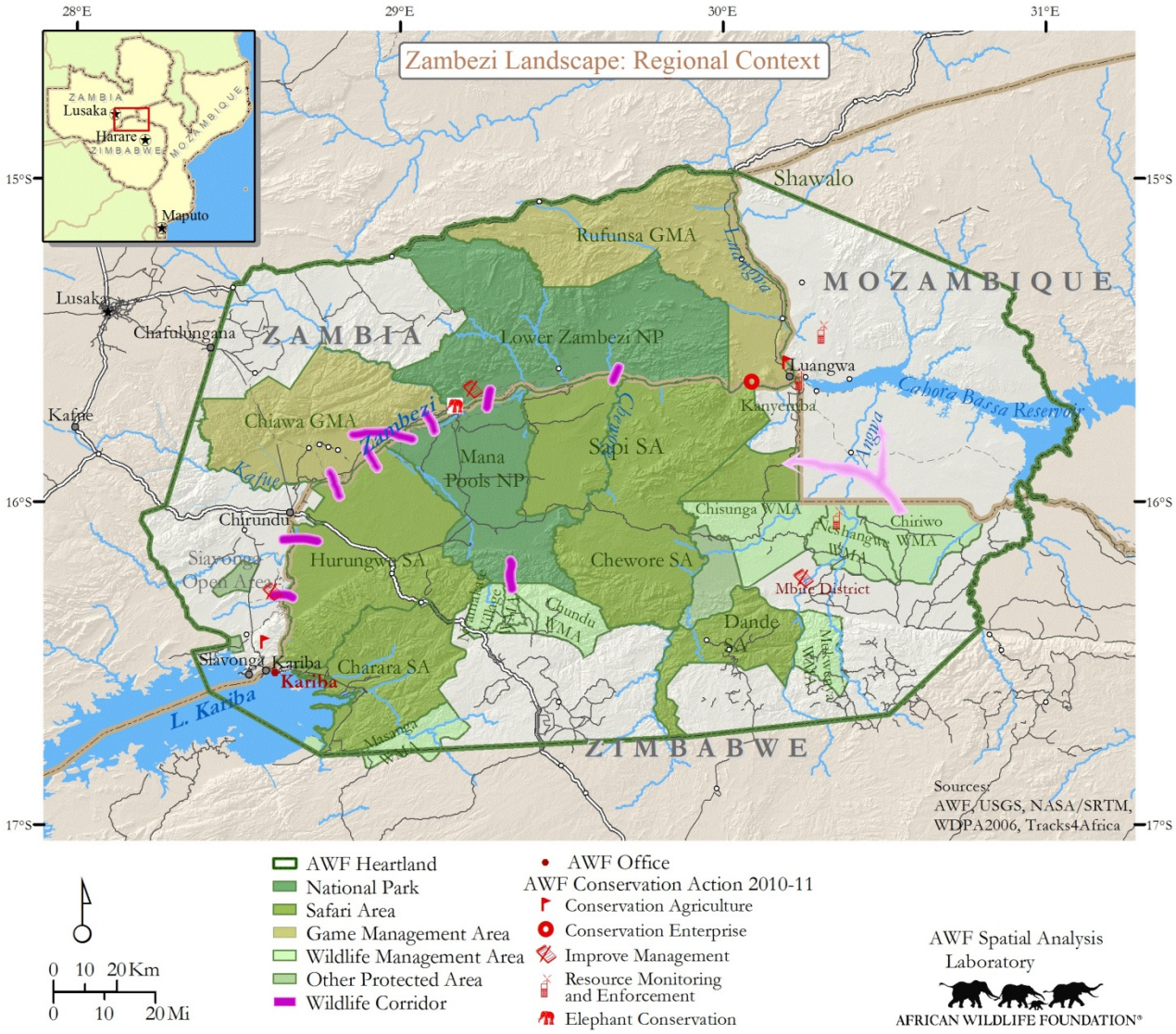

Figure 1: Map of AWF's Zambezi Landscape

SOCIO-ECONOMIC CHARACTERISTICS

According to the 2010 Census of Population and Housing Report the population of Siavonga is 90,213. District annual population growth rate is relatively high at 4.6% indicating a substantial rate of immigration from other parts of the country, primarily due to income and food opportunities from fishing activities. Livelihood options revolve around fishing, cropping and livestock, with livestock traditionally viewed as a key pathway out of poverty (Malasha, 2008). Malasha cites a survey carried out by the United Kingdom's Department for International Development in 2000 which reveals that 70% of household income is from livestock sales (cattle, goats and sheep). Cash crops contribute 15% and the balance is from fishing related incomes. Cotton is the major cash crop, while food crops consist of sorghum, millet and maize.

CONSERVATION IMPORTANCE

The target project area of Simamba is within the Important Bird Area (IBA) and is connected to Zimbabwe through the Namoomba corridor which has a trans-boundary context that sets it as an important complementary dispersal area and habitat for the shared elephant population. Currently, the communities in this area use the IBA and surrounding landscape for charcoal burning, shifting cultivation and stone crushing amongst other habitat degrading activities. If provided with an alternative livelihood, these ecologically destructive activities will stop.

Figure 2: Zambia Agro-Ecological Regions. Siavonga falls within the pink area of the map.

Improved rural livelihoods through goat production is expected to be an alternative that releases pressure from natural resources in this IBA and will consequently result in improved wildlife and birdlife aesthetic values in the area. At the start of the AWF interventions, illegal production of charcoal in the local areas was on the increase, as confirmed by His Royal Highness Chief Simamba (personal communications), which he attributed to the notion that people are able to make money faster in charcoal production than livestock production. However, AWF's research showed much higher returns per goat than per bag of charcoal. (At the time of project inception, a goat in Lusaka sold for between US$ 10 and $ 30 while a 50 kg bag of charcoal sold for US$ 3 in Siavonga).

In return for AWF's support in developing this market program, the beneficiary communities were expected to play an important role in the protection and conservation of the local forest and the corresponding 30,000 ha elephant corridor through the area.

The support of aquaculture was a much smaller initiative, but similar rational and reasoning supported the activities. In addition to providing an alternative source of income to charcoal production and other unsustainable resource uses, aquaculture production would serve the market opportunity and demand for protein-rich fish while simultaneously reducing pressures on natural fish populations within the Kafue River. By promoting on local cooperative with good aquaculture training and management practices, the expectation was that the income generated from aquaculture would incentivize other communities to undertake similar initiatives, multiplying the reduced impact of river-based fishing on local fish populations.

Case Study: Simamba Goat Production

The focus of AWF's goat intervention was to improve the performance of goat-based enterprises as a major source of income within the rural communities, which included the establishment of a breeding and management program to ensure improved quality of the goats for both meat and milk production; and development of forage and fodder feeding to supplement natural feeds. Other interventions focused on animal health management training to promote high quality goat production within the area thereby reducing animal mortality, as well as small business management and marketing to ensure sustainability and viability.

Specific activities of AWF's program included:

- Distributing Boer goats, which are more productive than the commonly used dwarf breed
- Establishing organizational structures for veterinary services
- Training in:
    - Basic small ruminant husbandry techniques
    - Producer group governance
    - Goat farming as a business
- Developing improved goat housing

AWF also provided support to the veterinary department through training of Community Livestock Auxiliary Attendants (CLAAs). The attendants are the representatives of the veterinarian at the community level. The CLAA is not a certified veterinarian but is qualified in providing primary animal health care and animal production advice to farmers within their communities.

The case study of the Simamba Goat Producers and Marketing Cooperative serves as an example of assessing the needs and activities along the value chain necessary to successfully operate a goat production value chain initiative managed by a community-based organization (CBO). The AWF program focused on the first three steps of the value chain:

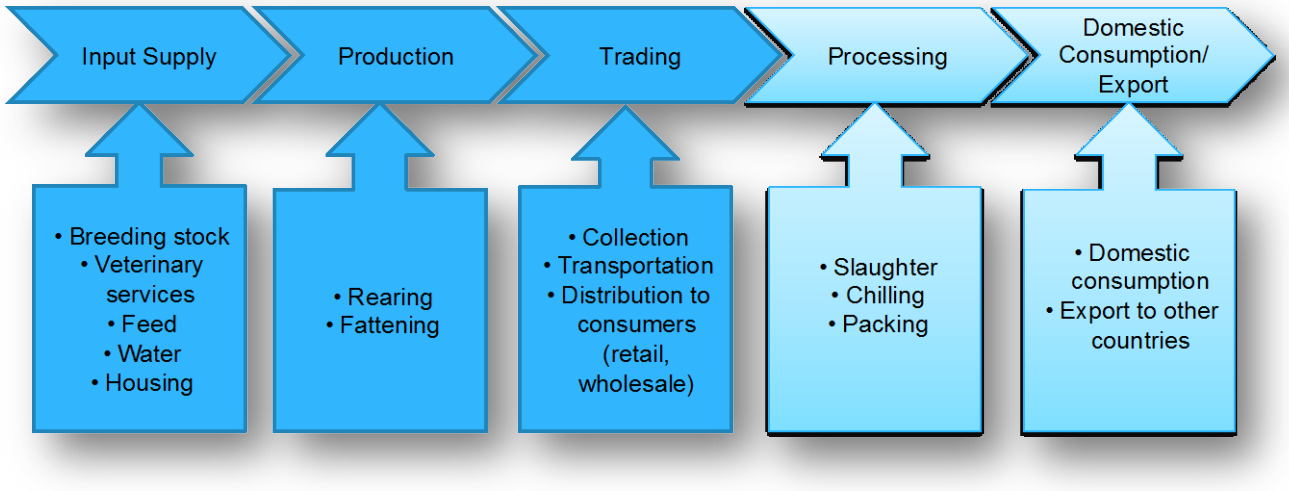

Figure 3: Goat Production Value Chain

CHALLENGES TARGETED IN IMPLEMENTATION

Input Supply: Before AWF's intervention, goat production in Siavonga was facing a number of challenges. Inadequate availability and supply of the most appropriate type of breeding stock had led to small goats with limited productivity. The farmers had limited knowledge on the opportunities to improve their goat production. Poor supply of inputs such as drugs and feed were restricting farmers from commercializing their goat business. Finally, poor public policy on the environment, especially on the administration of animal health policies and disease control, also constrained farmers' goat production efforts.

Production:

As goat production was not commercialized, farmers did not have the necessary management skills for goat production. This resulted in inadequate husbandry which further limited outputs.

The farmers traditionally allowed goats to roam freely within the community, allowing them to forage for food. Even during the rainy reason, when the goats were kept in-house most of the time, supplementary feeding systems were not applied. Reasons for the "de facto" feeding regime included:

- Lack of knowledge about supplementary feeding systems (what, why, how)
- Lack of understanding that goats can actually be trained
- Inadequate goat housing did not provide the possibility for supplementary feeding systems

Supplementary feeding during a mother's lactation period can assist and improve the health of both mothers and offspring; however, no consideration to this important aspect of goat husbandry was practiced by local farmers.

Trading:

Goats had been primarily reared for consumption on special occasions and for occasional sales when cash is needed to meet household needs. When selling the goats, the trading usually took place locally through local traders.

Farmers did not consider going to different markets in the country to sell their goats, or any linkage to commercial markets/buyers. This was mainly due to insufficient knowledge about additional market opportunities, lack of efficient information networks, and limited marketing skills on how to assess the various market opportunities.

Generally, local prices for goats were well below market prices in Lusaka, or in border towns to the DRC.

Figure 4: Listening to a goat farmer. Note the Setting for Goat Housing in the Background.

PROGRAM IMPLEMENTATION AND SUCCESSES

In 2009, just prior to AWF's program implementation, livestock numbers within the district were significant, with the number of goats exceeding the number of cattle, sheep and pigs combined. Unfortunately the community never considered goats as an alternative source of livelihood, only as a financial and nutritional safety net. It was against this background that AWF considered the commercialization of goat production in Simamba as a mitigation measure to unsustainable natural resource use in the area.

Following consultation with Chief Simamba, the Ministry of Livestock and Fisheries, the Golden Valley Agriculture Research Institute (GART), and Land 'O Lakes, community sensitization meetings were held in three zones of the chiefdom. This endeavor sought to capitalize on the available large herds of goats owned by farmers in the Simamba Chiefdom and demonstrate that goats can be utilized as a reliable source of income to provide significant contribution to their livelihood.

It was through these meetings that brought together seventy voluntary goat farmers to form the Simamba Goat Producer and Marketing Cooperative (SGPMC) which was formally registered as a cooperative with the Ministry of Agriculture and Cooperatives in August 2010. The cooperative comprised of three area groups (Matua, Siamatika and Nabutezi) each of which has a committee composed of ten elected members. The SGPMC is governed by a Board whose members were elected from among the elected members of the area committees.

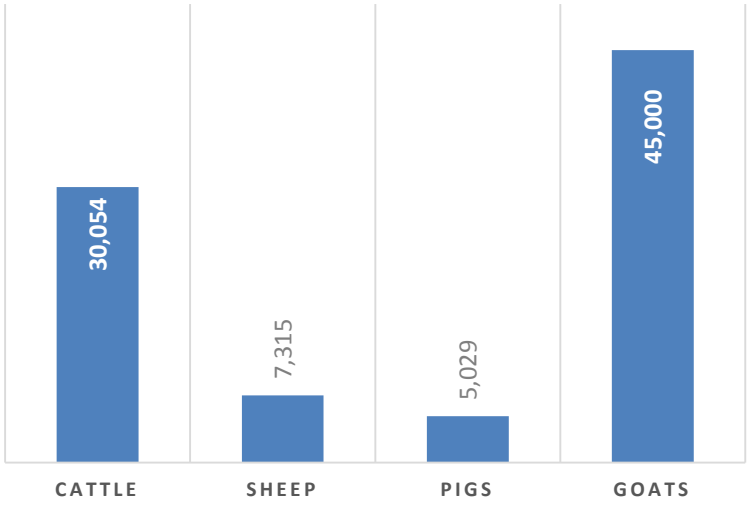

Chart 3: Number of Livestock, based on 2009 Siavonga District Census

Commercialization and income generation from goat production was only part of the effort. The primary focus for AWF was protection of the ecosystem, the forests, and the corresponding wildlife corridors. To help solidify and reinforce the linkage between income generation, goat production, and conservation, AWF reached out to individual charcoal producers from the local communities.

Twenty individuals that had previously been involved in charcoal burning were given forty goats as part of a strategy to offer them an alternative means of generating income. Though the benefit of goat rearing would take a bit longer, these community members were sensitized on the negative environmental effects of charcoal burning and the legal implications of such illegal acts. Furthermore, the poor economic value of charcoal production was highlighted, noting that production of one bag of charcoal was labor intensive compared to the local selling price of US$ 1.50 or the price of US$ 3.00 when transported to Siavonga town. An agreement between AWF and the SGPMC was signed that included provisions prohibiting the project beneficiaries from producing charcoal.

Figure 5: Boer goat. The white Boer goat (center) is larger than the other local breed goats shown.

Improved Breed

The farmer group facilitated the distribution of 162 Boer goats, which are more productive and robust than the traditional dwarf breed. The Boer goats were introduced at three sites: 50 in Siamatika, 70 in Matuwa and 42 in Nabutezi[4]. The goats were distributed in pairs (one male and one female) to the target group.

Recipients of the Boer goats reported satisfaction with the improved breeds, as they helped lead to an improvement in the size of their goats. Bigger goats, irrespective of age, command better prices. According to Genetic Breeders in Lusaka, a pure adult Boer goat can be sold for ZMW 3,500 (US$ 670) and the corresponding prices for the local dwarf goat were ZMW 150–250 (US$ 28–48).

Even though some farmers expressed desire to include cattle in the AWF project, most agreed that goat rearing was an appropriate entry point because it can be a pathway to cattle wealth. The target group was unanimous on the suitability of goat rearing for low-income households. One focus group discussion revealed that local farmers considered ten goats to be the rough equivalent to a mating heifer and that the goat enterprise was particularly favorable to resource poor households because it is less costly to start and requires less management activities. Because goats are hardy, they have fewer risks and present a quick return. One result from the AWF intervention, based on discussions with farmers, was the shift in purpose for goat production; farmers now view goat production primarily as an income-generating activity. This shift in focus also highlighted the challenges in marketing that may not have been fully appreciated when goats were viewed primarily as a source of food.

Feed

The AWF intervention introduced the supplementary feeding system to the participating farmers. This included the production of silage and use of other crop residues. To facilitate the acceptance and uptake of supplementary feeding programs, AWF provided forage seedlings and comprehensive training to the participating farmers.

The trainings demonstrated techniques to make silage to provided hands-on training for all participants.

Figure 6: Farmer hand-feeds a goat, utilizing new techniques resulting from AWF initiatives.

Improved Goat Housing

[4] Conversation with Gideon Siakopa: Community Livestock Auxiliary Attendant at Siamatika School 4/06/2013

The AWF intervention provided training on constructing improved goat housings. Furthermore, the trainers physically demonstrated the construction of goat houses.

The new goat housings have significantly contributed to the following improvements:

- Reduced predation
- Enabling sanitary disposal of urine and stool, which then is collected and used as crop manure
- Better goat feeding practices, including easier supplementary feeding
- Better husbandry

Veterinary Services

AWF procured veterinary drugs and medicines, which are managed through a revolving fund. According to the CLAA at Siamatika, the system is working well.[5] Farmers expressed satisfaction with the service delivery system, where they are able to place their medicine orders through the CLAA to the veterinary assistant at Simamba and/or receive the required service from the CLAA at a stipulated charge for each service provided. The proceeds from the services rendered are deposited in a drug fund account which is used to purchase additional medicines on a revolving basis.

Figure 7: Improved Goat Housing of the Project Area.

[5] Conversation with Gideon Siakopa: Community Livestock Auxiliary Attendant at Siamatika School 4/06/2013

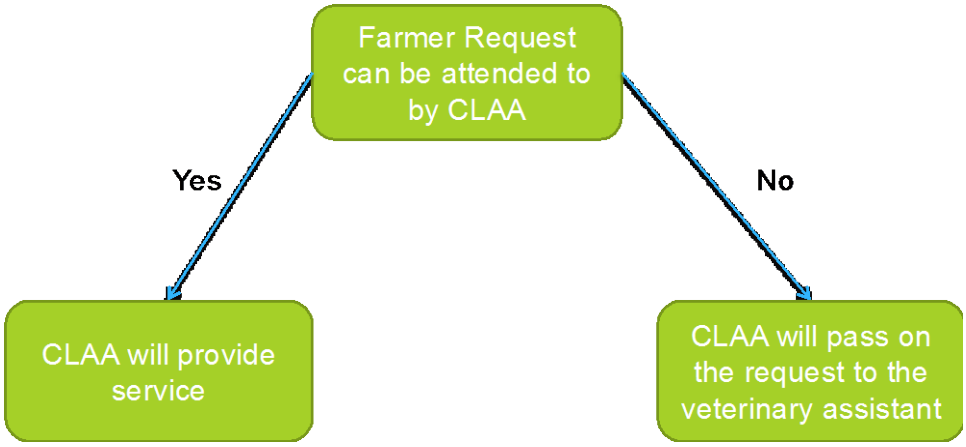

Figure 8: Veterinary Service Process

The introduction of a goat disease prevention and control system through the project CLAA and veterinary drug revolving fund has improved access to livestock disease control services as well as increasing the awareness of the importance of goat health management in the community. Because of increased access to dipping chemicals provided by the project, all of the farmers claimed to dip their goats. Interestingly, this practice has extended to non-project farmers as well,[6] indicating not only successful uptake of new practices, but the multiplier effect that his type of project can have beyond a small target group.

The activities focused on disease prevention and health management has contributed to gradual improvement of disease prevention, particularly of mange.[7]

Production

The target group was also trained in cut and carry feeding particularly of the thorny *Munyengele* bush and pods.[8] This practice involves cutting parts of tree foliage for feeding goats. Generally, the cut and carry feeding system is considered to improve control and management of the herd.

Trading

[6] Discussion with Tapes Kainda: Nabutezi Group member and owner of 7 goats of which 3 are improved.
[7] Mange is a highly contagious skin condition that occurs in all goat species as a result of parasitic mite infestations
[8] Conversation with Gideon Siakopa - CLAA

Market surveys were done in Lusaka towards the end of July 2010 which suggested that there existed substantial demand for goat meat. However, most formal markets prefer the delivery of animals to Lusaka by the supplier, while informal goat traders travelled to Siavonga for buying the goats.

Both markets have their own limitations. Logistical arrangements to transport goats to Lusaka are substantial for a new cooperative; comparatively, the informal traders would only buy few animals due to their capital limitations. This was confirmed by three traders who only managed to buy thirty goats at an average price of US$ 19 which was an improvement from the US$ 9 buying price before the project started.

Figure 9: A goat nursery constructed below grain storage, offering predator protection.

However the prices in Lusaka and the Kasumbalesa border of Zambia and DRC ranged between US$ 26-30 and US$ 54-60 respectively depending on the body size of the goat. There remains a gap that requires concrete research to secure commitment from bulk purchase markets at competitive prices. However, despite the above, the cooperative had three test goat sales (30 goats sold locally to goat traders) for total proceeds of US$ 570 (US$ 19 per goat). The 35 goats sold in Lusaka netted US$ 913 (US$ 26 per goat) and another fifty sold at Kasumbalesa boarder (to DRC) netted US$ 2,553 (US$ 51 per goat).

Through marketing and markets training, the farmers are now aware of the importance of marketing skills to make an informed decision on pricing for their goats. The knowledge about prospective prices for goats at various markets within the country has contributed to the willingness to commercialize goat production in the area.

Link to Conservation

The increased awareness and understanding of the marketing component of goat production has helped to shift the focus of goat production from a source of food to a source of income, as mentioned above. This shift in focus has contributory impact on conservation; farmers have begun shifting away from unsustainable resource use practices (most notably charcoal production) as a means of income generation given that goat production is now viewed as potential income for their livelihoods.

CONTINUING CHALLENGES AND LESSONS LEARNED

Goat Breed:

Because of the free-ranging farming system through which goats roam freely within the community, sustainability and viability of improved genetics is difficult. Even if participating farmers appreciate the need for selective breeding through castration of male goats, it is not always easy to control mating given the free communal range farming system.

Feeding and Housing:

While the new goat housings brought with them many improvements, concerns remain about maintaining these new buildings over the long term. Some farmers spoke of termite infestations on the wooden structures.

The feed supplementation is a seasonal issue, especially during the wet season when goats spend most of the day in housing. However, the wet season coincides with the time when farmers traditionally are low on food stocks and also with the peak harvesting season when labor demand is greatest. When farmers do provide goats with a supplemental feeding program, farmers provide grains as a supplementary feed, which conflicts with food needs of the communities.

Supplementary Feeding Success:

Pearson Hampinda, one of the participating farmers in Nabutezi, had never fed his goats but rather just let them roam freely in the community to find pasture or other food sources. Before the project, Pearson said he (as with many other farmers) did not know that goats could actually be trained. Now he has seen that it is possible to call a goat as you would a dog or oxen. The increased interaction between him and his goats helps him to manage his herd better. He is now also able to regularly monitor disease, breeding cycles and parturition.

Figure 10: Mr. Hampinda Demonstrates Feeding of a Boer Goat Cross in Nabutezi

Marketing:

The absence of a well-informed market information system throughout Zambia is the main limitation to apply the acquired knowledge in the marketing of goats.

One market information system currently available is that of the Zambia National Farmers' Union (ZNFU). The ZNFU provides market information on their website. Airtel network users can also access it by Short Message Service (SMS). However, this listing by ZNFU is limited,

only indicating the buying price by selected processors, abattoirs and butcheries. It does not provide producer prices across the country. While a positive initiative promoting access to information, the ZNFU system remains primarily a Lusaka based market information portal rather than one with wider, cross-country coverage.

> Webster Mulengwa, a farmer in Nabutezi, took 12 goats from his herd of 30 goats for sale in Lusaka. If he had sold the goats within the village, he expected to obtain ZMW 800. He spent ZMW 300 on expenses for the round trip to Lusaka inclusive of goat movement charges and snacks. He sold the 12 goats for a total amount of ZMW 1,200. He could not describe the effort as worthwhile and now prefers to sell his goats locally.

The need for a working market information system becomes clear when looking at the experience of one of the farmers in Nabutezi:

ASSESSMENT OF NEEDS

Institutional Needs

To successfully operate a goat production value chain, which is run by a CBO, the following should be in place:

- Clear organizational structure
- Clear leadership structure
- Members of committees should be elected/appointed on voluntarily basis
- Set up of effective communication network
- Regular meetings to discuss current issues and problems
- Allowing members to actively participate in decision-making and solution-finding

The SGPMC serves as a good example for future community-based structures:

Involvement of Women:

The target group consists of 77 volunteer farmers, split into three centers in Siamatika, Matuwa and Nabutezi. At Siamatika, 10 of the 25 members are women (40%). With this, the female representation of the cooperative's members is above the ratio during the initial training (25%).

Local Representation:

Each center has a sub-group where each village has a representative on the area executive and an inter-group secretariat consisting of representatives of the three farmer groups makes the leadership of the Cooperative. The members and their leaders hold monthly review meetings.

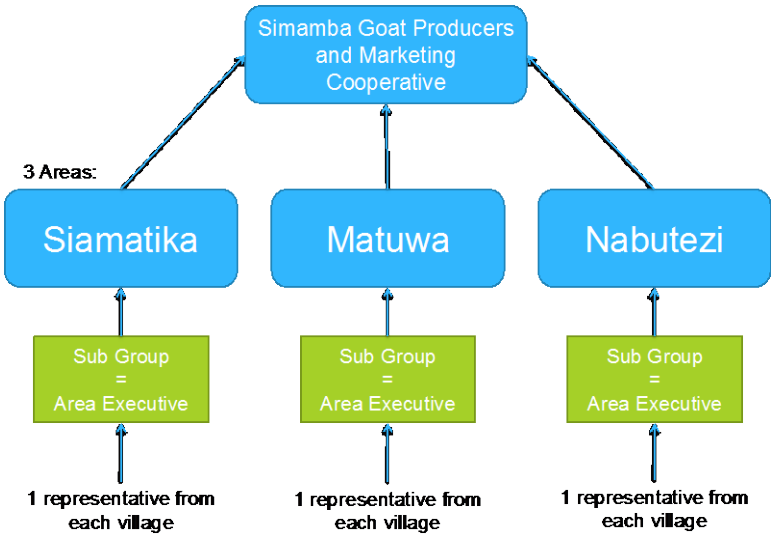

Figure 11: Simamba Goat Producers: Organizational Structure

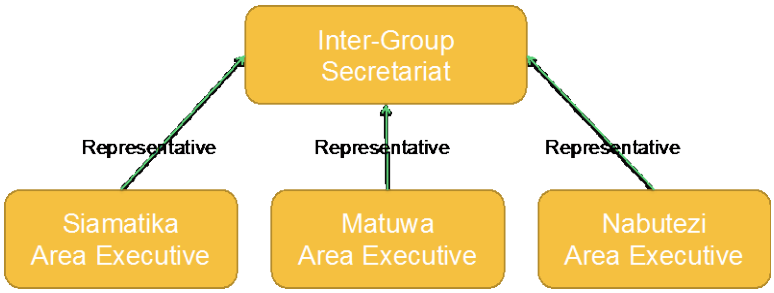

Figure 12: Simamba Goat Producers: Leadership Structure

Marketing Structure:

For a community-managed organization to generate income for its development, it must provide a valuable service to its members. One required service that the SGPMC could offer to its members is a **marketing infrastructure.** There are a number of different infrastructure systems could be developed. One opportunity would be the development of a physical market facility which could include a market yard, platforms for loading, assembling and auctioning of goats, weighing and other mechanical handling equipment. These facilities could be used for activities beyond the goat trade, for additional fees.

Functional Infrastructure:

As an alternative to the common market facilities mentioned above, the cooperative could establish functional infrastructure for assembling, grading, standardization and quality certification. There is need for intervention in this area to enable producers and consumers (buyers) to benefit from productivity and quality produce. These investments would support the development of a market channel for goats by promoting direct integration of processing units with producers.

Strategic Partnerships:

The above investments may not be solely borne by the cooperative. Some of these could be led by the cooperative, especially where minimal resources are required. However, it is also possible to partner with Government or the private sector (traders, processors). These partnerships could reduce the transaction costs associated with goat trading by reducing droving, enabling access to livestock transport and increasing value of sales from standardization and grading.

Veterinary Support:

Veterinary supply and services are also an essential institutional requirement to operate a viable and successful goat production system. The structures with the CLAA and the procedures to receive veterinary services in the way the SGPMC set them up are working well and are broadly accepted and appreciated by the farmers. The structures ensure constant supply with drugs and services for small livestock treatment. This way of disease prevention and control helps to keep the herds healthy.

Material Needs

On the material side, there are several needs to be covered to enable a CBO to successfully provide valuable services to goat production members.

- **Appropriate goat breed:** The right goat breed is essential to begin commercialization of goat production. The goats have to be hardy, resistant to locally-prevalent diseases, frugal considering limited availability of grass, and productive in terms of size and meat—the ultimate determinants of price within the marketplace.
- **Feed:** Introducing supplementary feeding is critical to ensure proper and fast rearing of the goats. However, local resources have to be taken into consideration. In the case of Simamba, silage production was introduced but due to thin grass coverage in the area, silage seems not to be the best option for supplementary feeding.
- **Resources for housing and maintenance:** To improve the goats' housings, sufficient amount and quality of wood and other construction supplies (nails, tools) must to be

provided. Materials needed for maintenance of the newly built housings also have to be considered as seen from the Simamba goat intervention; termites are an ongoing concern within the local population.

- **Medicines and Drugs:** Disease prevention and control is an essential part of livestock production. Apart from the veterinary support services mentioned above, accessibility and affordability of the necessary drugs and chemicals is fundamental for successful uptake and application. Key inputs include vaccinations for disease prevention, chemicals dips to stop disease spread (like mange), and drugs to treat diseases when they occur.

In terms of marketing, it is useful to have equipment for measuring goat weight (scales). This helps farmers calculate the value of their goats in advance. Equipped with that information, farmers should be able to assess the opportunity for sales, the markets in which to sell, and expectations proceeds.

RECOMMENDATIONS FOR FUTURE PROGRAMMING EFFORTS

The goat breed improvement intervention has significantly contributed to improve the commercialized goat production in the participating areas.

Further interventions may consider the lessons learned from this intervention:

- **Local resources:** The input supply, including supplies of supplemental feeds, should not interfere with people's needs for food. Feeding techniques should also be aimed to use those resources which are not limited in the local area.
- **Local systems:** The system of free-roaming goats within the community is a common practice. To sustain an improved breed of goat, it will be necessary to introduce a system of fenced grasslands or other practices of segregation for particular groups of goats, to ensure the long term viability and productivity of the improved breeds.

Further efforts concerning the marketing of goats, including the creation of an adequate market information system, will enable farmers to sell their goats with improved return based on current market information and understanding.

Also, a monitoring system might be introduced, giving the farmers a tool kit to track the impact of the changes made to their goat production system. This will also allow precise evaluation of the intervention's impact.

Program initiatives considering these recommendations will increase the popularity of commercialized goat production in the area. This in return will contribute to food security and continue the shift from unsustainable land use practices in the area —largely the result of the need for income—as farmers now have an sustainable and reliable source of income.

Case Study: Chiawa Aquaculture

Similar to the goat improvement program, the Chiawa aquaculture intervention by AWF focused on improving the cultivation and production of fish as a means to improve both income and food security within the area.

The Kupfuma Ishungu Cooperative (*KIC),* a group of nine women and five men, runs a fish farm called Chiawa Bream Farm.[9] The farm receives the majority of its support from the Mabel Reeder Foundation *(MRF)* through the private tourism lodge *Ndorochena*, which is owned by *Explore Africa*.

Figure 13: The Road Sign to the Kupfuma Ishungu Cooperative Farm

AWF's initiative with KIC was much more limited than the activities with the SGPMC. To support the development of the Chiawa Bream Farm, and in broader support of its conservation objectives, AWF facilitated members of KIC to attend a one-week intensive aquaculture training by the Zambia Department of Fisheries. The training touched on all aspects of the value chain, with the majority of focus on the production and business management.

The training covered all the activities directly related to growing the selected tilapia species. Planning and management included development of the initial concept, species and site selection, capital formation, design and construction of the farm and business management of the operation. It also includes the calculation of needs for personnel with technical and business management skills or training needs in this area.

[9] In many sub-Saharan African countries, the terms Bream and Tilapia are used interchangeably. However, the more official recognition of these species of fish is "tilapia" and for the purposes of this report, we will refer to these fish generally as tilapia.

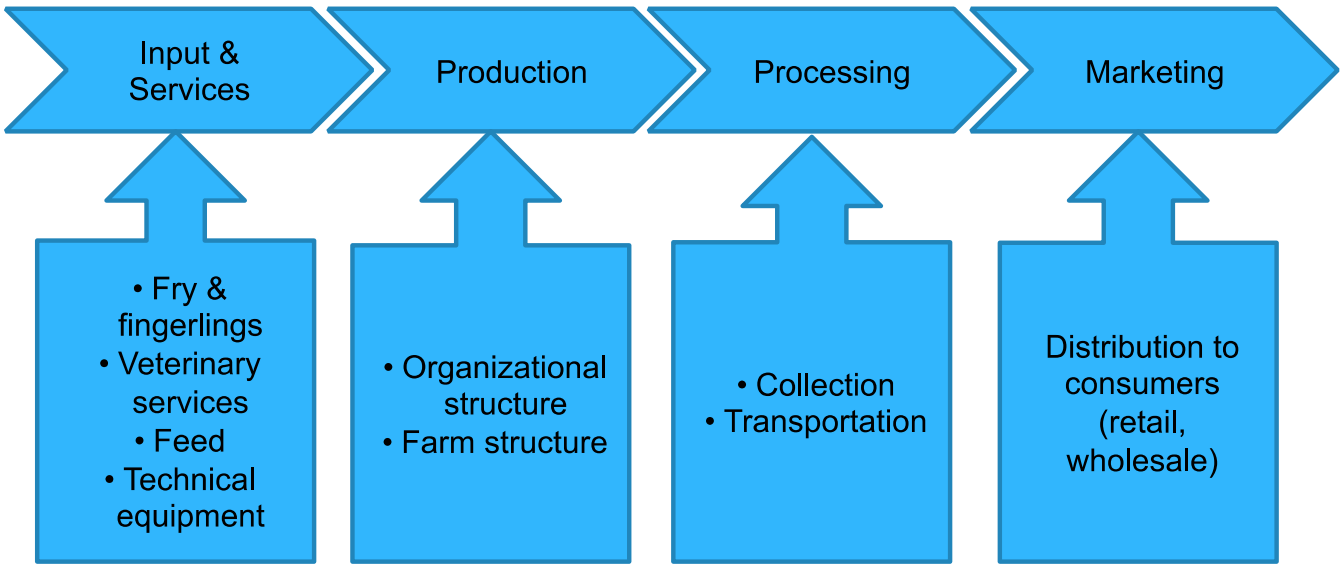

Figure 14: Aquaculture Value Chain

In addition to the AWF training, the cooperative received significant support (financial and technical) from the MRF, including pond construction services, water pumping equipment, and fish feeds. The members of the cooperative provided time and labor for manual pond construction—including leveling and shaping of the ponds. The resultant farm consists of six ponds of approximately 20 x 30 meters (66 x 98 feet).

CHALLENGES TARGETED IN IMPLEMENTATION

Challenges related to aquaculture in Zambia are numerous; small scale aquaculture practitioners face increased hurdles given the lack of available information.

The primary challenged faced in Zambia include:

- Lack of affordable fingerlings, and nursery stock (20g fish)
- Imported brood-stock prone to disease
- Unwillingness to buy inputs
- Limited seed, feed, other inputs supply points (accessibility)
- Inability to buy inputs to improve yields (affordability)
- Limited skills in seed/ nursery production
- Limited technical services

Sourcing of Fry and Fingerlings:

In Zambia, the commercial fish culture has a choice of several species: *Oreochromis Niloticus, O. Andersonii and O. Macrochir* and *Tilapia Rendalli*. Fish farmers often do not know what species is

the best for their area; different species are affected by various factors such as temperature and water quality. If the fish farm procures the wrong fingerlings, the fish farm production will be limited and efficiency will be compromised.

Feed:

Proper application of a nutritionally balanced fish feed is critical to the success of any tilapia farming operation. To produce excellent growth rates, tilapia are typically fed moderate to high protein pellet diets at rates ranging from 1.0% to 30% of their body weight per day depending upon their age and size.

Lack of knowledge about the feeding of fish was the main challenge for fish farms in operating their businesses profitably.

Veterinary Services:

Veterinary support for disease prevention and control is an essential requirement for operating a fish farm. The absence of veterinary support and lack of knowledge amongst farmers lead to reduced productivity, increased costs, and eventually to loss of profits.

Production:

The design and construction of fish ponds and related water management is largely dependent on the climate, the soil type, and the species to be produced. Inappropriate design can lead to ongoing challenges in successful operation, or limit the potential production of a fish pond. The pond construction is often insufficient, as not guided by competent advice.

Inefficient farm design also leads to high operational costs, which limits the output potential and income potential of the farm.

Fish farms also often lack proper management plans and organizational structures, which again increase operational costs and lead to ineffective businesses.

Further constraints at the production stage are:

- Poor breeding and production practices
- Lack of business awareness
- Low yields
- Poor on-farm feed practices
- Fish theft – human, otter, birds of prey, etc.
- Lack of resourced Government extension personnel

Marketing:

Fish has to be in an uninterrupted cold chain (refrigerated or frozen) before selling it at any market of size. Power supply problems in the area often create problems in sustaining any cold storage infrastructure (cold rooms, commercial freezers and refrigerators) and use of generators to power these electricity-demanding appliances is cost-prohibitive. Due to poor fish transport practices, identification of appropriate markets for the amount of fish harvested can be problematic, creating competitive disadvantages for small-scale producers when compared to large-scale commercial enterprises or imports.

Fish processing facilities or processors look for specific size fish to process. In some industries (like the goats above), larger size specimens often command bigger prices. However, with fish, this dynamic is not necessarily true. Larger-than-average fish are often slow to sell in the market due to processing problems. Poor presentation and unsafe handling practices also contribute to the challenging environment for aquaculture marketing.

Processing:

Harvest schedules help the fish farm to plan harvests and maximize output of each production cycle. As mentioned above, absence of well-trained management personnel on fish farms is often responsible for lack of such harvest schedules.

Without access to proper cold storage facilities, and consistent electricity supply, post-harvest processing ability is limited. Drying is one post-harvest alternative to cold-storage production, but local fish processing facilities, including drying facilities, do not exist at any scale.

PROJECT IMPLEMENTATION AND SUCCESSES

The Chiawa aquaculture intervention managed to be recognized as socially acceptable and appropriate to the area and the needs of the community. The individuals participating in the cooperative as well as others in the community—through training, information, and experience—now perceive aquaculture as having enough potential to cause them to change from other agricultural activities or fishing in rivers to fish farming (supporting the conservation objective of reducing pressures on fish stocks in the rivers). Furthermore, ponds in Zambia do not only serve as livestock deposit but also as water reservoir for the community who use the fish farm discharge water for other purposes.

Given the additional training through this initiative, the cooperative is able to manage more than one production cycle per year. The result of the training has been a direct increase in output and eventually income the cooperative members no have the necessary knowledge to appropriately apply correct production techniques and management, including:

1. Planning and management

2. Application of inputs
3. Efficient operations
4. Cost containment

In short, the project has now become a demonstration training facility within the area. In the long term, the farm expects to recruit a foreman while cooperative members aim to start construction of individual ponds.[10] The long term goal is to have twelve ponds (double current capacity). In addition, the farm has opted to integrate a 2.5 ha banana plantation within the fishpond area—using the discharge water from the fish pond (which happens to be rich in nutrients) as irrigation water for the banana plantation.

Fish Farm Production:

The Chiawa Bream Farm is stocked with *O. Niloticus* and obtained its 12,000 fish from Chirundu Bream Farm, one of the three private hatcheries in Zambia's Southern Province. The stocking is approximately 3.3 individuals (or 1 kg of fish) per square meter. The Nile bream is the most commonly bread fish in Zambia.

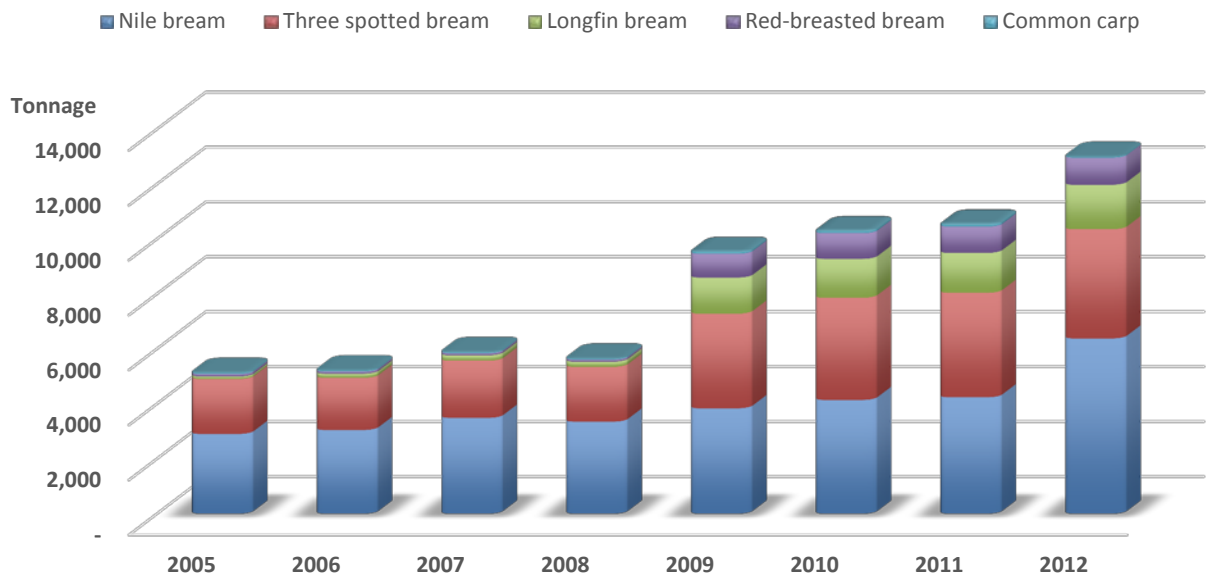

Chart 4: Tilapia Production by Tonnage, Year and Type in Zambia[11]

High quality seed (sex reversed all male fish fingerlings) is locally available and is being used correctly on the Chiawa Bream Farm.

[10] Conversation with Cooperative Chairperson, Mr Chinoi
[11] Source: Department of Fisheries Annual Report 2012

The grow-out strategy being implemented is relatively simple and from the stocking density employed, it can be described as being semi-intensive. The fish is fed with formulated fish feeds manufactured by the National Milling Company Limited (Zambia), which is known to produce high quality fish feed and is among the five main nationwide feed companies.[12] Due to the high quality of feed, the feed conversion ratio (FCR) can be set at 1.2 with a cost of around ZMW 4,240 (approximately US$ 800) per ton. Low quality feed have higher FCR ratios (are less efficient) and costs ZMW 2,650 (or US$ 500) per ton.[13] Lower quality feeds cost less, but more feed is required. With additional feed, there is additional waste created by the fish.

Processing:

According to *Agriculture Today*[14], a magazine produced by the Agriculture Information Unit of the Department of Agriculture in Lusaka, the Chiawa Bream Farm was established to serve as a model on how to address challenges of drought and other climate change factors that affect crop production. So far, the farm reports to have produced 3,000 kg (6,614 lbs) of bream fish in one year. The farm has been able to manage one production cycle per year, although there is potential to manage two or even three production cycles per year with existing resources on the farm as in ideal conditions one production cycle should take six to seven and a half months for 300 g (10.6 oz) fish and three months for 150 g (5.3 oz) fish. In general, semi-intensive fishing as practiced on the farm will generate 4,000–12,000 kg for every 10,000 m^2 (8,818–26,455 lbs for every 11,960 yd^2) annually in a fishpond. With the current total fishpond size of 3,600m^2 (4,305 yd^2), this means a possible annual production of 1,440–4,320 kg (3,175–9,525 lbs) per year for the Chiawa Bream Farm.[15]

[12] The other four major feed companies in Zambia are Tiger Feeds, FarmFeeds, Novatek (division of ZamBeef) and NutriFeed. Source: SAPP – Technical Support Team Presentation of Aquaculture Value Chain & Outline Intervention Plan Options (2013)
[13] Source: Interview Emanuel Chibesakunda with Malcom Beveridge (Director World Fish Center), 24.09.2013
[14] Agriculture Today, Number 6, June-December 2012 pp 7-9
[15] Source: Interview with Malcom Beveridge (Director World Fish Center), 24.09.2013

Figure 15: One of the six fish ponds at the Chiawa Bream Farm

Marketing

Demand, income and **price considerations** are the major incentives for market planning and management objectives. Research on local market dynamics suggest that the Chiawa Bream Farm actually can obtain adequate revenue at the price, income and demand from fish sales with possibility of more regular harvests and expansion of production.

The price of wild fish in the area is sufficiently high to allow farmed fish to be competitive with its wild counterparts. Fish demand is adequate and can permit profitable aquaculture. The market is also near to the farm to allow for off farm sales or timely deliveries without need for further processing.

From the information obtained, the farm has the capacity for a turnover of about ZMW 18.5 per kg (approximately US$ 1.52 per lb). This means a total turnover of ZMW 55,500 (US$ 10,470) for the cumulative 3,000 kg (6,614 lbs) of fish produced at the time of this report.

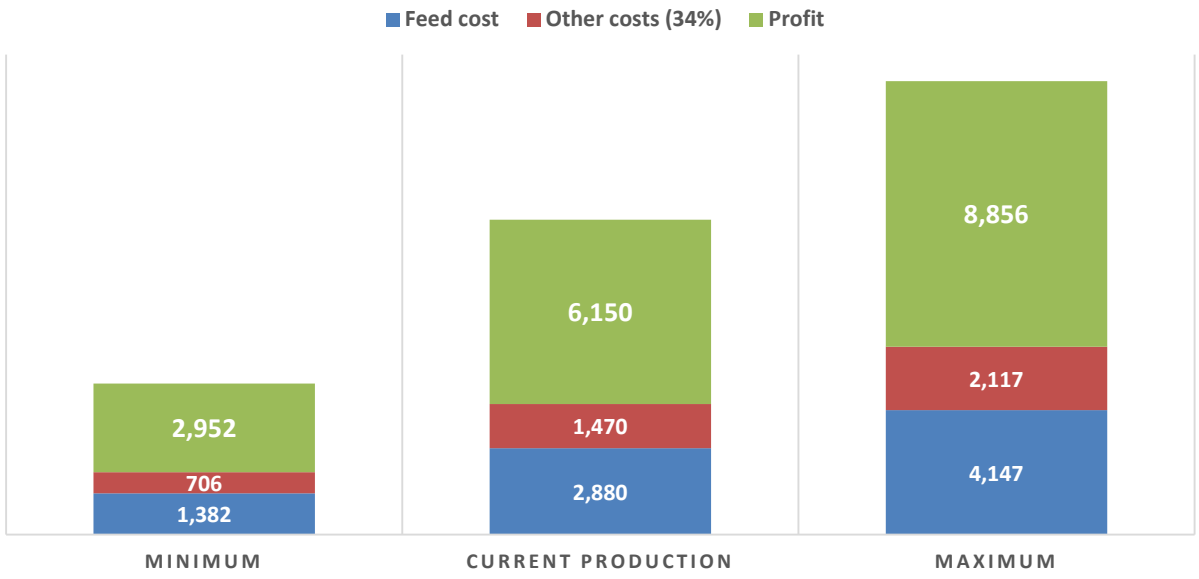

Chart 5: Profit of Chiawa Bream Farm (US$)

CONTINUING CHALLENGES AND LESSONS LEARNED

Training and Information:

During the intervention, it became clear that lack of knowledge is the main limiting factor for successful operation of an aquaculture enterprise for local community development. This affects all parts of the aquaculture value chain.

Given the technical aspects of the construction of fishponds and the overall farm design, it is essential to get the foundational design correct (e.g. regarding water inlet and water drain out), as it is difficult to make significant changes afterwards. Therefore, the establishment of aquaculture enterprises should be accompanied by experienced personnel (e.g. from the Department of Fisheries) from the beginning. This will also help to reduce operational costs over time.

The one-week training provided by AWF helped the farmers to gain elementary knowledge about fish farming. Nevertheless, it may be useful to have constant local availability of information concerning culture and production technology. A modular training program that stresses hands on practical training through the Department of Fisheries may be implemented to continue the training provided by AWF and offer more timely support when challenges occur. In addition, a manual or handbook to accompany the training and guide of good aquaculture practices might intensify the effect of the training.

Feeding:

According to received knowledge and culture practice in Zambian conditions, the culture of *O. Niloticus* in ponds takes between 180 and 225 days in ideal conditions (24 to 30 weeks). A number of factors influence the culture period. Notable among them is the size at which the fingerlings are received for the grow-out phase.

Environmental conditions:

Successful aquaculture requires specific physical conditions of the space where the facility is located such as ample water supply, water quality, ambient temperature and soil quality.

The soil quality at the Chiawa site is good and the site has year-round access to water supplies from the Kafue River, except for the limitation that the water is not driven by gravity flows and has to be pumped mechanically. At Chiawa, the water inflow pipes are moved by hand from pond to pond.

The intervention showed that, in addition to biological factors, successful fishpond farming of *O. Niloticus* as with other indigenous tilapia species requires appropriate technology. This involves growing the preferred species, preparing or preserving the resulting products and delivering them to the consumers in good condition.

Marketing:

A large market for farmed fish exists in Zambia, and specifically in Chiawa and neighboring areas. The key to a successful operation of an aquaculture enterprise in Chiawa is the effective marketing of produce. Availability of demand and adequacy of revenues from the marketing of farmed fish are probably the most important determinants of successful marketing.

The market for farmed fish can be generally segmented in the following categories, with the specific requirements highlighted:

Specialist Fishmongers	→ e.g., Roberts Fish & Veg
Supermarkets	→ Gutted & fish fillets fresh-frozen domestic/imports
Franchised dealerships	→ e.g. OK Food Stores linked to Lake Harvest
Markets and street vendors	→ Smaller fish <300g
Lodges, hotel and restaurants	→ 300-450g whole fish + fish fillets for recipe dishes
Guesthouses, mine canteens	→ 250-350g whole fish
Institutional canteens	→ Small fish

For Chiawa (or any aquaculture enterprise) to continue to grow, be competitive in the market, and generate increasing returns on the enterprise, an in-depth understating of the market opportunities, and a plan capitalize on those opportunities, must be developed and followed.

ASSESSMENT OF NEEDS

Institutional Needs

Being a Game Management Area, wildlife-agriculture conflicts are common. Further, other animal husbandry livelihoods are also discouraged by rapacious wildlife. Fish may be the only legitimate, viable and sustainable source of animal protein in the local area. However, a reduction in availability of natural fisheries due to upstream pollution and impoundments as well as overfishing on the Kafue River makes aquaculture the more favorable and sustainable option compared to fishing.

Aquaculture can serve as an important source of animal protein in a community like Chiawa. Besides, the cultivated tilapia is superior to other animal husbandry options in terms of production efficiency. Fish farming is seven times more efficient than lamb, four times more than beef, twice more than swine and 1.25 times more efficient than chicken when considering the conversion of feed inputs to meat output.[16] Aquaculture is a good food option for both the communities and individual farmers, while reducing pressures on the environment.

Well-trained management staff and organizational structures are key to successful operation of an aquaculture enterprise that contributes to the development of local communities. The enterprise needs to have a management plan, a marketing plan, and a harvest schedule

With regard to planning and management, timing of harvests is the main advantage of farmed fish operation and successful marketing. Unlike natural fishery harvests, which are influenced by natural factors and therefore subject to seasonal over-production or shortages, aquaculture is a controlled operation.

Fish-farmer organization development, policy, advocacy and regulatory control harmonisation will also improve aquaculture on the production level. A lobby to protect Zambian fish-sector from subsidised-imports will also be helpful.

[16] Source: Sustainable Ecological Aquaculture Systems: The Need for a New Social Contract for Aquaculture Development by Barry A. Costa-Pierce Department of Fisheries, Animal & Veterinary Science, Rhode Island Sea Grant College Program, University of Rhode Island. www.ecologicalaquaculture.org/Costa-PierceMTSJ.pdf

Material Needs

To allow successful operation of aquaculture enterprises, the following material needs must be covered:

- **Appropriate site:** The farm has to be designed and situated in a manner that provides the opportunity for maximum output in a sustainable operation
- **Fishponds:** The ponds on the fish farm should be constructed considering the optimal usage of water and allow constant and efficient water quality and supply
- **Feed:** Fish feed in sufficient amount is required to provide proper nutrition and achieve maximum growth rates. The feed may be bought or produced within the ponds (on-farm production of feed adds a significant technical complexity to the operation, but may increase sustainability and reduce overall costs).

RECOMMENDATIONS FOR FUTURE PROGRAMMING EFFORTS

The Government of Zambia recognizes the importance of promoting commercially oriented small and medium scale aquaculture businesses to increase animal protein supply and food security in the country, address urgent need for poverty alleviation, achieve greater diversification of food and income sources and promote balanced regional development.[17]

The National Aquaculture Development Plan (2010) recognizes the need for aquaculture to be commercially oriented in order for it to become sustainable. It also stresses the need to devise low cost viable technologies, establishing and developing necessary services, and empowering women and marginalized populations through their own organizations. The plan also focuses on promotion of aquaculture based on low cost technologies that are environmentally friendly, socially responsible and economically viable.

The experience with the Chiawa Bream Farm showed that future programs may have large impact if they are involved in the early stages of the development of an aquaculture enterprise—accompany the establishment from the very beginning, including site selection, farm design and construction, as these create the basis for smooth operation.

Furthermore, continuous training and availability of information is recommended to ensure good management and maintenance of the farms. In the same vein, a system should be put in place to enable the farm management to keep track of their business activities and evaluate the farm's performance.

Through aquaculture enterprises such as the Chiawa Bream Farm, local community members are trained in running a fish farm. Eventually, when they start their own fish farms, this will contribute to the food security in the area, where fish is the main source of animal protein and

[17] National Aquaculture Strategy 2006 (Zambia) and the National Aquaculture Development Plan 2010 (Zambia)

decreasing natural fish resources are problematic. Through having their own fish farm, fishing in the river will reduce and the natural fish stocks can recover.

Looking Towards the Future

The two case studies document and provide evidence that shows with proper training and assistance, local communities can positively alter their impacts on the natural environment and increase their incomes simultaneously. In both Simamba and Chiawa, local incomes were increased, additional food protein was generated and sold to markets, and behaviors adapted to properly focus on sustainable approaches to livelihood development.

Going forward, both cases highlight the need for proper planning and management. Lack of these aspects in the initial phases of any activities could result in long-term implications and limit the potential positive impacts of any program or initiative.

In the case of the breed improvement in goat husbandry, the research has shown that AWF initiated a positive approach by providing improved breeds to local goat-keepers. Local herders indicated that the improved breeds helped to increase their incomes and instill confidence that goat production can indeed be an income-generating endeavor (and not just a means of food production). However, longer-term planning on breed segregation, proper herd management, and prevention of local-breed pregnancies is imperative to maintain the benefits of the improved genetics. Failure to employ these critical herd management skills and techniques will result in the loss of any improved breed benefits.

Similarly, Chiawa Bream Farm highlights the positive contribution that aquaculture can have on a local community's access to animal protein while mitigating the pressures on local ecosystems. The successful fish farm has employed good management skills and maintains a consistently high quality output from its operations. The success thus far has led to an additional, ancillary business—banana cultivation—that benefits from coexistence with a fish farm operation. Working with local communities from the beginning is crucial to ensure smooth operations. Fish farming can be a very technical operation. Site selection, farm (and pond) design and construction are fundamental aspects of the development phase that can potentially create a winning (or losing) foundation for future success.

Finally, one of the limiting factors in booth of these cases (and, in fact, in most smallholder farmer/community farming initiatives) is the access to markets. Smallholder farmers are at inherent disadvantages when compared to larger players in the agriculture sector. Farmers lack the volumes of the bigger operations, lack the consistency of output. Community-based farmers also lack the resources to build efficient networks, research market conditions, and make rational, reasoned decisions about production, pricing and positioning.

Future interventions in these spaces should provide innovative mechanisms to allow smallholder farmers to participate in a more equitable and informed manner with the large-scale market actors. As these cases have shown, farmer-level interventions can have a positive impact on food security, income generation, and ultimately positive stewardship of the local

ecosystems and local environments. However, much of this impact will remain limited until smallholder farmers can more effectively participate in the broader markets for agriculture and livestock. Access to markets and market information is one fundamental key to future success.

APPENDICES

ANNEX 1: TERMS OF REFERENCE OF THE EVALUATION

Project Description:

The Food Security Working Group will focus on contributing to understanding the sustainability of livelihood and conservation gains achieved through participatory land use planning approaches. One of the sets of issues through which this will take place, is by developing production options that provide an immediate return to families in terms of improving the quality of their diets, and which can also be sold when there is sufficient surplus, at a price that is sufficiently attractive to sustain the creation of incentives for conservation and sustainable land and natural resource use. Production systems to be considered will include in-depth analysis of the scope to scale up the role of fisheries and small livestock as non-traditional ways of developing protein and income sources for rural communities.

During Financial Year (FY) 2012, AWF conducted an analysis of the contributions of different production systems, including riverine fisheries and aquaculture, and small livestock husbandry to household production strategies in conservation landscapes in Southern and Central Africa (Zambezi & Kazungula Landscapes in Zambia, and Maringa-Lopori-Wamba Landscape in D. R. Congo respectively). During FY 2013, it will build on this work to document the institutional and material issues that need to be addressed for communities to successfully manage small livestock and aquaculture activities. The resulting improved understanding of the opportunities and constraints associated with these production options for rural communities will provide guidance for constructing incentives to reduce the encroachment of farming into areas that are important for conservation, and work with local people to develop options for adapting to climate change.

AWF has worked in the past to develop sustainable small-scale goat production and aquaculture in the Siavonga and Chiawa areas of Zambia. Using AWF's past programming efforts in the region as a source of information, this consultancy will provide evidence of the results of livelihood and conservation gains achieved through participatory land use planning approaches, and help guide future strategy development for sustainable gains through livestock production and fish farming.

Objective:

The Consultant is expected to develop a report that contains two case studies on the institutional and material needs:

1. To successfully operate a goat production value chain run by a community based organization in the Siavonga District including input from the Department of Veterinary and Livestock Services, and Land O'Lakes (which has done similar small livestock projects in other parts of Zambia).
2. To successfully operate aquaculture enterprises for local community development to address food and nutritional needs, and the conservation of natural fisheries through reduced fishing pressure. This will be done in the Chiawa Game Management Area of Zambia, and will include inputs from the World Fish Centre in Lusaka and the Zambia's Department of Fisheries.

The consultancy report should include challenges, successes and lessons learned from the aquaculture and goat production activities, as well as financial and physical assessments of both the institutional and material needs for both value chains. The report should also contain recommendations for future programming efforts based on information collected during the consultancy.

Scope of Work:

The consultant will:

- Develop a work plan for the consultancy;
- Work with AWF staff in Livingstone and Nairobi to gather background information on program implementation in the target region;
- Visit communities to assess the successes and challenges of the aquaculture and goat production programs, gathering the required information to develop case studies and make recommendations
- Conduct interviews with key stakeholders such as the World Fish Centre, Land O'Lakes, Department of Veterinary and Livestock Services and the Department of Fisheries;
- Develop and submit a draft report for review by AWF staff;
- Finalize report based on comments from AWF staff;
- Develop a high-level presentation and present findings to a stakeholder workshop.

Expected Outputs and Deliverables:

The Consultant will produce a report that includes:

- A detailed case study on the institutional and material needs to operate a goat production value chain by a CBO in Siavonga region.
- A detailed case study on the institutional and material needs for aquaculture for local community development in Chiawa region of Zambia.
- Summary recommendations for future programming efforts.

The consultant will also develop a presentation based on the written report findings, to be presented at a stakeholder workshop to be held in Zambia.

ANNEX 2: LIST OF INDIVIDUALS INTERVIEWED

- Muchindu Watson - Environmental Officer Harvest Help 0979 910 512, Siavonga
- Nchimunya Hamfwiti - Child Sponsorship Officer from Harvest Help Siavonga
- Mrs Kasenzi - (harvesthelp@zamnet.zm) from Harvest Help Siavonga
- Gideon Siakopa - Community Livestock Auxiliary Attendant, Siamatika School, Siavonga
- Kenny Siamatika - Simamba Goat Cooperative Chairman
- Charles Halubanje - Founder member of Simamba Goat Cooperative and Chairperson of Simamba Traditional Council
- Sandwell Chnyama - Senior Headman
- Pearson Hampinda - Nabutezi Committee member
- Sylvester Simulila - Participating Farmer
- Tapes Kainda Nabuteezi - Group Member
- Frackson Mweene - Goat Farmer Nabutezi
- Mrs Simweemba Mweene - Inter-Group Secretary of the Simamba Goat Cooperative
- Webster Mulengwa - Member
- Patrick Mwiya - Fisheries Technical Officer, Chirundu 0977 256 832
- Peter Bunonge - Fisheries Assistant, Chirundu 0977481784
- Esther Gola - Chiawa Bream Farm, Member Kupfuma Ishungu Cooperative
- Irene Matunga - Member Kupfuma Ishungu Cooperative
- Selina Budongo - Member Kupfuma Ishungu Cooperative
- Tiyazana Shangula - Vice Chairperson and Member Kupfuma Ishungu Cooperative
- Mr Chinoi - Chairperson and Member Kupfuma Ishungu Cooperative
- Aliness Gundu - Member Kupfuma Ishungu Cooperative
- Mainess Nyamachili - Member Kupfuma Ishungu Cooperative
- Mr Chongo - Siavonga District Agriculture Coordinator (DACO)

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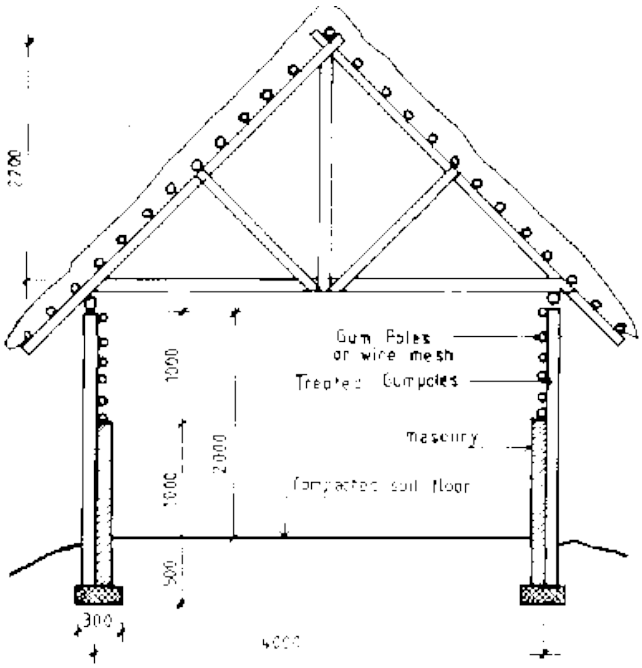
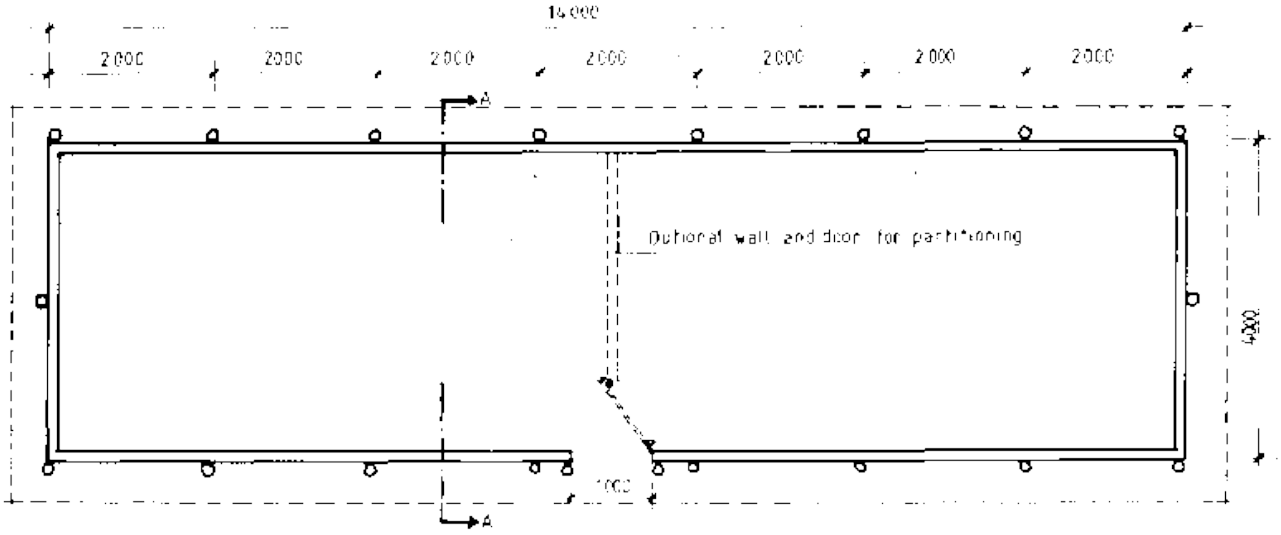
ANNEX 4: SCHEMATICS FOR IMPROVED GOAT HOUSING





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Page 18, Figure 6: Nasson Tembo, African Wildlife Foundation

Page 19, Figure 7: Nasson Tembo, African Wildlife Foundation

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Page 27, Figure 13: Munich Advisors Group (Zambia)

Page 33, Figure 15: Munich Advisors Group (Zambia)

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