Geophysical Research Abstracts
Vol. 19, EGU2017-5724, 2017
EGU General Assembly 2017

Forest gardening on abandoned terraces links local biomass carbon accumulation to international carbon markets, reverses land degradation, improves food diversity, and increases farmer income

Hans-Peter Schmidt (1), Bishnu Hari Pandit (2), and Claudia Kammann (3)

(1) Ithaka Institute for Carbon Strategies, Ancienne Eglise 9, 1974 Arbaz, Switzerland, (2) Ithaka Institute for Climate Farming, Ratanpur, Tanahu, Nepal, (3) WG Climate Change Research for Special Crops, Department of Soil Science and Plant Nutrition, Hochschule Geisenheim University, Von-Lade-Str. 1, 65366 Geisenheim, Germany

Despite chronic underproduction of food in Nepal, more and more agricultural land is abandoned especially in the remote middle hills and mountains. Male and young workers leave the villages for higher wages in the bigger cities or abroad. By now, most villages are mainly populated by women, children and elderly persons maintaining the gardens and fields close to the houses and leave the centenarian terraces fallow. Erosion, vanishing water resources, losses of soil organic carbon and the weakening of the local agro-economy become increasingly problematic.
During the rainy season of 2015/16, 86 farmer families from four villages replanted their abandoned terraces with 25,000 mixed trees, mostly Cinnamon, Moringa, Mulberry, Lemon, Michelia, Paulownia, and various nuts. All trees were planted with a blend of organic biochar-based fertilizer and compost, since it was convincingly demonstrated by more than 20 field trials in this region that this was the most plant-growth promoting method. Mulching of the trees with rice straw or thatch grass was generalized. To let the young tries pass the critical seven months of dry season, water retention ponds with pipe irrigation were installed. Farmers were organized in groups of three families to mutually help and control the tree maintenance which led to an average tree survival rate of more than 80% after the first year compared to less than 50% in many country-wide forestation projects since the 1980s. Between the lower and upper lines of trees on the terraces, ginger, turmeric, black beans, onions, lentils and other secondary crops were cultivated using the same organic biochar based fertilizer and mulching techniques.

What may seem a reasonable approach for many places, is in many of the poorest countries simply not possible to realize because village families do often not have the necessary initial investment for saplings and irrigation facilities at their disposal. Therefore, the Ithaka Institute linked the forest garden project to a carbon capture financing system. All planted trees are GIS inventoried and their yearly biomass carbon up-take is calculated on the base of the average ten-year carbon accumulation. The 25,000 mixed trees accumulate the equivalent of 350 t CO_2 per year. At 35 US$ per t of CO_2eq paid in advance by the international community in form of private carbon compensation subscriptions, all costs for the set-up of the forest gardens, their maintenance for three years plus a yearly prime could be paid. After this initial period of three years, the income from tree crops (fruits, nuts, medicine, essential oil, silk, perfume, honey, timber, animal fodder) exceeds by far the (catalyzer) carbon credits providing average crop incomes for the 25,000 trees including secondary mixed cropping of more than 150,000 USD per year. With new processed tree crop products, better-paid jobs are created, the local economy is fostered and the “lost generation” can start to return to their home villages.

The objective of this pilot forest garden project was to establish a robust socio-agronomic system that can be multiplied from village to village, increasing soil fertility, protecting abandoned terraces from erosion, replenishing water resources, and generating stable incomes with climate-smart agriculture. The essential catalyst of the project was to link the global need to capture atmospheric carbon and to create negative emissions to slow down climate change with the local capacity to increase biomass growth and to sequester biomass carbon with new low-tech technology (biochar). The financial exchange between global CO_2-emmitting communities with local CO_2 capturing farmer communities could become a new motor to reverse land degradation, to reestablish ecosystem services, and to develop the rural socio-economy.