

The world over, but particularly in Africa, Asia and Latin America, farmers cope with the vagaries of climate variability and weather extremes by diversifying their management practices and through financial, social and institutional safety nets. Their first and primary concern are food and nutritional security followed by considerations about longer-term returns on investment and the long-term provisioning character of their land. In most cases they have developed a strong connectedness with and caring for their land. Mitigation of climate change is generally not on their agenda.

Yet, responses to climate variability and change and other drivers of change may lead to shifts in management practices that can have beneficial effects on the climate system if they are considered from the outset, and if the costs of investing in systems that are at the same time more adapted to climate risks and remove GHGs from the atmosphere can be borne. For farmers to consider investing in practices that can be considered climate-smart, they require technical support, an enabling environment and appropriate supply chains.

The following cases may exemplify how carefully planned investments can have both development outcomes and contribute to the mitigation of climate change:

First. The East Africa Dairy Development (EADD) program works to build a robust dairy industry in a region where demand for fresh milk is close to outstripping supply. But livestock is among the highest contributors of greenhouse gas emissions caused by human activity. Producing milk with fewer emissions per liter could play a big part in mitigating climate change. The World Agroforestry Centre (ICRAF) and the International Livestock Research Institute (ILRI), partners in EADD, are helping Heifer International reach 179 000 farming families. Together they have increased the total earnings of these families by USD 131 million.

To boost productivity while generating fewer emissions per liter of milk, ILRI scientists studied feeds for cows that would lower their greenhouse gas emissions. Meanwhile researchers from ICRAF, supported by FAO estimated greenhouse gas emissions and productivity in dairy systems at an EADD site. Evidence is mounting that by developing fodder banks, improving pasture species, planting feed legumes, feeding animals with crop by-products and managing with manure in environmentally-friendly ways, farmers can both contribute to reducing greenhouse gas emissions and improve their incomes.

Second. The Mekong Delta produces about half of Vietnam's annual rice harvest. In the coastal area of Bac Lieu, climate change is affecting farming in several ways: dry seasons are becoming longer, there are more dry spells during rainy seasons and the problem of saline water intruding into fields is getting worse. These trends mean that there is less water available for irrigation than before.

Thanks to collaboration between the International Rice Research Institute (IRRI) and national and international development and research partners in the region, and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) over a thousand rice farmers are now successfully using a water-saving technique known as alternate wetting and drying

(AWD).

Farmers practicing AWD were able to cut the frequency of irrigation by two-thirds compared to farmers not practicing AWD. They also used 30% less water, and needed to apply less fertilizer and insecticides. Altogether, they made substantial cost savings while at the same time obtaining higher yields. In addition, by saving water AWD also significantly reduces the emission of methane, thereby contributing to the mitigation of climate change, but further research is required to identify by how much AWD increases the emission of nitrous oxide.

Third. In southern Niger Farmer Managed Natural Regeneration (FMNR) has led to a re-greening of 5 million ha of nearly barren bush savanna over the past two decades. While farmers were previously removing germinating trees because they had no user rights, change in national governance and legislation allowed them to selectively nurture saplings. This practice has not only increased farmer income by 18-24%, it has also contributed to the reduction of greenhouse gas emissions by sequestering carbon in the tree biomass.

These three examples may highlight the potential for greenhouse gas mitigation in different smallholder agricultural systems. Many more opportunities exist provided there are clear development benefits. National and international policies can support the introduction of these climate-smart agriculture practices by providing appropriate legal frameworks and funding. In this way food and nutritional security targets can contribute to the mitigation of climate change without negatively affecting development outcomes.