A bird, a tree and an ADP.
Environmental Sustainability in ADPs.

Tony Rinaudo, WV Australia.

The cattle egret eats large numbers of insects, mostly grasshoppers and caterpillars, but also ticks, crickets, spiders, and flies that are stirred up by cattle and wild animals. In West Africa, the cattle egret only nests in the Gao tree (Faidherbia albida). Oral history tells of vast flocks of cattle egrets combing through crops and darting between cattle hoofs in pursuit of insects in the recent past. Egrets hunt for pests for free and without leaving toxic hazards. As an added blessing, egrets deposit nutrient rich droppings in their wake.

The fast growing Gao tree is unusual in that unlike other species it retains its leaves during the dry season, providing essential shade for livestock, but during the rainy season it sheds its leaves, providing beneficial light shading for crops. Gao trees fix nitrogen and accumulate other nutrients in the soil, resulting in three times the grain protein content and two and a half times the yield from millet plants growing near them. Gao’s produce large amounts of protein rich fodder (leaves, pods and seed) for livestock. Just twenty five trees per hectare can provide the full ration of 1 to 1.5 sheep per year, thus allowing two to three times the ‘optimal’ stocking rate for Sahelian rangelands. At the same time, this ‘parkland’ farming system allows for an additional production of 1,220 to 1,500 Kgs of millet grain and 2,500 to 3,000 kgs of stalks to be produced per hectare. Stalks are used for fodder, fuel and for building purposes.

In recent decades, widespread aerial spraying to control locusts and the wanton destruction of Gao trees resulted in a significant decline in egret numbers. Perhaps linked to this, across West Africa today, average millet yields are very low (between 200-500Kgs per hectare) and most farmers cannot afford either pesticides or fertilizers. Livestock are malnourished for much of the year and soil fertility is very low.

A bird and a tree: What do they and environmental sustainability have to do with ADPs? Is it possible that a mere bird and a simple tree could have a significant influence on attaining food security, a fundamental goal of all WV ADPs? What is happening in West Africa is symptomatic of what is happening across many ADPs around the world. Environmental degradation, as evidenced in declining biodiversity, is subtle at first, are is not recognized until it is all but too late. Sadly, the significance of this loss is too often barely understood. Farmers become accustomed to increased pest attacks, reliance on synthetic pesticides, loss of soil fertility and dependence on artificial fertilizers. They become increasingly dependant on a narrow range of crops susceptible to various shocks such as drought, strong winds, excessive rainfall, weeds, insect and disease attack. WV programs sometimes reinforce this dependence which really only treats symptoms and does not deal with the root causes of food insecurity.

While causes of famine are complex and are not confined to biodiversity loss, a malfunction in the life support system, the environment, should be one of the first places to look for root causes of hunger. TDI nutrition findings from one West African country are not untypical for Africa: 90% of all households are not food or resource secure in any one year, and 50% of the children are stunted and this is the average for 5 ADPs funded by different support offices. And this, despite WV presence for at least ten years. In Senegal I learnt of a township with wonderful new facilities including water tower, clinic and school buildings, things which WV excels in providing. The only problem was that there were no people! The entire population had fled because the encroaching desert had made it impossible for them to support themselves. In our WV programs we ignore the environment at our own peril and we risk investing heavily in ultimately unsustainable activities.
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Lets further explore the bird and the tree story and see where it takes us. What is the hypothetical cumulative effect of losing just one small flock of one species?

An egret can eat say 30 to 50 locusts in a day and each locust can lay 80 to 150 eggs three times in its lifetime. Lets assume that 50% of the offspring are female and that these daughters could lay twice in the same year and that the grand daughters could lay once in the same year. Lets also assume that there are no other causes of death. By eating 15 female locusts a single egret could theoretically prevent 11.8 million locusts from damaging crops and pastures. Each locust consumes its own weight (2 grams) in food each day, so 11.8 million locusts could eat 23,623 kgs of vegetation daily, or the equivalent amount consumed by 230 elephants, or 575 camels or 57,500 people. From a purely economic viewpoint alone, to not have to feed 57,500 people for a single day must provide sufficient reason for an ADP to maintain its egret flocks.

However, it does not end there if one takes into account the fact that egrets don’t live alone. If an average size flock of egrets (say 100 birds) prevented the hatching of 11.8 million locusts each, from just one days pickings – well, I’ve run out of fingers and toes. Additionally, any gao tree is also going to provide habitat for a plethora of lizards, chameleons, spiders, wasps and other insect eating birds which in turn eat insect pests. There may not be enough fingers and toes in all of WV to work that one out though.

### Rough work sheet.
Starting with 30 locusts.

**Parent generation:** $30 \times 50\% = 15$ female locusts.

$15 \times 80$ eggs x 3 hatchings $= 3600$ offspring.

**Daughters generation:** $3600$ offspring x $50\% \times 80$ eggs x 2 hatchings $= 288,000$ offspring.

**Grand daughters generation:** $288,000$ offspring x $50\% \times 80$ eggs x 1 hatching $= 11,520,000$ offspring.

TOTAL: $11,811,600$ offspring.

Total number of locusts potentially generated from original 15 females is 11.8 million.

Every species lost may lead to the loss of numerous other species. Each species plays a role in the environment which contributes to the welfare and the sustainability of the human community to one degree or another. Egrets and gao trees are well documented examples of species which make an outstanding contribution towards ADP sustainability. For most species however, there is little known about the important functions they play. There are plants which concentrate phosphorus in the root zone and make it more available to crops. This is critical in regions with low soil phosphorus levels where poor farmers cannot afford artificial fertilizers. Some insects are critical for pollination of certain crops. Loss of biodiversity in turn negatively impacts crop yields and hence a communities’ welfare and sustainability.

The importance of knowing what our natural assets are, what their role is and how to utilize them was made very clear to me in 2004 when I visited West Africa in the aftermath of drought and a massive
locust invasion. As part of WVs response villagers were given vegetable seed and basic gardening tools. Walking through the plots containing stunted maize, desiccated lettuce and caterpillar riddled tomatoes, I asked one of the participants what they were really living on. She immediately took me barely 200 meters from the garden to an Anza bush (Boscia Senegelensis). Without irrigation or protection and despite the drought and locusts, this wild plant was covered in edible fruits which were the staple during periods of food shortage. ADP staff had no knowledge of this incredible gift from God. There was no program to protect endangered remaining trees let alone propagate and promote new plantings.

Understanding species population dynamics (including population size, age composition, health, diversity and equilibrium with other species) gives an insight into how well an environment will be able to support sustainable livelihoods. It is just one indicator of environmental health. Other key areas which tell us about the health of the environment include:

- **The mineral cycle** or how well minerals are used and recycled in the environment. There will be little recycling activity on cleared landscapes or on those with degraded vegetation. In many regions it is common practice for farmers to slash and burn their fields. Fewer and fewer farmers are able to return manure or crop residues to fields, practices essential for soil health and plant productivity. When tap rooted plants are left in fields they draw nutrients from deep in the soil profile and deposit organic matter and minerals as leaf litter on the surface, making them available to crops. Carbon is absorbed from the atmosphere and deposited in the soil as ‘multi-purpose’ organic matter. Organic matter holds moisture and nutrients, gives structure to the soil, keeps it cool in the heat and warm in cool weather and provides habitat and food for beneficial soil life. Nitrogen fixing species take essential nitrogen from the atmosphere for free and make it available to plants in a way that is not toxic to the general environment.

- **Water Cycle.** In many ADPs, the water cycle is not functioning. Hard bare ground sheds rainfall which becomes eroding runoff. Flash floods and erosion silt up fertile lowlands and fill lakes. Perversely, because of the soils inability to absorb moisture, floods are frequently followed by drought! Understanding the significance of water cycles and armed with appropriate low technology tools, it is possible to reduce flooding and water run off, restore springs and streams, raise water tables and create favourable conditions for crops to resist drought for longer.

- **Energy cycle.** Energy from sunlight is trapped by plants through the process of photosynthesis. This is basic to life on earth. Yet increasingly, large tracts of land are devoid of vegetation either permanently or seasonally. The net result is a reduction in the flow of energy, a reduction in the total potential biomass and diversity and hence a decline in the environments ability to support life.

Despite the importance of the environment few ADPs seem to be equipped to understand, repair or harness environmental processes. If that sounds unfair, test for yourself how well your ADP scores in answering the following questions:

- Has an assessment of the state of the Environment been made?
- Does the ADP have a list of indigenous species of plants, animals, birds, fish, amphibians and insects and their status (common, threatened or endangered)?
- Do ADP staff know about the role of these species in contributing to sustainability?
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- Has the ADP done an inventory of the status of key environmental processes which are essential for life on earth – the water, mineral and energy cycles?
- Does the ADP have a tool kit for rapid, cheap, replicable environmental repairs?

If you could only answer two or three questions in the affirmative, judge for your self how important the environment figures in your ADPs programming for sustainability. Without this sort of information on the environment, how can we know where to start when it comes to building sustainable livelihoods or attaining food security?

To a large degree, within WV the environment has been the cornerstone of development that the builder rejected. However, awareness of the importance of the environment is growing and there are increasing numbers of projects which enhance environmental sustainability by working with nature instead of against it. These include projects incorporating principles of Permaculture, organic farming, conservation farming, agro forestry, reforestation, forest protection, protection of biodiversity, eco tourism, recycling, bio fuels and marine environment restoration.

I find it ironic that projects properly designed to enhance the environment utilize local resources, rely on communities taking responsibility, are sustainable, low cost, do not create dependence, have few negative impacts and are easily replicated without ongoing external input by ADPs. Ironical because these are all features which WV aspires to incorporate in its programming, and yet so often has failed to do for it has overlooked the environment.

The following testimonies speak for themselves of the powerful impact environmental sustainability can have on ADP sustainability.

Malatin André a farmer from Chad who adopted agro forestry practice says: “Thanks to the new technique our life has changed. Food production has doubled and many people, who were laughing at us, have also adopted the techniques for soil regeneration. As a result, there is always good production, the soil is protected from erosion and heat and women can still get fire wood. We have been using the same plot for more than 30 years and without such natural fertilizing possibility, we would soon stop getting food from it”.

Khadidja Gangan, a 35 year old Chadian mother of six says: “This year is very exceptional for me because I have been able to get enough sorghum. I cultivated one hectare and harvested 15 bags of sorghum. Generally, I could get three to five bags when working this land in the past. This would have been impossible if I was not taught the new technique of land management”.

Niger Republic experienced its worst famine in 20 years in 2005. Eric Toumieux, WVSenegal National Director, visiting at the time later wrote: “I was absolutely amazed by what I saw. In an arid environment with threats of desertification, sand encroachment and dust storms 36 villages have set in place a mechanism to encourage natural regeneration of trees on their fields. The results are astounding: each farmer now leaves an average of 100-200 trees on his field instead of chopping them down. This year, when a deadly combination of locusts and drought struck, farmers in the villages overcame the tragedy by selling firewood and non wood tree products. As a result, there is no need for any food distribution in this community unlike what is happening elsewhere in Niger”. What makes this report doubly amazing is that in 1984 desertification was so severe that the population was on the verge of mass exodus.

WV Ethiopia boasts numerous projects where dust bowls are being transformed into productive land. Since 1984 millions of trees have been planted and kilometres of contour banks and check dams
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constructed resulting in the restoration of biological processes. Water tables and springs have been recharged and irrigation is now possible. The trees provide food, timber and fuel for humans, fodder for livestock and nectar for a thriving honey bee industry.

In Makuyu ADP, Kenya, communities had been on government food assistance for over ten consecutive years. After adopting organic farming methods, one farmer reported “we lived like refugees in our own land. Even if we needed an onion, we had to buy it in the market. Now we grow everything ourselves.” Maize yields have typically increased four fold. The biggest difference in yields recorded (between organically grown crops and those grown under traditional methods) was nine fold. Organically grown crops even out yielded those grown with chemical fertilizers by 60 – 70%. Farmers have moved from a food deficit situation to one of surplus and they have diversified their farming operations. Soils once considered useless for farming are now fetching premium prices as farmers have learnt how to bring them into productivity using organic methods.

If WV really is a learning organization why aren’t our ADP staff falling over each other to see these successful examples of ADP sustainable development?

WV has been promoting sustainable development in its ADPs for close to two decades and yet sadly in many ADPs we are no closer to attaining food security than we were at inception. We are too often stuck in a rut, so busy running from disaster to disaster that we have overlooked the basics.

In the first chapter of the book of Genesis there are many “God Said’s” and “it was so’s”. For example, “God said let there be light, and it was so” (Genesis 1: 3). Is it not of enormous significance that when it came to the garden of Eden, Genesis 2:8 records that God ‘planted’ a garden? God who created the universe through the word of his mouth, did not speak the garden of Eden into being. He did not even send Adam and Eve to plant it. He, as it were, rolled up his sleeves, got down on his hands and knees, and planted it himself! It was that important to Him.

If we were to roll up our sleeves more, spend more time on our knees, getting close to the earth and to God, observing, listening and seeing what God did in the garden, perhaps we would have greater understanding of the incredible gift he has given us. Perhaps we would better realize how utterly dependant we are on God and on the incredible creation that he put us in. And perhaps we would learn how to live in harmony, that is sustainably with this beautiful and bountiful world that he has put in our care. Next time you are in an ADP, spare a thought for that bird, that tree or that insect that you see. Take the time to find out what its significance is for the sustainability of what WV will spend 15 years working on and investing upward of $ 7,500,000 in. It may change your whole approach to ADP programming. It may even mean the difference between success and failure.