Improving the jhum system in Bangladesh

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The Chittagong Hill Tracts in Bangladesh differ in many respects to the rest of the country. A mountainous area, it is geographically part of the Hindu Kush-Himalaya region. Demographic and environmental conditions have changed drastically in the last decades, mainly as a result of the dam built on the Karnafuli River (which inundated more than 20 000 hectares of cultivated land) and twenty years of armed conflict that ended in 1997. These changes, together with the scarcity of suitable land, have meant that the traditional slash and burn farming system locally known as *jhum* has become unsustainable. Combined with other factors, such as forest overexploitation, it is one cause of increased land degradation, resulting in diminishing yields and decreased biodiversity.

In 2005, four institutes started the Chittagong Hill Tracts Improved Natural Resources Management project (CHARM). This project aims at building local capacities in natural resource management and planning, through the provision of improved information for decision making. It aims to contribute to the formulation of alternative strategies for sustainable management at both the field and policy levels.

Jhum farming systems in the Chittagong Hill Tracts

Temporary clearing and burning of forest vegetation for cropping is characteristic for shifting cultivation and is seen as an alternative nutrient management strategy. Clearing and burning releases the nutrients in the vegetation. After cropping, the fallow quickly recovers into secondary forest from coppices, underground rhizomes, root suckers and the soil seed bank. Tribal people in the Chittagong Hill Tracts practice *jhum* in an area for one year and keep the land fallow after that to allow it to rejuvenate. The most frequent cycle involves one year of cropping and 4 to 5 years fallow.

The main species grown in *jhum* cultivation are rice, turmeric, cucumber, chilli and ginger, although many others are also frequently intercropped. In general, farmers cultivate more than 40 species in their fields, while approximately 50 wild plant species are collected by women. In this way, farmers meet all their day-to-day demands except for salt. Many crops grown in the *jhum* system have a potential commercial value such as cereals, medicinal plants, aromatic plants, spices or condiments, and various legumes.

But most farmers acknowledge that there has been a 50 percent decline in productivity of *jhum* land over the past 10 to 12 years, even though more than half of the farmers use pesticides and fertilizers. With decreasing yields, the average 4 to 5 years fallow seems to be too short to be sustainable. Fallows of 5 years or less do not allow for sufficient vegetation growth and biomass production, while mineralisation of organic matter occurs rapidly due to the open conditions. Soil quality recovery is therefore incomplete. Not surprisingly, the *jhum* system is commonly blamed for land and forest degradation.

Photo: J.R. Olarieta

Jhum farmer planting seeds in the Chittagong Hill Tracts.

"Manipulated" fallows

The need for self-sufficiency, the difficulties that farmers have in reaching markets, the lack of infrastructure and the overall situation in the Chittagong Hill Tracts, all determine that *jhum* is likely to continue as a fundamental land use system in the region. Improving the sustainable management of the natural resources in this area must therefore consider sustainable alternatives within *jhum* farming. The use of "manipulated" or improved fallows provides a range of techniques which make better use of the ecological processes, leading to more sustainable practices. These improvements are based on farmers own knowledge and experience. Some of the improved techniques that have been observed being used by farmers in the Chittagong Hill Tracts are detailed below.

Using mulch for soil protection

Erosion, declining soil fertility, and increased emergence of weeds affect production when fallows are shortened. Zero-tillage and mulching are ways that help prevent soil degradation and excessive weed emergence. This technique is used by farmers growing ginger and taro in hilly areas of this region. Innovative farmers in the village of Sharon Para grow ginger in a zero-tillage system, planting in small holes rather than hoeing the whole field. Mulching is also widely used in the cultivation of these two crops, using old sun grass, rice straw and other lops and tops of trees as mulch. According to farmers, mulch controls weeds, minimises soil erosion and adds humus after decomposition. The use of mulch safeguards the topsoil against excessive soil temperatures and favours seed germination. It keeps the soils loose so that the rhizomes and tubers grow better, and hence enhances production. Moreover, mulching reduces weeding frequency and costs.

Managing trees for biodiversity conservation

Some farmers keep important plants like *Ficus, Derris, Albizzia* and other leguminous trees while clearing away other vegetation during the preparation of their fields. Maintaining trees in the field, in combination with cover crops, helps reduce soil erosion, and contributes to plant conservation. Leguminous plants enhance crop growth. While preparing their fields, farmers cut the trees about one-metre above ground height to coppice it.

As the stumps coppice generally at that height, the shoots remain out of reach of browsing animals. Farmers in the tribal village of Empu Para do not remove the large trees from their *jhum* field, but lop the branches for more light penetration.

Managing the coppices of some tree species
Gamar (*Gmelina arborea*) is one of the most important forest timber species in the Chittagong Hill Tracts, but is only harvested after 10-12 years. Farmers in the village of Sharon Para have their own technology for doing this, which makes better use of this tree. Trees are cut in February (before spring), 15 cm above ground level, using a handsaw. The stumps of the felled and harvested trees are kept in the field undisturbed. Profuse coppice shoots regenerate from these stumps within 15 to 30 days, reaching a height of one metre within two to three months. Farmers allow coppice shoot growth up to mid-July, maintaining the bunches of coppice shoots to decrease the speed of the wind. Shoots are thinned when wind velocities decrease (after mid-July), as this reduces the risk of breaking coppice shoots. Generally, farmers keep two or three healthy timber shoots for the first year and finally select the best coppice shoot to get a healthy coppice tree. They also reported that *gamar* grows better when coppiced in this fashion then when grown from seed. The coppice shoots produce marketable timber within six to seven years.

In general terms, an improved *jhum* can be created by selectively weeding the fields and enriching them by planting species that increase the rate of return of organic matter to the soil and have some commercial interest for the farmer (such as commercial bamboos and various leguminous shrubs). Further improvement is also possible after cropping, when fields quickly turn into secondary forests. Many farmers plant teak and other timber species as a way to claim land-use rights, even though regulations and permits make it difficult to reach the timber markets. Management during the cropping phase may also be improved, especially in terms of erosion control. Weeding is practised three times per cropping season, but the weeds are often simply disposed of. The resulting biomass can provide a good source of compost or mulch.

Knowledge exchange for innovation

Traditional knowledge in the Chittagong Hill Tracts is closely interlinked with the economy, livelihood and culture of the population. It can, in contrast to general belief, have positive effects on the conservation of local biodiversity at different levels, and can contribute to enhanced production. Farmers display considerable knowledge about their environments and how best to use their resources, but despite the improvements already seen, more can be done in working towards sustainable systems. Furthermore, traditional knowledge is currently being lost at an alarming rate due to changes in land use, population increase, interaction with people from outside, deforestation, and loss of social norms and rules.

The exchange of information between generations within farmer communities and families has been an important mechanism in the development of sustainable land management systems that are adapted to the local environment. Access to information on successful land management approaches and technologies, both indigenous or traditional and "scientific" or newly acquired knowledge, allows land managers to select viable options for specific locations. Knowledge of the experience of others in similar environments can help farmers to cope with changing conditions and try out new practices. On the basis of these ideas, CHARM aims to strengthen the capacity of local government institutions, NGOs, and other beneficiaries in planning and implementing sustainable land management. It co-operates with local institutes and expert groups, such as the professional association of soil and water conservation BANCAT (Bangladesh Conservation Approaches and Technologies).

Information access and decision support

A decision support system has been designed based on a comprehensive assessment of the information needs of various stakeholder groups. It draws on the various digital maps and databases compiled on the environment of the Chittagong Hill Tracts, and land management technologies. The system allows users to identify an area in the region and retrieve information on themes such as land cover, soil type, slope, and landform. The system can identify a broad land management class for each location and recommend suitable land management priorities, ranging between conservation and uninhibited production. More specific practices can be selected within a given environment and location. In other words, the system facilitates identifying interesting and appropriate land management options which have proven to be effective in similar situations. These are tailored to meet the priorities of the users, such as improving production or conservation. This system is currently being tested with user-groups in a pilot area. The recommendations from these pilots will be used to improve the information system before dissemination. A regional plan is being devised which will indicate priorities for conservation and alternative practices and the resulting discussion is intended to strengthen resource management practices.

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