

# CARBON OFFSETS THROUGH CONSERVATION AGRICULTURE

*Financial incentives to improve food security and address climate change*



Food insecurity and poverty are persistent problems for many households in Zambia, and can lead rural households to rely heavily on their natural resources to survive. Pressure on arable land is increasing and soils are gradually being degraded by unsustainable farming practices and reduced fallow periods. These trends lead farmers to clear forests to make way for new (temporarily) fertile agricultural land and hunt wildlife for additional protein or to barter for staples such as maize. Zambia is not alone in being burdened by these issues, but they are proving to be particularly damaging here, and could become more widespread as a changing climate makes rainfall and seasonal temperatures more variable.

Climate change is one of the greatest challenges facing the world right now, and is likely to become ever more so in the coming decades. And rightly so: [The Stern Review characterized climate change as “the greatest and widest-ranging market failure ever seen”<sup>1</sup>](#). To address this failing, efforts to mitigate the impacts of climate change cannot be piecemeal – they must involve all sectors and all participants, and not only reduce harmful greenhouse gas (GHG) emissions but also remove them from the atmosphere (sequestration).

Farmers, as the largest group of natural resource managers in the world, can have significant collective impact on GHG concentrations in the atmosphere. And this need not be a burden; one of the most effective means of carbon sequestration available – trees – can also lift smallholder farmers out of food insecurity and enhance incomes. In a practice known as agroforestry, intercropping with nitrogen-fixing trees can significantly improve food crop yields, and in doing so shift land manage-

<sup>1</sup> Nicholas Stern: The Economics of Climate Change, 2006.

ment strategies away from slash and burn agriculture. Between this reduced pressure to clear new land, which leads to GHG emissions from deforestation and degradation of nearby forests (REDD), and the GHG sequestration in the trees themselves, tree intercropping can also be an effective tool in fighting climate change.

Although many species show promise in agroforestry, *Faidherbia albida*, an indigenous acacia-like tree widespread across Africa, is particularly beneficial in two ways. **At the recommended planting density of 100 trees per hectare, mature *Faidherbia* trees supply the equivalent of 300kg of complete fertiliser and 250kg of lime, which result in an estimated 250-400% yield increase in maize under the tree canopy<sup>2</sup>.** In addition, *Faidherbia* display the unusual trait of reverse phenology. This means that they leaf up in the dry season and defoliate in the rains, the reverse of the common growth pattern, thus reducing competition for sunlight with rain-fed crops (such as maize) which are grown underneath the trees so as to benefit directly from improved soil fertility.

Growing trees is a long-term investment – trees require additional labor inputs for their establishment and maintenance, and it can take several years to see benefits to crop yields. This delayed return on investment has been a major challenge in promoting the adoption of agroforestry. However, if this gap could be bridged, it would benefit both smallholder farmers through increased food security and resilience to climate change, and also the global community through climate change mitigation from GHG sequestration.

Carbon markets have the potential to build such a bridge. Climate change has made GHG emission sequestration into a valuable asset, one that farmers can create with the resources already available to them – land and labor, along with seeds. Farmers could then realize the financial value of these carbon assets through carbon markets, providing them returns to cover their initial investment. But land-based emission offsets in both compliance and voluntary carbon markets are burdened with complex rules and require ongoing monitoring, reporting and verification, incurring transaction costs that are prohibitive for individual smallholder farmers.

The Africa Carbon Credit Exchange (ACCE) has the unique combination of technical expertise and financial experience to develop agroforestry-based carbon offset projects that integrate transparent and reliable financing and payment mechanisms. ACCE will partner with businesses and NGOs that have broad access to smallholder farmers, and leverage their infrastructure and extension networks to ensure sufficient scale and robust implementation.

Carbon offsets based on tree intercropping represent a legitimate new financial asset for smallholder farmers, and one that increases yields – which means enhanced food security and reduced pressure on Zambia's precious natural resources.

#### Earning carbon credits for smallholder farmers in Zambia

ACCE is working to develop carbon offset projects for organisations that have well-established farmer extension networks. Our services include:

- ❖ GHG sequestration using Agricultural Land Management practices, in collaboration with leading academic institutions worldwide and in Zambia
- ❖ Estimation of carbon revenue per hectare
- ❖ Marketing and sale of agricultural land management based credits

<sup>2</sup>Conservation Farming Unit (Zambia), 2007.