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Agriculture for Food Security 2030
- Translating science into policy and practice

Agroforestry as a multifunctional landscaping tool in the char land area of Bangladesh

Agriculture is the single largest producing sector of the Bangladesh economy and contributes about 17% to the total Gross Domestic Product (GDP). The sector also accommodates around 45% of labor force and 65% of the population depend on farming as part of their livelihood.

On the other hand, the area of cultivable land in Bangladesh is declining by one percent every year due to establishment of rural settlements and infrastructure. In addition, Bangladesh is vulnerable to climate change as projections indicate that Bangladesh will experience erratic rainfall and severe cold periods in the coming years which will impact the growing season and therefore the agricultural sector. In light of this, it is urgent to identify underutilized land, such as char land, where agriculture production can be expanded sustainably. Strategic actions like maximization of agricultural land through alternative farming systems are needed to ensure future food security.

Char land – an increasing source of agricultural land

It has been estimated that 10% of the Bangladeshi population live on the char lands and that they cover 6% of the total land area of the country. Bangladesh is a country affected by floods. Regular flooding during monsoon season is a common phenomenon and the flooded lands in Bangladesh are gradually increasing. Extensive char areas have been created along the bed or basin of the Jamuna, Padma,

Key messages

- Bangladesh needs to cultivate currently underutilized land to address the decline of cultivable land and food shortages. Char lands expand every year and contribute an increasing land source in Bangladesh
- However, char lands are generally less productive than traditional crop lands and farmers have limited access to knowledge, agroforestry advisory or extension services and connection to markets
- Introducing climate resilient agroforestry systems in char land areas can provide a good opportunity for marginalized farmers to grow more food, fuel and timber
- River erosion is the most serious problem in char land areas. For sustainable char land agroforestry practices, a hydrological framework to protect the settled fixed char land is needed.
- Agroforestry in char land areas need to be more clearly recognized by local and national governments to strengthen their role as important providers of agroforestry products and services.
- There has been limited research on char land agroforestry. Thus, there is a great need to invest in research on different aspects of char land agroforestry practices.

Meghna, Brahmaputra and Tista rivers and these char landscapes are of great value for its exceptional hydro-geological setting. It is estimated that the char land areas of Bangladesh will continue to expand every year as silt is deposited on riverbeds.

What is char land?

During the flooding period, suspended sediment loads contribute to the creation of char land areas. Char land refers to soil and stone deposits in a river course or estuary, and includes both lateral (point-bars) and medial (braid-bars) types. In the dynamics of erosion and accretion in the rivers of Bangladesh, the sand bars emerging as islands within the river channel (island chars) or as attached land to the riverbanks (attached chars), often create new opportunities to establish settlements and pursue agricultural activities. A distinction should be made between island chars, which are surrounded by water year-round and attached chars, which are connected to the mainland under normal flow.

What problems are faced by char land dwellers?

Char lands are, however, less productive than adjacent mainland areas. The major reasons for this are less favorable soil conditions in some of the charland areas and uncertainties caused by erosion and frequent floods. As a result of the lower productivity, poverty incidence in char lands is higher than the national average. In addition, the geographic isolation of the char lands results in limited infrastructure, poor access to markets and services, and high transaction costs for the char dwellers. These conditions hinder public and private service providers from delivering services to people in the char land areas, leading to fewer livelihood opportunities and even lower net revenue for the agricultural production. Moreover, free cattle grazing in char land areas damage newly planted trees and other crops.

Typical char land homestead with agroforestry.

Increasing the livelihood for charland farmers: A case study from the Tista river basin area

In the past years, the Tista river has been running dry annually during the pre- and post- monsoon seasons, causing water scarcity in the char regions and restricts the livelihood options available to its inhabitants. Due to the unavailability of river-dependent livelihood options such as fishing and boating, agriculture has emerged as a major means of earning and living. About ten years ago, most char land inhabitants cultivated pumpkin on the sandy and loamy soil of their chars, however with low returns. To increase their livelihoods, char farmers in the area have recently switched to cultivating maize, peanut, onion, chili and potato crops that offer better profit margins. However, by using modest inputs and better agronomic practices, many of the char land farms have the potential to produce three to four times as much compared to their current practices. This has resulted in char land farmers adopting new farming systems and practices, such as agroforestry, which has a great impact in terms of increasing total biomass production, crop yield, improved environment and better livelihood of char farmers.

Agroforestry - an opportunity to sustainably improve livelihoods of char land dwellers

The inclusion of trees in agricultural systems, i.e. agroforestry, can optimize nutrient cycling and have positive effects on soil chemical and physical properties. This process is especially important in tropical soils like those of char lands in Bangladesh, where a high degree of weathering has created deep, leached soils that are poor in plant nutrients. Agroforestry can provide a sound ecological basis for increased crop and animal productivity, more dependable economic returns, and greater diversity for social benefits, which has been verified by several studies of Bangladesh agriculture. Using char land as proposed here is multifunctional since the aim is to manage the land for crop production and at the same time reduce land erosion and impacts of floods.

Indeed, researchers have found that in areas where there is a shortage of wood, and where crop yield are less than 35% of potential production, agroforestry have proven highly beneficial in sustaining crop productivity as well as providing tree products simultaneously. The researchers state that agroforestry can improve productivity in several ways, for example by increasing soil organic matter, infiltration and water storage; improving soil physical properties and biological activity; enhancing nutrient supplies through nitrogen fixation, reduced leaching and soil erosion. This implies that agroforestry could be a potential solution to increasing the livelihood of char land farmers at the same time managing char land areas in a sustainable manner to contribute to increased food production and security in Bangladesh.

The need for a policy network to support agroforestry on char lands

Until now, agroforestry programmes have only focused on mainland areas in Bangladesh, meaning that specific development progammes and policies

Road and bridge networks needs to be updated in the char land areas.

Lack of roads is the main barrier in the char land area for marketing the agri-product.

to support char land agroforestry practices are not yet available. There is a great opportunity to introduce both improved homestead and cropland agroforestry production systems in char land areas. Such introduction would offer sustainable and climate resilient land use systems that also have the potential to improve the livelihood for char land dwellers. Therefore, innovative policies and development plans related to multiscale landscaping through agroforestry incorporation in char land areas should be prioritized.

Ways forward

- Local and national governments need to create effective policies that encourage collaboration with char land farmers to ensure they are rewarded for their investment in agroforestry systems and sustainable land management.
- The knowledge about agroforestry practices for char land areas must improve amongst government extension workers. In case of tree species selection, leguminous nitrogen fixing trees should be preferred.
- Knowledge sharing and exchange between farmers, extension officers, authorities and researchers about char land agroforestry should be facilitated.
- Farmers practicing agroforestry could also engage in local agroforestry groups to develop guidelines and provide a platform for knowledge sharing and generation regarding agroforestry practices in which NGOs could also support farmers to increase their productivity.
- There is need to upgrade the road and bridge networks in char land areas, and policies to support such development are required
- Relevant government agencies should develop appropriate policies regarding the issue of free grazing cattle. They should also provide training and resources to assist char farmers to build fences to protect their land from livestock.
- Hydro-engineering embankments or dams could be constructed to reduce the char and erosion and settlement displacement. Nonstructural options like live stakes, riparian buffer, stones, boards or concrete blocks should be included as alternative solutions for erosion control.
- Bangladesh Agricultural Research Council (BARC) should develop a research priority on char land agroforestry. Other national agricultural research institutes like Bangladesh Agricultural Research Institute (BARI), Bangladesh Rice Research Institute (BRRI), Bangladesh Forest Research Institute (BFRI), Bangladesh Nuclear Agricultural Research Institute (BINA) should integrate char land agroforestry research and policy development into their holistic institutional agendas.

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