



Documentation of lessons learnt from piloting sustainable agriculture intensification to improve food security, and improved on-farm uptake of biodiversity-sensitive intensification practices: the case of Zambezi and Ituri landscapes

DRAFT report on ABCG/BATS Food Security Task

by

African Wildlife Foundation

and

Wildlife Conservation Society

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AFRICA BIODIVERSITY COLLABORATIVE GROUP

Table of Contents

1.	INTRODUCTION.....	2
1.1	General Background.....	2
1.2	Objectives of this Assessment.....	3
2.	DESCRIPTION OF THE TASK.....	4
2.1	Context.....	4
2.2	WCS' Ituri Landscape.....	4
2.3	AWF's Zambezi Heartland.....	6
3.	MAJOR FINDINGS.....	7
3.1	Importance of a Spatially Explicit Approach.....	8
3.2	Need for clear conservation objectives.....	8
3.3	Role of partnerships.....	10
3.3.1	Government.....	10
3.3.2	Traditional leaders.....	11
3.3.3	Partner NGOs.....	11
3.3.4	Community based organizations.....	12
3.4	Boundary, scale and intensity issues.....	12
3.4.1	Critical issues.....	12
3.4.2	Intensity and duration of contact with farmers.....	12
3.4.3	Scalability.....	13
3.4.4	Market linkages.....	13
3.4.5	Guiding policy framework, dialogue and coordination.....	14
4.	LESSONS LEARNED.....	15
4.1	Role of Agricultural Intensification in African Conservation Strategies.....	15
4.2	Keys to Designing Agricultural Intensification Efforts that Lead to Effective Conservation.....	16
4.2.1	Size, scale.....	16
4.2.2	Location.....	17
4.2.3	Knowledge Management and Program Implementation.....	18
4.2.4	Defining Appropriate Time Horizons.....	19
4.3	Risks.....	19
5.	NEXT STEPS.....	20
5.1	Next Steps for AWF.....	20
5.1.1	Replicate CA techniques among more farmers in Siavonga and Luangwa.....	20
5.1.2	PLUP in Luangwa and micro-zoning in the development zone.....	21
5.1.3	Establish and strengthen community based organizations.....	21
5.1.4	Next Steps at Organizational Level.....	21
5.2.	Next Steps for WCS.....	21
5.2.1	Implementing Land Use Zone Management in the OWR.....	22
5.2.2.	Complete PLUP Exercises in Communities Outside the OWR.....	23
5.3	Possible Next Steps for ABCG.....	23
5.3.1	Definition of Best Practices.....	23
5.3.2	Food Security Indicators.....	23

1. INTRODUCTION

1.1 General Background

Poor rural people frequently seek to improve their food security through extensive use of land. On the one hand, this is a rational approach that reflects the scarcity of capital and labor that frequently limits the production options of poor rural families. On the other, undertaking more extensive production practices requires that additional amounts of land be available. In many situations extensive land use leads people into areas that are poorly suited to farming, but which contain important wildlife habitats, and/or play an essential role in the provision of ecosystem services upon which people and wildlife alike depend (e.g., the upper portions of a watershed that provides both with fresh water). In this context, the future of both poor rural people and wildlife may be tied to the development of new land use options. Unfortunately, in the absence of concrete proposals, and the means to implement them, extensive land use by the poor often does extensive damage to wildlife and their habitats, and, sharing space with wildlife often adds to the food insecurity experienced by poor people.

From a development perspective, the circumstance of poor families trying to compensate for scarce capital and/or labor resources through extensive use of land that is not well suited for conventional farming is often a dead end. Opportunities for capital accumulation are likely to remain limited, and people are likely to find themselves in a “poverty trap,” where they have resources that allow them to persist for extended periods of time, but not to thrive. In this context, the introduction of capital improvements that increase the productivity of land and labor, may offer a means of constructing new livelihood options that are beneficial to both rural people and wildlife. Such improvements may include the application of packages of improved inputs for crop production, the introduction of new cultivars, the introduction or improvement of livestock, and the introduction of technology and techniques to reduce losses of crops and livestock to wildlife. To the extent that people are able increase farm yields and the productivity of their labor, the pressure to expand farming activities into areas that are important wildlife habitats and sources of important ecosystem services may be reduced.

Greater food security may also reduce the pressure on people to sacrifice medium and long-term land management in order to satisfy immediate needs. Thus, if they do not need to occupy new areas to practice subsistence farming, hunt bushmeat or poach to ensure that basic needs are met, conditions are more favorable for them to consider new land use options that require longer term management strategies and involve more complex organization (e.g., payments for ecosystem services (PES), ecotourism, sustainable forestry), but also offer greater potential for generating the resources that provide a pathway out of poverty.

However, our experience demonstrates that intensified agricultural production does not lead inevitably either to more secure livelihoods for the rural poor or new opportunities for biodiversity conservation. Issues related to benefit distribution, investment incentives, land tenure and other factors can clearly lead to perverse outcomes from both food security and conservation perspectives. Therefore, it is important for local actors who use and manage land, government officers whose responsibilities include defining and regulating land ownership and use rights, and donors and non-governmental organizations seeking to promote sound land management, to understand the opportunities and risks associated with promoting improved farming practices as a tool that contributes to both more secure livelihoods for

rural people and more effective conservation and management of wildlife and the ecosystems of which they are part.

1.2 Objectives of this Assessment

While the issues described above operate in many areas of the world, they have particular urgency in Africa, because large numbers of rural families must deal with chronic food insecurity, and their situation is likely to become more vulnerable in the years ahead, because of variations in temperature and precipitation associated with climate change. Thus, seeking to make farming systems more productive and robust, conserving the wildlife patrimony that generates considerable foreign exchange and investment, and protecting the integrity of the natural ecosystems upon which both depend are important development objectives. Furthermore, pursuing these objectives so that they complement, rather than compete with one another, requires a better understanding of the linkages among them.

The African Biodiversity Collaborative Group (ABCG) is in a position to make important contributions to this discussion because several of its members have been actively promoting integrated approaches that seek to construct win-win approaches to rural land management that contribute to improving the livelihood options of rural people through activities that also promote the conservation of wildlife and natural ecosystems. ABCG has also been active in facilitating dialogue and providing USAID field Missions and African partners with lessons learned from field experience. This effort has become especially relevant in the context of USAID's Feed the Future Initiative, where ABCG has been supporting USAID in developing concepts and indicators to ensure that efforts to increase agricultural production and productivity also contribute to the integrity of the ecosystems upon which farming systems depend.

To this end, the African Wildlife Foundation (AWF) and the Wildlife Conservation Society (WCS) have conducted a review of their efforts to address food security and biodiversity conservation issues in two key landscapes, the Zambezi Heartland landscape, of Zambia, Zimbabwe and Mozambique, where AWF is active, and the Ituri Forest Landscape, in the northeastern Democratic Republic of Congo (DRC), where WCS has been working for many years. Both landscapes are strongholds for unique assemblages of wildlife, whose survival depends on the success of current conservation efforts, and are home to human populations that are among the poorest members of their respective national societies, whose prosperity depends on finding livelihood alternatives that allow them to become secure that their basic food needs will be met, and offer their children the chance to improve their quality of life through education and new productive opportunities.

In both areas, AWF and WCS have worked closely with local people to increase yields and the productivity of farm labor, and reduce the pressure that people are placing on wildlife and natural ecosystems as they seek to satisfy basic livelihood needs. Both efforts show promising results in many areas, but also highlight the complex nature of the linkages between human production systems, biodiversity and ecosystem integrity. With support from USAID's Biodiversity Analysis and Technical Support (BATS) program, the two organizations have conducted joint field visits to the two programs to assess what the two experiences can teach us about the ways in which improving the food security can contribute to conservation and the risks and limitations of promoting food security as a conservation tool, and identify best practices that can contribute to making efforts to construct win-win situations where increased food security and biodiversity conservation objectives reinforce one another more effectively. The present paper reports on the results of this exercise.

2. DESCRIPTION OF THE TASK

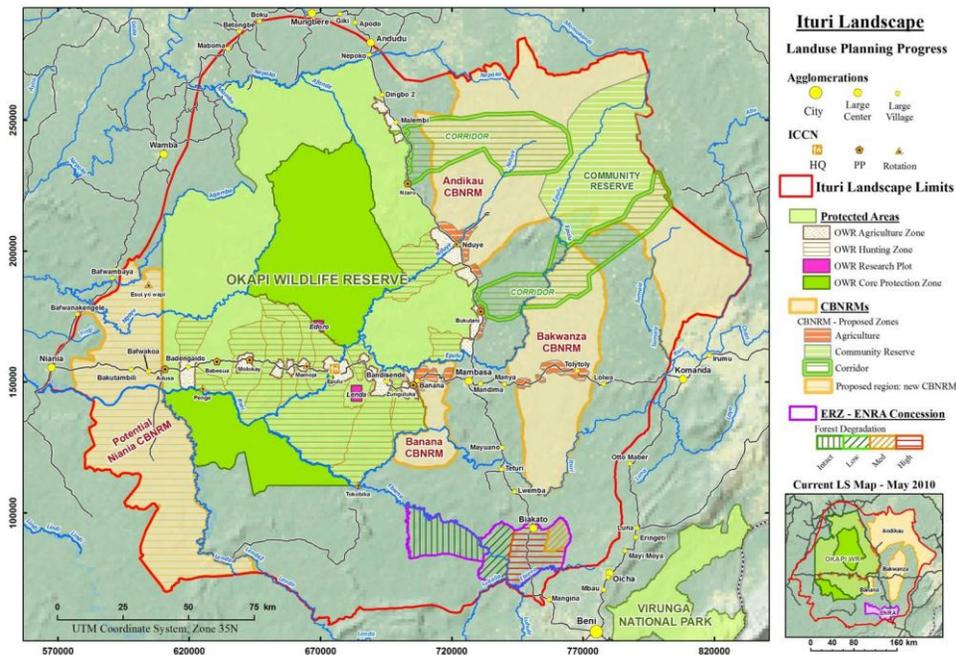
2.1 Context

This document reports on the findings of reciprocal field studies that teams from AWF and WCS made to field programs where efforts to improve farming practices, to increase yields and increase labor productivity, play an important role in the conservation strategies of the two organizations. The objective is to stabilize farming systems, by increasing yields, labor productivity and income, through improved farming practices, and reducing pressures on families to expand their farms into forest areas, and/or supplement their incomes through practices like poaching and charcoal production. The two teams attempted to learn from one another's experiences, and bring a critical eye to what one another was doing, in an effort to make their respective efforts more effective. The field visits were carried out in March 2011, with visits to AWF's Zambezi Heartland landscape, and WCS's Ituri Forest landscape.

2.2 WCS' Ituri Landscape

The Ituri Landscape in northeastern Democratic Republic of Congo covers 40,806 km² and is the largest most intact rainforest block in the eastern Congo Basin (Map 2.2). Ituri hosts an extraordinary biodiversity including 90 species of mammals, 333 species of birds, over 500 species of butterflies, and over 2,500 species of plants, including:

- The largest population of okapi, a forest giraffe, endemic to DR Congo (7,000 to 10,000).
- The highest number of primate species (17) recorded in one area in Africa.
- The largest population of forest elephants remaining in DR Congo (3,000-5,000).
- An important population of chimpanzees (11,000).
- An array of forest antelopes species (10), 2 species of forest pigs, and the forest buffalo.
- More than 75 commercial timber species



Ituri is home to approximately 300,000 people that occupy the landscape and its immediate surroundings and this includes the largest remaining population (30,000) of the hunter-gatherer Mbuti Pygmies. Located on a settlement frontier, the landscape is increasingly under threat due to an influx of immigrants from densely populated surrounding areas and human activities, including slash-and-burn agriculture, logging, ivory poaching, commercial bush meat hunting, and artisanal mining. Because there are very few options for employment, most people rely on their farms and the forest for all of their dietary, household, and economic needs. Thus the health of local communities is intricately linked to the health of the landscape. Projected population growth and expansion due to immigration into the region are expected to lead to higher rates of forest conversion and concomitant pressure on natural resources.

Livelihood activities are conducted in the 4 macro zones of the landscape defined by the actual land use planning process supported by the Congo Basin Forest Partnership (CBFP) and USAID's Central African Regional Program for the Environment (CARPE). These macro zones are the Okapi Wildlife Reserve (OWR; within the agriculture zones) and three Community Based Natural Resource Management (CBNRM) namely Bakwanza (2,861 km²), Banana (575 km²) and Andikau (6.000 km²).

Activities are conducted by two WCS partners, Pact and Gilman International Conservation (GIC). In the Okapi Wildlife Reserve, WCS and GIC are working with individual households in food crop production, and with local associations in implementation of small grant projects that promote alternative economic activities (animal husbandry, fish husbandry, microenterprises, etc). Outside the OWR, WCS works with individual livelihoods to promote food crop production and agroforestry as well as small grant projects with local associations to develop alternative economic activities. Pact is promoting food crop production through local association and literacy program with women groups in all three CBNRMS.

Livelihood activities carried out by WCS and its partners include:

- To raise awareness of alternative livelihood options and improved NRM practices.
- To develop alternative livelihoods that will raise household income, reduce poverty and improve food security, through food crop production, agroforestry, small grant projects.
- Building capacity of local organizations, governance structures and women (literacy, microenterprise, saving).

WCS' vision in the Ituri Landscape is to conserve forest ecosystems and the biodiversity, to preserve its cultural values and to support the livelihoods of local communities living within its limits. The objective pursued by WCS in the Ituri landscape is to preserve its unique biodiversity and to ensure a balanced use of the natural resources. This will be achieved through:

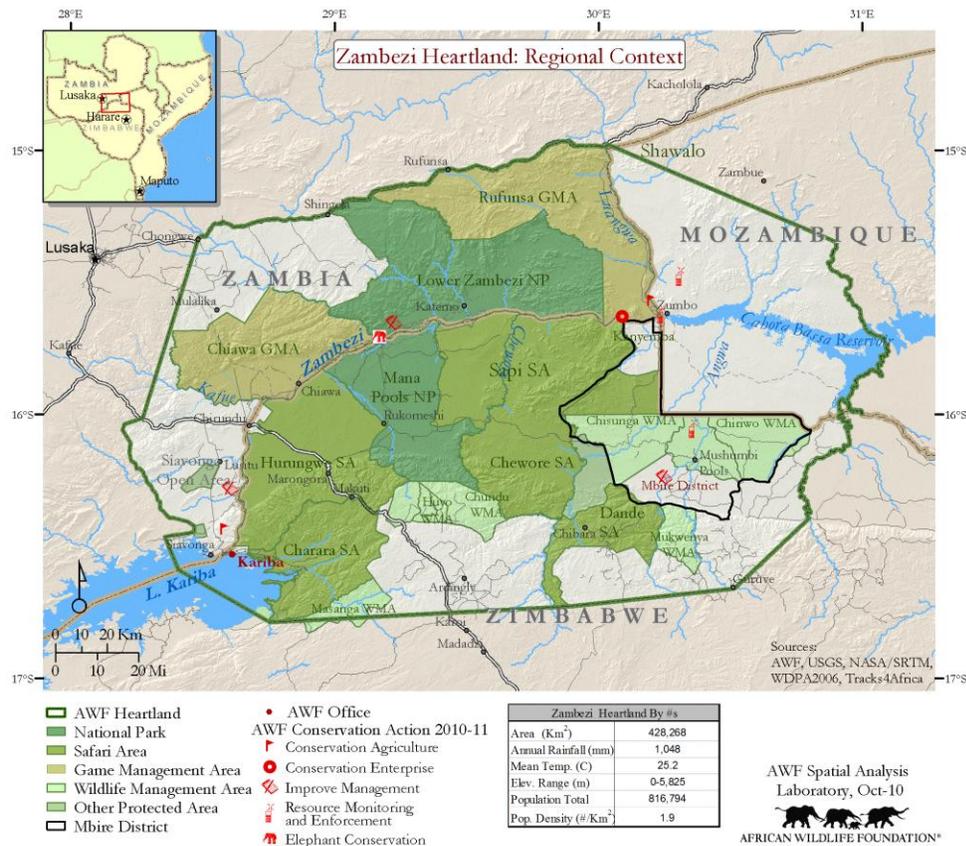
- Increased populations of elephant, okapi and chimpanzee and reduced poaching.
- Sustainable hunting across the landscape of duikers.
- Conserved and well managed forest ecosystems and habitats.
- Equitable governance of natural resource use achieved.
- Long term survival of Mbuti populations ensured and their traditional rights secured.
- Achieved community managed forests with a significantly larger number of local populations benefiting from sustainably managing forests.

In relation with livelihood activities conducted in the landscape the goal pursued by WCS is to improve household income by investing in economically sustainable alternative livelihood activities that mitigate

negative environmental impacts of current practices, particularly farming and uncontrolled small-scale timber exploitation, unsustainable hunting and to improve natural resource management.

2.3 AWF's Zambezi Heartland

Recognized by humans as three distinct countries but by wildlife as a single vast ecosystem, AWF's Zambezi Heartland is a three country (Zimbabwe, Mozambique and Zambia) transboundary landscape along the middle stretch of the Zambezi River from Kariba to Cahora Bassa Dams, covering an area of approximately 47,000 km² (Map 2.3). Apart from the Zambezi, two other major rivers transect the Heartland: the Kafue and the Luangwa. The Heartland is typified by extended riverine habitat that hosts over 36,000 elephants and in terms of biodiversity richness, the protected wildlife areas in the Heartland incorporate some of the most outstanding terrestrial and riverine wildlife viewing and scenic landscape in Southern Africa. The total human population resident in the heartland is approximately 560,000, the majority of whom derive their livelihoods from subsistence agriculture and livestock husbandry. Because of the nature of livelihood economic activities, the ecological landscape is threatened by land degradation as a result of forest removal for agriculture, construction timber and fuel, high livestock densities, especially goats, and bush fires set by poachers. The landscape is made up of three broad land tenure systems: communal areas, state and private ownership. Each one of these broad land parcels is subject to different and sometimes conflicting land uses that result in serious threats to conservation targets. Human-wildlife conflict exists in the communal areas and GMAs because wildlife, especially elephants, damages crops and threatens the livelihoods of some communal people.



AWF has worked in the Heartland since 2002 and the Conservation Agriculture (CA) work that founds the base for this study was carried out as one of the main objectives to introduction and implement improved agricultural practices under AWF's Wildlife, Environment and Agriculture for improved Livelihoods in a Transboundary Heartland (WEALTH) project, which was a 2.5 years project ending in February 2011 and funded by the Swiss Agency for Development and Cooperation (SDC).

The reasons for engaging in CA in these two districts were based on the following observations:

- **Unsustainable land use practices:** Rapid expansion of agriculture to produce maize is occurring whereas neither the soils nor the climate are best suited for maize. Consequently, yields are erratic and decline over time as the agricultural practices are not sustainable and deplete the soil nutrients. This has led to pressure to clear more land resulting in 'shifting cultivation'. Stream bank cultivation has caused land degradation and sedimentation of the rivers and streams which negatively affects the aquatic resources in the rivers.
- **Lack of diversified livelihoods options:** Local communities depend on traditional subsistence agriculture and, along the rivers, subsistence fishing as the main livelihoods options. There is a general lack of participation by the local population in economic activities that tap onto other natural resources such as the abundant wildlife through ecotourism and commercialization of non-timber forestry products (NTFP) like honey, wild fruits etc.
- **Human-wildlife conflicts:** Due to lack of direct tangible benefits accruing from wildlife through tourism to most of the population, wildlife is not welcome as it causes damage to crops, and injury or loss of lives to people and livestock. This conflict and animosity grows as people open up new areas for cultivation, in the process shrinking the dispersal area for wildlife while not necessarily improving any crop production gains.

The CA techniques are an adaptive set of cost and labor effective tools that improve use of the available farming resources, in particular the soil and the soil moisture while exploiting the benefits of suitable crops and livestock.

AWF's goal for work in this landscape is to improve the integrity of biological diversity through improved land and habitat management that addresses livelihood issues for which sustainable agriculture is one option in those spaces suited for it.

3. MAJOR FINDINGS

This section provides highlights of the implementation experience and performance of sustainable agriculture across the two case studies in AWF's Zambezi Heartland and WCS's Ituri landscape. Results show broad variation in terms of application and outputs of sustainable agriculture. Key characteristics include: (i) inadequate scale, both spatially (number of hectares) and number of farmers involved; (ii) multiplicity of support agencies, incl. government, NGOs, CBOs and traditional authorities whose approach and techniques are disjointed and weak resulting in weak impacts; (iii) inadequate appreciation of the link between agriculture and biodiversity conservation; (iv) prevalent culture of dependence on free hand-outs of inputs and food relief; (v) varying degrees of impacts of human-wildlife conflicts, crop disease, and pests on crop production, (vi) low crop yields that constrain the possibility of linking crop production to viable markets; and (vii) noticeable trend that farmers

accustomed to sustainable agriculture for longer periods performed better and obtain much better yields than new entrants. These findings are elaborated in the context of the implications for supporting agriculture that can leverage biodiversity in conservation landscapes.

3.1 Importance of a Spatially Explicit Approach

The successful conservation of wildlife and other natural resources in both landscapes where AWF and WCS operate requires strategic integration of agriculture systems that satisfy the food and nutritional requirements of local communities living within and/or in the proximity of the landscapes and at the same time use techniques that promote conservation. This requires a paradigm shift from use of extensive crop cultivation that relies on clearance of forests to increase hectarage to intensification of agriculture in restricted designated agriculture zones.

In both Ituri and Zambezi, sustainable agriculture actions were focused on existing farmlands that are located to optimize the use of the increasingly limited land resources and create a balance that secures habitats for biodiversity conservation while satisfying the food requirements. Not all farmlands are, however, located in optimal sites as some are in wildlife dispersal and movement areas due to a lack of systematic and explicit land use planning (LUP) and related micro-zoning to confine agriculture intensification to designated zones. Such farmlands tend to experience more incidences of crop damage from wildlife, while some suffered chronic crop failures because they are located in impoverished soils and drought-prone areas. As such, it is ideal to zone land for agriculture based on considerations of the overarching soil and climatic attributes that determine the agro-ecological characteristics, and the wildlife distribution and movement corridors. With exception to Ituri where land use planning and the zoning was a participatory process based on biological and socioeconomic information, It also was apparent that any earlier zoning done in Zambia did not follow a systematic structures participatory approach that addressed the issues tabulated below in order to secure commitment and success in integrating agriculture to NRM & biodiversity conservation.

Table: Issues to be considered to implement spatially explicit food security strategies

❖ Participatory resource mapping by local communities and all other relevant public and traditional authority stakeholders
❖ Analysis of resource distribution and respective utilization over time
❖ Detailed socioeconomic analysis of settlement trends, patterns and distribution
❖ Assessment of existing food security strategies and ranking of the role of crop cultivation, livestock, fisheries and others (e.g. NTFP)
❖ Document land tenure systems and analyze resource use rights to inform implications of zoning
❖ Overall assessment of staple foods, crop varieties and livestock types that suit the area

3.2 Need for clear conservation objectives

The quest to improve sustainable agriculture approaches through intensification in designated sites within a landscape needs to be paralleled by clear conservation logic. Both AWF and WCS recognize

from the onset that sustainable agriculture has to integrate three goals of environmental impact, social and economic equity. The Conservation Agriculture/Conservation Farming implemented in these sites attempted to have a '*systems perspective*' envisioned in its broadest sense, from the individual farm, to the local ecosystem, *and* to communities affected by this farming system both locally and globally in the context of climate change. This emphasis on the system allows a larger and more thorough view of the consequences of farming practices on both human communities and the environment. Such an approach gives us the tools to explore the interconnections between farming and other environmental aspects. Awareness on the value of natural capital for ecosystem services and how agriculture practices that enhance functionality of ecosystems are essential is poor.

It was apparent that the majority of the local communities in the sites are not accustomed to formal dependency on harvest of natural products for livelihoods except for the periodic *ad hoc* collection or extraction of NTFP, and wildlife and fishing for household consumption. The main traditional way of life remains crop cultivation and/or livestock production, with the later usually as a status symbol for wealth and safety net in emergencies. These systems have over the years continued to need more space as human population grows, hence increasing demand for land conversion for agriculture. This finding renders it imperative to articulate the full benefits of biodiversity conservation and how that links to the sustenance of local community livelihoods so that farmers appreciate the big picture.

There is existing local knowledge on the value of conservation and it all tends to be embedded in the cultural beliefs, designation of sacred sites and places, etc. As such, it is important to engage communities and embrace the indigenous knowledge systems (IKS) that have always included aspects of conserving culture and natural resources. This should then be linked to modern science on ecosystem function, the role of forests to safeguard land degradation and in the water cycle. There is a dire need to highlight the key aspects in a landscape that demonstrate the interdependence of farming systems and natural resources so that the target communities can appreciate the rationale behind zoning and enforcement of the zone limits, the need to use selected crop / livestock varieties and employment of the CA/CF technologies that seek to enhance soil fertility and reduce degradation.

Table: Conservation imperatives behind sustainable agriculture systems in the sites studied

<ul style="list-style-type: none"> ❖ Water is a principal resource that helps agriculture and society to advance, and in semi-dry areas of Zambezi Heartland, can be a major limiting factor when mismanaged, so it is essential to regulate its supply & use through 1) improving water conservation and storage measures, 2) promote use of drought-tolerant crop species, 3) using reduced-volume irrigation systems (where applicable), and 4) managing crops to reduce water loss. ❖ Conventional agriculture affects water resources through deforestation and the destruction of riparian habitats within watersheds and the conversion of wild habitat to agricultural land reducing fish and wildlife through erosion and sedimentation and altering the hydrological cycle regulated by forests enhancing the risk of flash floods and soil erosion and reducing the charge of groundwater aquifers. The plant diversity in and around both riparian and agricultural areas should be maintained in order to support a diversity of wildlife. This diversity enhances natural ecosystems and could aid in agricultural pest management. ❖ Soil erosion is a serious threat to the ability to produce adequate food; as such numerous practices in place to reduce erosion, which include reducing or zero tillage, managing irrigation to reduce runoff, and keeping the soil covered with plants or mulch need to be applied. Enhancement of soil quality is also done through crop rotation & intercropping to enhance soil fertility. ❖ Conventional agriculture is among the principal source of deforestation, degradation and loss of biodiversity. It has an impact on the mobility of wildlife as large spaces are cleared. Deforestation contributes also to the release of carbon in the atmosphere and then a contributing factor to the greenhouse effect and climate change.

3.3 Role of partnerships

The role of multiple partners is pivotal for conservation success at a landscape level as such parties bring complementary expertise, resources and mandates that all contribute to successful implementation of actions. In the case of work in Zambezi and Ituri, both AWF & WCS enlisted the direct involvement of public, traditional, NGO and community based institutions to implement actions that would result in conservation leverage. Government provides and oversees the policy arena of actions being implemented, and through its technical agencies work with a diversity of other implementing partners to get work done. This approach has value in ensuring that the right skills set are brought together for a common goal and also result in efficient resource use, while also avoiding duplication.

3.3.1 Government

Government's role is to develop policy and direct implementation of programs that conform to National Development Plans. In both countries, food security is a priority and more so in the target sites that are in marginal remote settings. For the Zambia sites, the Ministry of Agriculture and Cooperatives (MACO) has the mandate to facilitate and support the development of a sustainable and competitive agricultural sector. This mission is guided by the National Agriculture Policy, various legislations, National Development Plans and on an annual basis the Activity Based Budgets.

The ideal is for MACO to provide agricultural services to the farming community which assures food security and income generation without destroying the environment. In line with this mandate, MACO worked closely with AWF and GART to identify the series of activities that needed to be done in order to successfully pilot conservation agriculture. The MACO team at district level identified the team of 19 extension officers that were trained on various CA techniques to be trainers of the farmers in the sites. The Ministry then identified lead champion farmers that formed the core of the target farmers that subsequently received training and starter packs of inputs for CA. Selection was based on MACO's history of knowing the farmers and their commitment to agriculture and also flexibility to accept new techniques, as well as willingness to dedicate portions of their farmland to CA trials.

The Ministry provided all the extension services required for regular follow up with the farmers including supervising land preparation in some cases and other on-farm activities. The team also provided oversight on distribution of inputs and in some cases stored the inputs centrally. MACO joined GART and AWF teams on periodic monitoring and evaluation visits to the farmers each season and participated in the annual seasonal field days. MACO provided all the required field extension backstopping with the major challenge being resource constraints for transport to get to the field. As such, extension teams depended on availability of transport logistics facilitated by AWF & GART. In some cases, the ministry provided vehicles and motorbikes and only needed fuel from the partners.

In DRC the Strategic Document for Growth and Poverty Reduction (DSCR) has identified agriculture as one of the most important priority sectors for the national economic growth and thus for poverty reduction. This is also underlined in the reform of the agriculture sector with a new agriculture code adopted by Parliament in May 2011 and signed by the President of DRC. It is on this basis that the government teams supported this project in Ituri as part of their mandate to fulfill this government goal. Locally, the agriculture extension services of the Mambasa Territory were closely involved with WCS and PACT in the implementation of the project activities with farmers either in the three CBNRM areas or in the OWR and in return, they were provided with means of transport (motorbikes, bicycles, fuel,

etc..) to ensure the supervision of agriculture activities across the landscape and received complementary training in agriculture techniques.

Both ZAWA and ICCN, government agencies responsible for wildlife management in Zambia and D.R. Congo respectively, participated in the mapping of wildlife corridors during PLUP and in human wildlife conflict mitigation, which is an essential dynamic for food security.

3.3.2 Traditional leaders

Traditional leaders such as chiefs and village head persons are custodians of the local culture and oversee matters of land and its uses. In both sites, they play an important role on the access, use and management of natural resources.

For the work both in Zambia and in DRC, all relevant chiefs and headmen were engaged to introduce the project, and their endorsement was sought on selection of farmers to participate in this pilot phase. This assisted to get farmers to embrace the new techniques as it was endorsed by the traditional leaders. The AWF team worked with the chiefs to emphasize awareness on the need to restrict clearance of land for crop cultivation in order to protect forests and wildlife habitat.

A challenge that manifests itself regularly and was evident during this project is the inadequate clarity on the roles and responsibilities of the traditional authorities in development processes that result in lack of accountability; independent actions are taken that results in alienation of communal land to private investors or immigrants and settlers (for Ituri) at the expense of locals. The head persons lack sufficient authority to enforce any land use rules and regulations.

3.3.3 Partner NGOs

Non Governmental Organisations supplement government development efforts with support from non state sources. They formulate projects and seek funding from local and international donors and implement activities at community level. They tend to be best placed to contribute to the improvement of livelihoods of the local people because they are very close to the people and therefore could mobilise and sensitise communities at low cost for project implementation. This was evident in this project with AWF, GART (a quasi-government institution) working well with the communities in Siavonga. In Siavonga, Harvest Help Zambia (HHZ) and the Siavonga Nutrition Group (SNG) partnered well in this program, streamlining their work on food aid and HIV/AIDS activities to support some of the farmers participating in conservation agriculture. In Luangwa, AWF worked with WCS's COMACO team. These partnerships helped align community projects and avoided conflicts. Challenges were still encountered, with some NGOs which have a stronger role in food aid which creates a dependency syndrome and easily worked against farmers' interest to engage in conservation agriculture, opting to get 'free food handouts'. In DRC, WCS has formed a consortium with GIC and Pact with shared responsibilities among them, set benchmarks and an integrated annual workplan. The distribution of tasks is coordinated by ICCN through the Site Management Committee that oversees all activities across the Reserve. In the OWR for example, GIC is responsible for implementing agroforestry activities and providing technical advice to farmers on agroforestry (leguminous plants) and vegetable gardening in villages and schools, while WCS provides technical advice on food crop production and animal husbandry projects and literacy. Within the CBNRMs, Pact works with local associations to promote environmentally friendly practices while WCS works directly with households to promote food crop production and agroforestry (shade cocoa).

3.3.4 Community based organizations

Community based organisations (CBOs) are groupings and associations of producers, learners or businesses who come together to pursue a common interest. They present an effective and efficient way to work with local communities . In Zambia, these mainly take the form of 'co-operatives' registered through MACO as single or multi-purpose agricultural cooperatives and the focus includes crop and livestock production and marketing. The Zambia Wildlife Act administered by the Zambia Wildlife Authority (ZAWA) provides for the formation of Community Resources Boards (CRBs) that spearhead community involvement in wildlife management. In this project, experience showed that these CBOS tend to be formed on a 'one-size-fits -all' model with MACO promoting and registering agriculture cooperatives even where they are not appropriate. It was clearly noted that farmers form organisations as a qualification for some benefit and not because they are interest in the development initiative e.g. fertilizer coops to receive free fertilizer. Another trend was that of a unclear policy guidance on small group formation and registration, and tendency by some NGOs to form multiple CBOs in one locality which results in a proliferation of opportunistic associations and even NGOs. In Ituri, this problem is not yet encountered as there is a general paucity of NGOs and CBOs.

3.4 Boundary, scale and intensity issues

Land, like other forms of natural capital, is not an infinite resource and it is essential to rationalize the how it is used in a given landscape. Demand for land is exacerbated by the very nature of rural economies that depend on multiple livelihood strategies that all require space and are often in conflict, but when planned well, this diversified use provides a cushion when different strategies fail in turn. Because of this, the scope, scale and location of sustainable agriculture needs to be judiciously determined after considering the totality of the ecosystem processes so as to balance and retain the ecosystem function.

3.4.1 Critical issues

Matters of agriculture intensification go beyond techniques and technology into other factors that influence the decision making process of farmers. The projects require a multi-sectoral approach to planning, implementation, monitoring and evaluation for people involved in literacy, organisational development, savings, microcredit and micro-entrepreneurships as well as community development and social security. Coverage of these aspects allow for accountability for resource use.

3.4.2 Intensity and duration of contact with farmers

There is no ideal intensity and duration of contact with farmers that can be prescribed to guarantee impact as this is situation specific due to varying contexts. However in Zambia, it was clearly evident that farmers newly introduced to CA/CF were more sceptical and had relatively poorer results than famers with more years of practicing sustainable agriculture. For crop production and productivity impacts, it was found that after acquiring conservation farming knowledge and assets in the form of livestock participating farmers have potential to make a significant contribution to household food security and income from the third season onwards (Ebbie Dengu, 2008; Tony Kaseke and Justin Django, *pers. comm.*). This is attested by performance at the Bbakasa Pilot Best Agricultural Practice Plot in Siavonga where the adoption of conservation farming principles of intercropping by coop farmers increased the diversity of crops harvested in the third year. Measures of nutritional gain were not included and would be essential to include as they can count as indicators for conservation agriculture success.

3.4.3 Scalability

In the field target sites in both Zambia and D.R. Congo, options for sustainable agriculture focused on conservation agriculture (CA), which in itself is only one of the several other approaches to improve food security. As this was pilot work, it focused on application of CA techniques in existing farmers plots. For example, in both Siavonga and Luangwa districts in Zambia, a total of 526 farmers were engaged with 263 ha being put under conservation agriculture, while in Okapi Wildlife Reserve 3000 households were targeted at the onset of the project and 1069 engaged two years later with 343.5 ha under improved food crop production (cassava, beans and coconuts). While the pilot sites diversified crops to include optimal crop combinations that enrich the soil and reduce land degradation, it was not possible to reach more farmers to apply the same model as it was dependent on supplied inputs. In the case of Zambia, there was limited lead time to train the farmers on various technical options so as to avoid having a 'one-size fits all' approach to agriculture intensification. Furthermore, because the CA techniques were sustained by inputs provided by the technical partners, only small pieces of land (approx. 0.5 ha per farmer in Zambia and 0.5-1 ha in Ituri) were put under this improved agriculture regime. Most farmers were reluctant to convert all their farmland from conventional to conservation agriculture techniques because of skepticism, and more because there were no free inputs packages to enable that. Consequently, the scale of operation (i.e. hectares under CA) was small and resulted in limited verifiable evidence of the impact of CA techniques to improve food production and conservation leverage on a landscape level. In addition, the scope for conservation leverage remained limited because the majority of farmers in the target sites continued cultivation using their traditional conventional methods on the bulk of their farmlands.

The limited production metrics comparing participating and non-participating farmers provide anecdotal evidence of improved production but overall, the production levels remained low. A few farmers put aside seed for use to replant in the next season but there was generally no surplus for marketing to help generate income for the participating farmers to independently purchase inputs for subsequent seasons. This experience shows that when implemented at small scale, in small spaces, and with no guidance on site suitability for specific crop varieties and livestock types, conservation agriculture and other complementary sustainable agriculture strategies have limited scope to improve food security and contribute to biodiversity conservation.

It is thus essential that the project is big enough to satisfy the target food security and conservation wins. Actions should involve key stakeholders including suppliers of inputs, producers, buyers/processors, regulators and consumers of commodities that offer comparative advantage.

3.4.4 Market linkages

Most outlying or inaccessible areas where conservation activities are predominant lack appropriate market services, infrastructure and systems. Such areas need marketing support and insurance against marketing and weather risks from the government and the private sector. In Zambia, ZNFU provides market information services which indicate current local prices of agriculture commodities as a useful aid to farmers and traders in deciding what crops to grow and where and when to sell them. An important principle in market links is for action taken to start from an understanding of the market and working back from this to production. Grassroots organizations like producer groups and associations could play an important market linkage role and this was exemplified by the Simamba Goat Producers and Marketing Cooperative in Siavonga for the case of tracking goat markets in Lusaka. The market linkages for Ituri were lacking in the design of the project. The project emphasized its interventions on productions and not much consideration was directed to commercialization of the farmers' production.

3.4.5 Guiding policy framework, dialogue and coordination

Issues of poverty alleviation and improved food security are aptly captured at an international level by the Millennium Development Goals (MDGs) that outline a set of internationally agreed targets by the members of the United Nations. Two key goals that relate to the streamlining of sustainable agriculture are (i) Goal 1 that seeks to eradicate extreme hunger and poverty by reducing by half the number of people living on less than USD1 per day, and reducing by half the number of people suffering hunger, and (ii) Goal 7 seeking to ensure environmental sustainability, by among other things, integrating the principles of sustainable development into country policies and programs while at the same time reversing the loss of environmental resources.

These high level international goals are further captured in the continental AU/NEPAD Comprehensive African Agricultural Development Program (CAADP), a strategic framework to guide country development efforts and partnerships in the agricultural sector¹. CAADP's four pillars include i) Pillar 1 - that addresses Land and water management; ii) Pillar 2 - Market access; iii) Pillar 3 - Food supply and hunger, and iv) Pillar 4 - Support to agricultural research. The use of Conservation Agriculture (CA) is considered to be one of the main strategies for achieving these pillars, especially in the area of sustainable land management as well as increasing resilience by decreasing food insecurity and linking vulnerable people into opportunities for agricultural growth. At national level, Zambia's National Development Plan has an overall Agriculture Policy which aims to facilitate and support the development of a sustainable and competitive agricultural sector that assures food security at national and household levels and maximizes the sector's contribution to Gross Domestic Product (GDP). The same kind of policy frameworks exist in Zimbabwe and Mozambique where the activities to streamline food security in conservation are being implemented as well as in DRC within the DSCR and Agriculture Code although this awaits implementation.

Such overarching national, regional and global goals for enhancing food security require a conducive policy framework that allows for efficient use of resources. In the case study areas, it is noted that cross-sector co-ordination is either non-existent or at best inadequate. Policies that govern the use of forests, wildlife, fisheries, water and land resources are alienated and often under the jurisdiction of different arms of government. This results in very restricted focus on resource management themes that are functionally connected but there is no investment to integrate their management. More often than not the political will to advance food production neglects to acknowledge that spaces for crop and livestock production are not infinite and that it is not every seemingly 'unused' land that can be cleared and turned into successful crop production. The role of other non-direct production means for food security is only starting to receive attention in the last decade. This growing diversification of livelihoods that support food security and improve the quality of life requires reform in the policy arena to accommodate a holistic, landscape-wide, ecosystem level approach.

Sustainable agriculture presents an opportunity to rethink the importance of small holder farming in rural communities. Success and tangible impacts require economic development policies that encourage more diversified agricultural production in rural farms as a foundation for healthy economies in rural communities. If complemented by other strategies driven by the natural wealth in these rural marginal locations, sustainable agriculture practices and policies can help foster community institutions that meet the totality of community needs incl. employment, educational, health, cultural and spiritual needs.

¹ Agriculture is used here to refer to the entire value chain and to include crop staples, vegetables, fruits, fish, legumes and livestock products. Agricultural growth includes agricultural activities and the up and downstream activities that support growth, including non-farm activities and services.

4. LESSONS LEARNED

Based on the findings described in section 3, above, the AWF-WCS team participating in this exercise, along with some of our key partners, have met to define lessons that should shape our own work as we move ahead in our respective programs. We also hope that the lessons that we identify prove helpful to colleagues in other organizations working on similar issue to plan and implement their activities more effectively, and avoid repeating our mistakes.

4.1 Role of Agricultural Intensification in African Conservation Strategies

Agriculture intensification can play a significant role in African conservation strategies through the reduction of agricultural expansion and natural habitat degradation and deforestation and loss of biodiversity. This can reduce the pressure to convert forest and natural ecosystems to farmland as yields and returns per unit of family labor increase. This can reduce the pressure on critical habitats for wildlife and on natural ecosystems that provide services like freshwater, climate and disease regulation and pollination. Reduced pressure to convert these areas to farmland also opens the possibility of exploring how local communities can participate more fully in the management of this natural patrimony and receive benefits from these management activities in the form of tourism revenues, payments for ecosystem services, and access to markets that pay premium prices for goods produced in environmentally responsible ways. In many cases, the potential of these activities to generate income for rural people far exceeds the income-producing of farming. However, to tap this potential, people need to be secure that investing in medium and long-term land management strategies will not render them unable to meet immediate needs, and have the capacity to participate in management structures that are technically and administratively more complex than those to which they are accustomed.

Environmentally friendly technologies offer the possibility of increasing yields and labor productivity while simultaneously reducing soil disturbances, fossil fuel consumption and agricultural runoff into rivers and streams, thereby contributing to cleaner air, reduced greenhouse gas emissions, and better water quality for downstream users. For example, reduced dependency on chemical fertilizers and promotion of on-farm manure, leguminous cover crops, and agroforestry further decreases water contamination. Environmentally friendly agricultural practices also promote more efficient use of rainwater through such practices as basin farming (pot holing), ripping and intercropping which are efficient at water retention therefore reduction in water runoff which would cause excessive soil erosion and sedimentation. Further it increases rainwater infiltration and reduces losses by evaporation while at the same time enhanced soil organic matter content improves soil structure and water infiltration and storage. Thus, in addition to decreasing the pressure for farming to expand into wildlife habitat and disturb critical ecosystems, agricultural intensification can also reduce the environmental impacts of farming itself.

However, these benefits are not automatic outcomes of increases in yields and returns to labor, but depend on how we go about our work with farmers. For example, it is important to ensure that we promote ensuring broad participation by all types of farmers, in order to involve the number of farmers and the amount of land necessary for our efforts to have an environmentally significant impact. We can have dramatic impacts on the lives of farmers we work with, but if we cannot scale our efforts up to where our efforts have measurable impacts on ecologically significant areas, we will not succeed in changing overall trends in forest conversion and land use change. Similarly, while increasing yields,

incomes and returns per unit of labor are essential elements of improving farmers' food security, they are not sufficient. We also need to look at the robustness of the farming systems we promote in the face of stresses from changing rainfall and temperature patterns and changing market conditions. Otherwise, climactic and economic shocks could lead farmers to revert to extensive land use practices and exert even more pressure than they currently are on wildlife habitats and natural ecosystems.

4.2 Keys to Designing Agricultural Intensification Efforts that Lead to Effective Conservation

While it is impossible to consider all of the variables that might play a critical role in affecting whether supporting intensified agricultural production, several stand out as factors that should be particular consideration:

4.2.1 Size, scale

As noted above, while we must achieve real improvements in yields, incomes and returns to labor, we must operate at the level of areas that are significant in terms of the biodiversity and ecosystem functions that we are attempting to conserve. A community that forms an island of success surrounded by a larger landscape in which nothing has changed does not contribute to conservation and resource management success until and unless the successes achieved there are scaled up to change conditions in the larger area.

WCS attempts to address these issues through its landscape conservation approach. Landscape boundaries are defined based on the habitat requirements of species that compete most directly with people in terms of their space requirements, and that are most affected by habitat loss associated with human activity. In general these tend to be large-bodied, slow-reproducing species that utilize multiple habitats, and require large areas of land to sustain biologically sustainable populations. Often protected areas lie at the core of these landscapes, although these rarely contain the area and habitats necessary to meet the requirements of these landscape species. Thus, in these settings, conservation efforts focus on ensuring the effective management of protected areas, and creating conditions for the management of spaces outside of protected areas that will enable them to continue to meet the needs of wildlife. Thus, in the Ituri landscape, for example, landscape species include forest elephants and okapis, and efforts to stabilize farming systems focus on people living along the highway that passes through the Okapi Wildlife Reserve, inside the protected area, and in areas where farming affects elephant migration corridors and possibilities for maintaining connectivity between the Ituri landscape and Virunga National Park, to the east. In this way, efforts with farmers are concentrated in areas that are of strategic importance in achieving effective management of the overall landscape, and complement more traditional conservation activities like environmental education and support for protected area management.

AWF works through its African Heartlands Programme - an innovative, science-based, and landscape-level approach to conservation that includes both conservation and development goals. Heartlands are biologically important areas which have the scope to maintain healthy populations of wild species and natural processes well into the future, including in the face of anticipated climate change. Each Heartland is made up of varied land units, including government, community and private lands, covering both protected and unprotected land with various uses. Since there is a critical need to undertake conservation work that improves the livelihoods of local people who live with wildlife each Heartland is also a sizeable economic unit in which tourism or other natural resource-based activities can contribute

significantly to the lives of local people. Currently AWF works in nine Heartlands ranging in size between 8,000-90,000 km² and covering parts of fourteen countries in Sub-Saharan Africa. In order to achieve landscape-level conservation impact AWF is committed to working in each Heartland over a minimum of 15 years. AWF has developed the Heartland Conservation Process² (HCP) as its approach to setting conservation targets, identifying critical opportunities and threats and for planning, implementing, monitoring and learning from interventions within each Heartland. HCP is a participatory, consultative approach, involving government, community and other stakeholders in each landscape. AWF has designed a suite of intervention strategies and applies them in different ways and intensities across the various Heartlands. Strategies employed include: protection of critical habitats and corridors by bringing land under conservation management, development of conservation-based enterprises, applied research and species conservation, development of capacity and leadership for conservation and, where necessary, engagement in policy and legislation work with partner governments. Land use planning and zoning is one important tool which allows AWF to develop a 10-year vision for the Heartland based on desired outcomes for various land-use zones within a landscape that contribute towards achieving goals for conservation targets.

4.2.2 Location

Location also shapes efforts to reduce pressure on wildlife and ecosystems from extensive land use by smallholding farmers in important ways. These are closely related to the size and scale issues, discussed above, as well issues related to the selection of target populations and definition of approaches for working effectively with them. For example, the conservation objective of reducing pressure on wildlife and ecosystems means that conservation organizations tend to concentrate their work with farmers people living in and around protected areas, where critical habitats are facing the greatest pressure from farmers. While this makes sense in terms of priority setting, it raises important issues about how we manage our relationships with local people.

For example, the problem of wildlife predation on crops will necessarily be a permanent issue, and programs need to include a suite of options for discouraging crop raiding, which will necessarily evolve over time as animals become more adroit circumventing efforts to keep them from crops. Indeed, as efforts to improve farming systems show results, the value of what is lost to crop raiding is likely to increase. For example, during the first year of AWF's WEALTH project, elephants destroyed all of the crops in about 50 percent of the fields planted by farmers, with losses being higher in Luangwa District, with its large permanent elephant population, than in Siavonga District, where elephants are more concentrated in migratory corridors and have a more seasonal presence. The conservation goal is to manage these areas so that healthy elephant populations remain in the landscape, so the problem cannot be made to go away. Therefore, a priority for AWF is to work with local people and ZAWA to find ways to cooperate that allow them to manage the problem more effectively.

Similarly, crop raiding is a permanent problem for people living in the Ituri landscape's Okapi Wildlife Reserve. WCS's effort to set up permanent agricultural areas received support from farmers because having their fields concentrated in a single area allowed people to work together more effectively to defend crops than they could when individual family fields were dispersed in the forest. Nonetheless,

² Henson, A., Williams, D., Dupain, J., Gichohi, H. and Muruthi, P. 2009. *The Heartland Conservation Process: enhancing biodiversity conservation and livelihoods through landscape-scale conservation planning in Africa*. Oryx. Vol. 43 No. 4 pp. 508-519.

ICCN has been ineffective in working with people to address crop raiding problems, failing to respond to crop raiding incidents in a timely manner, and being more vigorous than its own regulations require in collecting snares placed by villagers. This undermines support for improving management of the protected area, even though the zoning that defines agricultural zones makes crops more secure. Finding ways to improve cooperation between villagers and ICCN to manage crop raiding more effectively is a priority activity for WCS as part its support for the implementation of the zoning plan in OWR.

Also, the protected areas around which we work with farmers tend to be located in areas that are not especially well suited for farming, either because of biophysical conditions like soil, topography and precipitation, or because of poor linkages with commodity markets. While most smallholding farmers rely on multiple sources of income, off-farm income is especially important for people in areas that are less well endowed for farming, and some off-farm income is likely to come from poaching, charcoal production and other activities that undermine our conservation efforts, unless we identify and develop more suitable alternatives. Combining this makes it especially urgent that we invest in building the capacity of local communities in these areas to participate meaningfully in wildlife management, and share in the benefits.

By the same logic, on-farm work needs to integrate crops and livestock to improve farm incomes and efficient resources management. Livestock provide essential food products, sustains employment and income for rural population. Through animal draught power and manure, it contributes directly to increased agricultural production in general and food security in particular. The social relevance of particularly cattle and goats is high for prestige, dowry, as savings for school fees and other expenses, and as a bridge when crops fail. Crop residues feed the livestock which in turn which enrich the soil.

4.2.3 Knowledge Management and Program Implementation

Such complexities make it important that we conduct participatory land use planning (PLUP) exercises as part of our standard operating procedure for managing knowledge and building shared understanding of critical issues. This approach has been used to good effect in the Ituri landscape (Brown 2009)³, and in Luangwa and Siavonga districts, in Zambia. PLUP allows local people to engage in an explicit and transparent process of assessing their livelihood options and developing a shared vision for using land and natural resources. It is crucial the it also be carried out with the active participation of local officials with responsibility for allocating rights to use land and natural resources, and overseeing the exercise of those rights. PLUP can thus become the glue that binds the partnerships that are critical for efforts to stabilize and improve smallholder agriculture. It fills this function by providing a process to establish precedents for dialog and discussion between local people and their officials, and securing official buy-in, so that the people are able to hold one another to the agreements reached about land use through official sanction as well as peer pressure. It is crucial the results of these processes are recognized by local government authorities and incorporated into official development planning. Developing and implementing participatory land use plans allows people to elaborate shared understandings of the range of possible productive options, and how these can complement or undermine one another depending their respective spatial and resource requirements. It also provides a starting point for

³ Brown, E. (2009). Participatory Land Use in Zoning the Okapi Wildlife Reserve (OWR). Democratic Republic of Congo (DRC). Translinks Case Study. Bronx, NY: Wildlife Conservation Society and US Agency for International Development.

thinking strategically about how families might join together in producer associations to obtain more favorable terms for selling products and purchasing inputs, the kinds of bulking and processing facilities that would add value to local production, and where it should be placed, in order for farm families to engage with markets under the most favorable terms possible.

Finally, PLUP allows provides an opportunity to begin to understand the demographic, social and cultural factors that influence the effectiveness of key land use and resource management messages that we want to impart, and the ability of local people to respond in a positive way. For example, adoption of sustainable agriculture practices tends to be limited to families whose leaders are in the 20-45 year age range. Older farmers are sceptical of new technologies and techniques, and, if their children are grown and moved out, they may not have access to the labor they would to adopt them, anyway. PLUP provides a way to begin to identify such issues and define areas about which additional knowledge is needed for actions to be effective.

4.2.4 Defining Appropriate Time Horizons

Successful efforts to improve farming systems need to understand when to focus on long-term objectives, and when understanding short-term issues is key. On the one hand, the win-win scenarios for people and wildlife that we seek to construct need a longer implementation time frame to achieve the adoption rates needed to have a conservation impact, consolidate family food security, and construct stable and sustainable processes that allow families to increase their incomes. Agricultural intensification interventions should not be small projects limited to a few years but must be programs of 5-10 years to create significant impact to contribute to conservation objectives that create transformational change in the landscape. This time frame extends beyond the funding horizon of most donors, so it is important for organizations that are planning to undertake these kinds of activities to have a sound strategy for securing an adequate level of funding for the necessary period of time.

However, experience also demonstrates that many farmers cannot wait for a whole, or several, cropping season before reaping the benefits of intensified agriculture. Thus, the introduction of short lifecycle livestock production is key in these rural community which include; goats, chickens, guinea fowls. AWF initiated the Goat enterprise in Simamba Chiefdom which included the introduction of more productive improved goat breeds purchased from GART as the local breed in Siavionga is the East African Dwarf Goat. In Ituri, through the small grant programme, local associations and selected households have been granted money to start livestock production (goat, ducks, fish, and chickens).

4.3 Risks

Efforts to achieve conservation goals through the stabilizing and improving farming systems contain a significant element of risk, even if impeccably planned and implemented. One risk is that we undermine our own efforts to achieve conservation objectives through our success in building stronger farming systems. If we do not heed what we have learned about the importance of spatially explicit program planning, and the need to provide off-farm alternatives in addition to improvements to farming practice, greater success in farming may encourage people to want to expand the area under cultivation. It is therefore essential to build consensus beyond the farm level about appropriate land use options through continuing participation in planning and implementing land use plans at the landscape level.

As stressed throughout this discussion, efforts to achieve conservation goals through better farming are necessarily based on building the capacity of local actors to manage significant areas of land, literally, from the ground up. Because building capacity, securing collaboration among diverse actors, and demonstrating results that build support and secure necessary funding is necessarily a long process, even the best programs are constantly in danger of being overtaken by events that originate elsewhere. For example, a central government can wipe out years of work with the stroke of a pen by granting a mining concession, or signing a contract for the construction of a road, without consulting and coordinating with local people and their authorities. Similarly, a dramatic rise in the price of a commodity can encourage people to sacrifice the long-term robustness and stability of their production systems in the hope of earning a windfall by producing a cash crop that happens to be in high demand. Temperature and rainfall patterns associated with climate change are taking place even faster than widely accepted models have been predicting, and may render production systems that were well adapted to local conditions considerably less so in a short period of time, leading to crop failures and social conflicts that can undermine the most conscientious of efforts to integrate improvements in farming into a widely accepted development vision based on principles of conservation and sustainable use. Therefore, as we take note that undertaking improvements in farming as a means to achieve conservation objectives is a long-term process, we need to understand, and make our donors understand, the nature and scale of the threats our efforts face. Despite these risks, our experience leads us to believe that, in areas where people's inability to earn a decent livelihood drives destructive patterns of land use, efforts such as those described here constitute our best hope for conserving biodiversity, protecting the integrity of critical ecosystems, and helping local people secure the means to live with dignity.

5. NEXT STEPS

5.1 Next Steps for AWF

As part of activities of the WEALTH project funded by the SDC in the last 2.5 years, AWF piloted the application of conservation agriculture in the communal land areas within Zambezi Heartland where local communities already engage in subsistence agriculture. This was conducted as part of AWF's conservation actions in this landscape to rationalize land use for different purposes in order to create space for wildlife dispersal and movements while intensifying agriculture in appropriate zones. PLUP was piloted in 4 wards of Siavonga in Zambia and the whole of Mbire District in Zimbabwe. The response to CA techniques introduced to the 526 farmers trained was very positive and in order to build critical mass that will have significant biodiversity conservation impact, the following activities are planned in subsequent phases.

5.1.1 Replicate CA techniques among more farmers in Siavonga and Luangwa

AWF would like to increase the number of farmers using CA techniques with support of input starter packs in areas within Zambezi Heartland that were not reached earlier in order to spread demonstration of CA techniques. This will focus in the 4 wards where PLUP was completed and explicit agriculture zones have been designated with the target on those farmers in this zone that still use conventional agriculture techniques. Activities will include rolling out HWC mitigation using chili pepper by more

farmers and also promotion of production and use of chili. The HWC component will seek to work more with ZAWA to enhance their responsiveness to reports of HWC incidences.

5.1.2 PLUP in Luangwa and micro-zoning in the development zone

In Siavonga District where PLUP was completed for 4 wards that are juxta-positioned to wildlife and forest resources, AWF would like to focus follow up work on micro-zoning in the development zones where competition for land creates conflicts. The completed LUP designates a zone for 'mixed development' which also includes agriculture and the idea is to now partition this to micro-zones so as to further reduce incompatible use and also ensure that agriculture intensification through CA can be more effective.

In Luangwa where no LUP was conducted, AWDF plans to formally conduct PLUP following the same model as in Siavonga and then subsequently do micro-zoning in those macro-zones designated for development (which includes agriculture).

5.1.3 Establish and strengthen community based organizations

AWF has vast experience working with communities across its landscapes and in Kazungula Heartland within Zambia under a relevant context setting. A key lesson learnt in these areas is that establishing a robust Community Development Trust (CDT) helps democratize decision making for land uses and reduces land alienation by traditional authorities parceling out land to investors. In this respect, AWF would like to establish two CDT in Simamba and Sikoongo chiefdoms. These cover the key areas where PLUP was conducted and CA techniques will be rolled out to new farmers. The CDT will spearhead enforcement of the LUP and micro-zones to avoid perverse incentives to expand agriculture in light of successes that result from CA methods.

5.1.4 Next Steps at Organizational Level

AWF is at an advanced stage of developing an organizational agricultural strategy. This will be the white paper that guides how AWF works with partners and applies best practices for sustainable agriculture actions across its pan-African portfolio of landscapes. Lessons learn from the case studies covered under this task will be used to inform AWF's agriculture strategy.

5.2. Next Steps for WCS

As noted above, WCS has used worked with local residents and ICCN in the application of PLUP to define agriculture, traditional hunting and conservation areas within the OWR, and the successful definition of these zones has contributed to building a more cooperative relationship for managing the protected area. The priority now is to continue the PLUP process, with the ultimate goal being to build a structure that will permit a collaborative approach, involving local people, government officials and traditional chiefs, to manage the entire landscape. To this end, WCS will undertake activities to continue the implementation of management of the land use zones defined inside the OWR, and undertake PLUP activities with communities located outside the protected area.

5.2.1 Implementing Land Use Zone Management in the OWR

By ratifying the rights of villagers to farm and hunt within the OWR, as long as these activities are carried out in the agreed upon areas, the definition of agricultural, traditional hunting and conservation zones, provides a basis for ICCN and communities to collaborate in limiting the number of newcomers who attempt to settle in the OWR and on other matters of shared interest. However, as the plan is implemented, issues have arisen which can undermine cooperation between local communities and ICCN, if not handled well. The three priority issues in this regard are the use of snares, cultivation of perennial crops and rights to exploit trees felled in the agricultural zone.

a. Use of snares

Although ICCN recognizes traditional hunting rights, and its regulations permit snares as a hunting method, it has not yet regulated snare hunting in the OWR. As a result, current practice is that all snaring is prohibited. ICCN officers are instructed to collect all snares that they find in the course of their patrols, and they are paid a bonus for each snare collected. This is a major source of irritation for community members, and they respond by placing more snares in the forest in the hope that ICCN officers will miss some of them. This creates a perverse dynamic whereby the ban on snares is leading to more snares being deployed. Furthermore, the problem of snares is being conflated with the problem of crop raiding by wildlife, because the irritation about the snare issue get mixed with frustration about the ineffectiveness of ICCN in responding to requests for help when wildlife damage crops.

b. Planting of perennial crops

ICCN does not presently permit the planting of perennial crops like coffee and cocoa inside the OWR. While the reasons for this are clear, permitting tree crops would help maintain the stability of these areas by providing additional sources of food and income that complement annual crop production. This could be important in helping ensure that people continue to confine their farming activities to the agricultural zone over the long term.

c. Rights to trees felled in the agricultural zone

Presently, ICCN does not allow people to utilize the wood from large trees that are felled within the agricultural zone. Local people can apply for a permit to utilize the trees, but these are only granted in exceptional cases, with the result that a significant amount of timber that could contribute to local livelihoods goes to waste. The DRC forestry code recognizes that trees located on a person's farm belong to the landowner, so it would not be out of line for ICCN to permit people with rights to the agricultural areas to take advantage of timber from trees felled as part of their farming activities. Not doing so contributes nothing to forest management, denies people a potential source of income, and, like the snare issue, creates friction that interferes with cooperation on other matters.

The solution to all three cases lies in persuading ICCN to move from a position of prohibiting the activities in question to one of regulating them, so that they are permitted under specified conditions. However, this will require that ICCN trust its partnership with local people to a degree that it has not had to in the past, and it will require local people to respond to greater flexibility by ICCN by exercising greater control over their own activities than they have had to do before. Successful resolution of these issues will place local communities in a position to cooperate with ICCN to exercise a degree of authority over their areas inside the OWR that is comparable to the authority exercised by communities in the

CBNRMs, and create a basis for cooperation in managing the overall landscape based on a shared vision of conservation and development. A priority activity for WCS inside the OWR will be to work with ICCN and local people to resolve these three issues during the coming months.

5.2.2. Complete PLUP Exercises in Communities Outside the OWR

WCS is undertaking a PLUP process with the Bakwanza and Andikau community-based natural resource management (CBNRM) areas, which are located to the east of the OWR (see Ituri Landscape map, in Section 2, above). Work already conducted with communities in these areas has constructed a general consensus around the establishment of agricultural areas (for food crops and for commercial crops, including perennials like coffee and cocoa), hunting areas, logging areas and community reserve areas. The community reserve areas adjoin one another, and would be managed jointly by the two CBNRMs. The process has now reached a crucial stage where it is necessary to achieve formal endorsement from local chiefs, who have discretionary power to allocate land. The matter is sensitive because formal endorsement of the PLUP exercise would constitute consenting to have their land allocation powers, an important source of revenue for chiefs, curtailed. Nonetheless, securing chiefly buy-in is essential to establish a basis for managing the area according to principles of conservation and sustainable land use, and provide a measure of protection for wildlife and local livelihoods as plans proceed for beginning mining operations in the many concessions that the central government has granted in the landscape.

5.3 Possible Next Steps for ABCG

Based on the field observations gathered as part of this assessment, and discussions held with colleagues as part of the process of preparing this report, which would contribute to the conservation impacts of efforts to improve make farming systems more productive, and reduce pressures for farmers to encroach on wildlife habitats and poach to complement their on-farm incomes. One involves the definition of best practices that ABCG members working on the food security theme apply and advocate in the course of their work on this issue, and the other involves the definition of a set of indicators to document the impacts of our efforts to make farming systems more robust, which the ABCG group would publicly recommend to all organizations involved in efforts to improve food security.

5.3.1 Definition of Best Practices

A possible application of the present report would be that it serve as a discussion document among ABCG members. The purpose of this discussion would be to define a set of best practices derived from the experience of the entire group to which we would agree to adhere, and recommend to partners. This would contribute to making our own efforts to further conservation objectives by promoting more consistent, and clarify what we understand to be the relationship between more productive farming and conservation. This is potentially important in clarifying how work on this issue fits into our larger mission, and provide a basis for building partnerships and alliances with organizations whose missions revolve around improving farming systems.

5.3.2 Food Security Indicators

ABCG has already been involved in an initiative to encourage USAID to include indicators that address sustainability and robustness of farming systems, and the impact of farming on biodiversity and

ecosystems, as part of its Feed the Future Initiative. The effort has enjoyed limited success in moving FtF from a focus that is almost exclusively on year-to-year increases in yields, incomes and nutritional status (all things that we agree should be monitored), also to consider if efforts are contributing to creating conditions that increase the ability of people to deal successfully with challenges like climate change and fluctuations, and feed themselves over time. The indicators we proposed could be presented, independently of the FtF exercise, as design features that should characterize efforts to improve farming systems generally. This would contribute to raising public awareness and ensuring that the discussion continues with USAID and other donors.

