Sustainability goals in the Boteti area

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1.1 Introduction

As can be gauged from the WP1.3 report, the Boteti area is confronted by problems that pose a challenge to the attainment of the three sustainable development goals of ecological (environmental) integrity, economic (livelihood) efficiency and social equity. Several indicators support this claim.

Poverty: the Boteti area has had the highest proportion of permanent destitutes among the 5 subregions of the Central District of Botswana (Central District Council, 2003). Indeed participants in WOCAT workshops confirmed that poverty was the main issue for the communities of Boteti, which they blamed on a harsh, constricted and resource depleted environment (see also Chanda et al., 2007). There is a very high dependence on local natural resources for fuel wood, grazing and traditional construction.

Environment: the area is a well known desertification hot spot in Botswana and has been the focus of several confirmatory studies (e.g. Ministry of Agriculture, 1993; Perkins, 2007; Chanda, et al., 2007; DESIRE, on-going). The once abundant wildlife is now rare as species have retreated to protected areas to the north and west (Perkins, 2007) and wildlife migration into the area is constrained by wildlife and veterinary fences (see WB1.3 report). Recent (May 2009) field survey for degradation indicators by the DESIRE team found that overgrazing is a major problem in the area.

Livelihood productivity: The overgrazing problem just alluded to suggests that livestock production (a major livelihood source in Boteti) is not efficiently practised. Arable agricultural production is constrained by poor soils, unreliable rainfall and the failure of floods for the more productive *molapo* (flood recession) farming along the Boteti river valley. The people link their poverty to a progressive decline in the resource base which has adversely affected the productivity of the various livelihood systems (i.e. livestock rearing, *molapo* farming, wildlife and veldproduct utilization).

Thus, sustainability goals for the Boteti relate to securing livelihoods and environmental protection aligned to poverty alleviation. In this regard, through WOCAT workshops, land users identified several interventions that had potential to meet sustainability goals in their area. These were game ranching, water harvesting, biogas production and utilization and solar power utilization. This report discusses the opportunities (and constraints) associated with these

interventions, partly as revealed by WOCAT workshops (e.g. Boteti Stakeholder Report No. 2).

1.2 Game ranching

This option was highly popular to the land users in the WOCAT workshops, rivaling biogas production and utilization. This is evidenced in Table 1 which presents negotiated scores of the various sustainability interventions. However, while the option has obvious advantages for the environment and socio-economy of Boteti, the range ecologist on the team (Dr. Perkins) points out the constraints to the realization of its potential (see subsection b below and Appendix 1 from which the subsection is extracted).

Table 1: Negotiated scoring adopted by Boteti WOCAT workshop participants

Scoring	To improve the appearance and state of the environment by reducing degradation	To improve harvest	To protect the ozone layer	Profit	To create employment	Education	To alleviate poverty	To conserve culture and natural resources	To promote cooperation, self reliance and volunteerism
Game ranching	5	0	2	5	5	5	5	5	5
Rain harvesting	2	5	2	3.5	2.5	3.5	4	3.5	3.5
Bio gas	5	2.5	4.5	5	4	5	5	5	3.5
Solar cooker	3.5	0	3.5	3	1.5	2.5	2.5	3.5	1

Source: Stakeholder Workshop No. 2, p.10

a) *The general advantages of game ranching*

Game ranching is profitable and can bring economic returns from wildlife resources. Some of the income generating activities include game viewing, trophy hunting, selling biltong and live sale to other ranches. Game ranching can promote local tourism by bringing wildlife closer to people. Lodging facilities can be built inside the ranch and handicrafts sold. Game ranching also promotes culture, where the young generation may also benefit from viewing, interacting and relating to wildlife with a stronger sense of cultural understanding. It is noted that totems (tribal name or badge) for the people of Botswana bear mainly names of wildlife species, a cultural practice from time immemorial. Thus game ranching is seen as revival of culture. For these reasons (economic and social) game ranching is a highly favoured option by the community who see their poverty as the main product of an unfavourable environment in which they live. The community also sees game ranching as a solution to the overgrazing caused by livestock. Some of the environmental advantages of game ranching are that it can use marginal areas, which can otherwise not be effectively and sustainably used by the cattle. The Boteti area with poor soils, sparse vegetation, saline water and surrounded by wildlife sanctuaries is a good candidate for this venture. Game ranching also allows for the optimization of the range by having a variety of species as they utilize different niches within the ecosystem, as browsers and mixed feeders (Plate 1), unlike cattle which are grazers only. Game ranches can help in conserving threatened and endangered species, thereby reversing or preventing desertification.

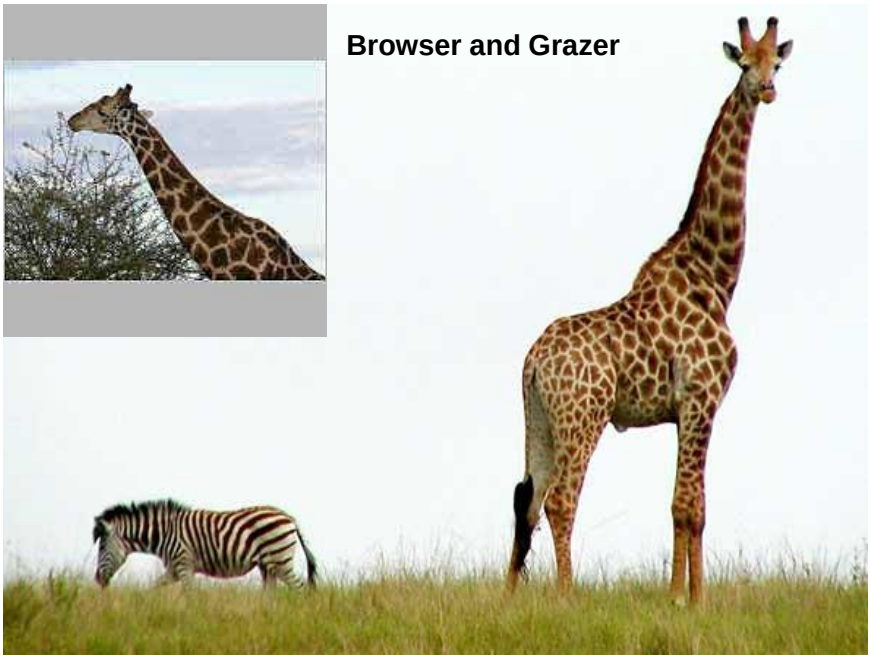

Plate 1: Two wildlife species exploiting different ecosystem niches (Photo: Provided by W. Mphinyane)

b) *Realities for game ranching in Boteti – a SWOT analysis* (extracted from Appendix 1)
The huge wildebeest and hartebeest resource in the Kalahari System has now been lost, while the huge zebra resource in Makgadikgadi has also declined catastrophically. Recovery of the key Kalahari ungulates to those population levels of the 1970s is undoubtedly no longer possible as the available habitat has declined due to livestock expansion and key resource areas have either been lost or are under unprecedented pressure. Securing the key resource areas, would however result in a substantial recovery of the key wild ungulate populations and renewed opportunities for the various forms of game use proposed by DHV (1980).

However, with many recent reports quoting wildlife figures from the late 1980s or even 1990 onwards, there is a very real danger that the potential of the Kalahari resource base to support wild ungulates, as proven by the resources that existed at the time of the DHV (1980) survey, will simply be forgotten or denied. The potential for a meaningful balance between the livestock and wildlife sectors does still exist but does not lie within existing Policy initiatives. Indeed, to continue along the current path of fenced livestock production and game ranching, is to conflict with the known ecological realities of the Kalahari System and will be unsustainable ecologically and counter productive socio-economically.

Despite the virtual absence of rigorous, consistent and reliable records and data, there is clear evidence that game ranching has increased considerably as a form of extensive land use in southern Africa, especially on private land in South Africa, Namibia and Zimbabwe. Botswana has lagged behind, mainly due to the relative scarcity of private land, the high start-up costs and the fact that hunting and tourism are concentrated in Controlled Hunting and concession areas where

free moving wildlife forms an attractive alternative to fenced, "artificial" populations as are found on fenced game ranches.

In Botswana, as in SA and Namibia, owners of game-fenced ranches with adequate fencing are exempted from many of the provisions of conservation legislation. For example, they may hunt any time of the year, may cull at night, may receive payment for hunting, and, subject to meat hygiene legislation, may sell venison and game products.

The removal of subsidies from the commercial livestock sector is undoubtedly a critical development which in South Africa, Namibia and Zimbabwe, overcame a powerful farmer lobby and meant that land use reverted back to wildlife based economies. In Botswana, domestic (e.g. tax breaks and subsidised services and infrastructure for cattle ranches) and international subsidies (the EU Cotonou Agreement) together with support for livestock sales and processing, marketing and veterinary disease control all remain in place. As a result wildlife based economies are disadvantaged. It follows that there is little or no willingness amongst those with an interest in the farming sector to create or maintain livestock free land for wildlife use. As livestock owners tend to be amongst the most politically and economically powerful within the country, land use is effectively locked into a commercial cattle ranching system for the foreseeable future.

Disease control restrictions prevent valuable trophy species such as buffalo, roan and sable being introduced to game ranches anywhere south of the Makgadikgadi Pans fenced southern boundary. Even disease free buffalo are not allowed south of this line – which effectively corresponds with the 'red line' fence in Namibia.

It is important to place the potential for game ranching in the Mopipi - Boteti area within the broader spatial context of its location between two protected areas (The Central Kalahari Game reserve and Makgadikgadi Pans National Park), and two distinct and now separated ecosystems – the Kalahari and Makgadikgadi. Game ranches that are isolated from either system are unlikely to be viable, whereas there are two possibilities:-
if a cluster of network of ranches, or a conservancy, can be used to link the two ecosystems
if game ranches can be 'bolted' on to the existing protected areas – i.e incorporated within their fenced boundaries via a step wise spatial expansion

A SWOT analysis of the game ranching potential in Mopipi reveals the following:-

Opportunities
Wildlife-based outdoor recreational activities is likely to increase
Wilderness areas and the biodiversity they contain can only increase in value
Climate change will increase this advantage and require increased flexibility in land use and livelihood options – which wildlife based systems can offer
Removal of livestock subsidies will create opportunities for wildlife based production
Rationalise land use planning and strengthen both the wildlife and livestock sectors

Strengths
Drought affected marginal environments are best suited to wildlife based economies.
Ecosystem services and products more likely to be maintained through wildlife based production systems – i.e. sustainability of production
Migratory systems have a higher carrying capacity than permanent grazing systems
Rural communities have the knowledge (ITK) to manage the resource
Equity more likely to be addressed through wildlife based CBNRM than livestock systems
The future of African wildlife conservation will be determined by the fate of areas found surrounding the Parks
Economic diversification – and diversification of the tourism product
Reintroduce species once found in the ecosystems concerned and link protected areas via a corridor

Constraints
Livestock subsidies artificially increase the value of domestic stock
Disease control restrictions prevent the re-introduction of the most valuable and, increasingly rare species (e.g. buffalo, roan, sable and tsessebe)
Predator numbers (especially of lions) decline due to Problem Animal Control and direct persecution (e.g. the poisoning of hyenas as occurred along the southern fence of Makgadikgadi), so removing an important 'big five' product from the area.
Low densities of game found in the area today and meat export/movement barriers
Low value of the species found in the area today (i.e. absence of the big five)
Start up costs (fencing, water provision and species reintroduction) are extremely high on game ranches.
Reluctance to create large areas of livestock free land on the part of those with interests in the livestock sector – spatial scale of game ranches inappropriate
Land cover changes resulting from permanent livestock grazing, namely bush encroachment is damaging the aesthetic and wilderness value of many areas, possibly for as long as 60-100 years – so decreasing the substituitability of livestock and game land uses,
A politically powerful elite dominates the livestock sector
Poor domestic markets for game meat
Expansion of fenced cattle ranches and cattleposts

Weaknesses
The ITK within rural communities is rapidly being lost
CBNRM is currently floundering in many areas and its future is uncertain
The future of trophy hunting, and hunting in general, is in question in Botswana.
Cattle and crops is the politically preferred production system
Negative ecological implications associated with small, fenced properties stocked with wildlife (including area selective grazing, biosphere effects, vulnerability to drought, genetic inbreeding etc).

It should be noted that the opportunities are dominantly ecological and socio-economic in terms of the sustainability and equity potential they offer local communities, while the constraints are political and economic. Indeed as long as

the subsidies remain intact the prevailing hierarchy of land use, which elevates livestock to an artificial advantage over that of wildlife, will continue.

While game ranching emerged as the most preferred strategy (Table 1) (overall score = 4.1), it could not be adopted for piloting because of the high start-up costs and much longer-term release of benefits for environment and society.

1.3 Rainwater harvesting

Water is scarce and therefore expensive in Botswana. Better water management and improvement of the quality, quantity and efficient storage and utilization of water is necessary. Rainwater harvesting is an effective means of water provision. Harvested rainwater can be very useful especially at arable lands and cattle posts where water is not provided through standpipes as is the case in the villages. People who have harvested rainwater do not need to travel long distances to fetch water. This is also helpful where ground water is sometimes too salty (e.g. in parts of the Boteti area) for human and/or animal consumption. Plates 2 and 3 indicate the type of water catchment structure and storage facilities common in Botswana and Boteti (i.e. roof catchment and either underground or above-ground storage tanks).

Plate 3: Existing water harvesting structure and underground water storage tank (Mopipi) (Photo: L. Magole)

Plate 4: Plastic water harvesting storage tanks (green) fitted to residential roof structures (Photo: J. Atlhopheng)

If harvested on a large scale and harvesting facilities carefully spatially distributed, harvested rain water could relieve pressure on scarce underground water supply and be used to redistribute livestock grazing pressure. This is particularly significant given the observed the non-optimal distribution of watering points in the Mopipi-Mokoboxane area which encourages overgrazing (CAR, 2006, p.19). Approached this way, rain water harvesting could be an instrument towards environmental sustainability (through prevention of overgrazing and associated erosion of herbaceous species diversity) and social sustainability (through supply of relatively clean water for human consumption at the cattle posts and arable lands).

While water harvesting has obvious has clear environmental socio-economic benefits and is a known strategy in Boteti (promoted and piloted by the Ministry of Agriculture in the area [Plate 3] and countrywide), it was not highly favoured by the land users who participated in WOCAT workshops (Table 1 above) mainly because they felt that the benefits might accrue to individuals rather than the community at large. Thus, community members were more concerned about

1.4 Bio gas

Biogas provides a clean, easily controlled source of renewable energy. Cow dung is collected from cattle sheds or, in the case of Boteti, around cattle watering points and kraals (Plate 4), mixed with water and channeled into fermentation pits. The resulting gas is produced as a by-product of this fermentation and collected in a storage tank from where it is piped into the user's house (Plate 5). It can be used for electricity production, cooking, water heating and laundry. By using biogas one can save time, use less labor and save trees. The gas doesn't have smoke or smell, so it reduces eye and respiratory irritations. The used cow dung, i.e.sludge, is a better fertilizer and cheaper than manufactured products. Thus with biogas, the final waste product (sludge) is used as fertilizer. It was also indicated that, other organic wastes like cuttings in the kitchen could be used to generate biogas. Thus a total recycling system incorporating the toilet, kitchen and garden could be part of the set-up.

Since cow-dung is collected from around water points and or cattle kraals, not in the open veldt or range, there is no danger of any decline in soil fertility in the range. In most cases, the water points and cattle kraals act as excessive concentration points for cow dung (not suitable for most plants). The points around boreholes, due to excessive manure (cow dung), are devoid of vegetation and have therefore been termed 'sacrifice zones', the sacrifice paid for keeping the cattle industry. Some of the sacrificial zones persist for over 100 years. Thus biogas is mainly seen as halting this process, of creating bald patches on the landscape.

Plate 4: Cattle dung by cattle post kraal

Plate 5: Biogas infrastructure (Photo: Rural Industries Innovation Centre [RIIC], Kanye, Botswana)

Biogas production emerged as the next most popular strategy to game ranching (Table 1) (overall score = 3.8). It was less costly to pilot than game ranching, and biogas facilities are easy to set up. However, general poverty in Mopipi and Mokoboxane means that community members cannot afford the cost of implementing the strategy. They therefore pleaded with DESIRE to provide funds for the purpose or assist in raising the required funds. The objective, commitments and benefit indicators as agreed by community members are presented in Table 2 below.

Table 2: The objective, commitments and benefit indicators of the biogas strategy

Objective	Technology	Commitments made by different stakeholders	Stakeholders	Indication of improvement
To reduce depletion of trees	Biogas	To consult with the community Form the committee that will look after the test plot Find a plot Find ways of raising money Provide education Being involved in the day to day running of the project Maintenance Organize evaluation meetings Write reports	VDC The community Committee The committee and Desire The committee, Desire and RIIC The community and Desire The committee and RIIC Desire Desire	Reduction in cutting down of trees More people buy and use biogas Improvement in the lives of people*

* Improvement in welfare would arise from the benefits discussed under Step 7 above. Time saved from firewood collection, jobs created and income gained due to biogas –based enterprises would serve as indicators.

Source: Stakeholder Workshop No. 2, p.14

1.5 Solar cooker

As can be seen in Table 1, this was the least popular strategy considered. The focus was on sunlight as a fuel for cooking. A solar cooker needs an outdoor spot that is sunny for several hours and protected from strong winds, and where food will be safe. Solar cooker would not work at night or on cloudy days. Food cooks best in black, shallow, thin metal pots with black tight-fitting lids to hold in the heat and moisture. One or more shiny surfaces reflect extra sunlight on to the pot. Solar cookers are better than other means because fuel is free and abundant, provide extra income, saves time (food doesn't need to be stirred and would not burn. Solar cooker is portable, allowing solar cooking at work sides, picnics and camping sites.

Plate 6: Solar at work during Workshop 2 (Mopipi) (Photo: R. Chanda)

While solar cooking could relieve pressure on woody vegetation as an energy source, community members felt it had insufficient socio-economic benefits. Also considering the relatively high wind speeds in the area, solar cooking could not be a very practical strategy.

1.6 Concluding remarks

There is great need to pursue environmental, social and livelihood sustainability in the Boteti area. Fortunately this need is much appreciated by local land users, who are also willing to be directly involved in the pursuit of the goals. Indeed, with external support and facilitation, they have organized themselves into a Trust and adopted a land and range resources management plan (CAR, 2006). Unfortunately, the communities feel incapable of pursuing the goals on their own due to serious capacity problems. There Is therefore need for a co-management strategy in which land users, DESIRE, government, non-governmental organizations and even the private sector would be complementing players. Government has adopted a CBNRM Policy under which it has established an environmental fund which is not yet fully functional. The communities have had financial and capacity-building support from GEF and UNDP (e.g. for the development of the Trust and the Management Plan as well as for the construction of a drift fence) (CAR, 2006; Chanda et al., 2007). At the moment the communities' hopes are pinned on DESIRE to mobilize funds and co-management partnerships for the implementation of the WOCAT-generated sustainability strategy (biogas production and use). Failure by DESIRE to assist in this way would surely deal a heavy blow to future applied research initiatives in the area.

1.7 References

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