

# Assam's Agro-Climatic Realities: Problems, Solutions, and Policy Imperatives

Assam occupies a unique position, being the "Gateway to the Northeast," as it is endowed with a varied topography comprising fertile plains, river valleys, and hills, along with detached river islands formed by the mighty Brahmaputra. More than 75% of its population depends on agriculture for their livelihood; however, farmers are frequently confronted with adversities such as recurrent floods, scant rainfall, small plots of land, and poor irrigation conditions.

The state is divided into six agro-ecological zones: North Bank Plains, Upper Brahmaputra Valley, Central Brahmaputra Valley, Lower Brahmaputra Valley, Barak Valley, and Hill Zone<sup>2</sup>, which face different farm-related challenges. The flood-prone area of the country as a whole stand at approximately 10.2 % of the total area of the country, but the flood-prone area of Assam is 39.58 % of the area of the state. <sup>3</sup>This causes losses, hardships, and erosion, although farmer-support services have not yet been developed.



## Agroforestry Experiences from Hailakandi District

One such example of climate-resilient agriculture in Assam is the agroforestry project in Hailakandi district, which falls under the Aspirational Districts Programme of the Government of India. Hailakandi is a flood-prone area in the Barak Valley, where floods, waterlogging, and depletion of soil fertility are common occurrences. This is particularly true for small and marginal farmers, who practice monocropping paddy cultivation. Traditionally, farmers have considered trees as competitors rather than as an asset, leading to a limited adoption of tree-based farming systems, although the area is suitable for growing bamboo, arecanut, fruit trees, and other local multipurpose species. In the ADP, agroforestry schemes encouraged bamboo-based systems intercropped with turmeric,

ginger, and vegetables seasonally on bunds and homesteads. Growing bamboo helped to check soil erosion during floods and ensured a regular source of income from pole and shoot sales. Intercropping arecanut, bananas, and vegetables increased land use efficiency and minimized crop damage due to unpredictable rainfall patterns. Coordination between the district agriculture, forest, and rural development departments ensured the distribution of planting materials, training, and assistance for market access, thus overcoming institutional constraints.



This is an example of how agroforestry can turn climate change challenges into ecological resilience. The district-specific agroforestry systems help to meet the climate adaptation needs of Assam by decreasing dependence on forests, increasing carbon sequestration, and ensuring stable agricultural production in flood-susceptible regions.

These can be solved if the issue is addressed comprehensively, incorporating farming methods as well as governmental measures suitable for flood scenarios in Assam. It is necessary to encourage the cultivation of flood tolerant crops that can resist flooding or thrive under low-flood conditions. Floodwaters also offer great potential for fish stocks and reed production, helping to diversify livelihoods. There is also a need to ensure the provision of climate-smart information on crops from the perspective of flooding scenarios, as water shortages due to erratic monsoons further exacerbate the problem. In 2025, as many as 25 districts received far below-average rainfall during the kharif season, which affected the paddy crop<sup>4</sup>, and there is a need to promote water-saving practices such as direct-seeded rice, system of rice intensification, and decentralized irrigation using rainwater harvesting ponds and check dams. Government funding for irrigation infrastructure and weather monitoring systems will help farmers make better decisions.

Small-scale farms, averaging 1.1 to 1.3 hectares of land<sup>5</sup>, with only 5% of the area irrigated, heavily constrain mechanization and market access, leading to low incomes and higher vulnerability. FPOs pool

resources to access machinery, inputs, and market opportunities to improve their income. Community-managed irrigation systems improve water availability. Supporting policies in shared resources and developing collective infrastructure will contribute significantly to farm resilience and profitability.



Poor market linkage and post-harvest losses reduce farmers' incomes. Although Assam has recently procured more than 8,02,560 metric tons of paddy at remunerative prices<sup>6</sup>, challenges such as poor storage, fragile supply chains, and price variability continue to persist. Village-level storage can reduce waste and improve farmers' bargaining strength. Marketing cooperatives need to be strengthened, and processing clusters should be developed through public-private participation to improve market access and value addition. Buffer stocking at the district level can stabilize prices and help farmers during lean seasons.

The crop diversity of Assam extends beyond paddy to special rice varieties like Assam Joha rice and special products like Karbi Anglong ginger and Tezpur lychee that reflect Assam's rich cultural heritage. Moreover, crop diversity is hindered by limited access to available technologies, markets, and institutional support facilities. An increased sense of access to these facilities is important for encouraging crop diversification. Natural farming techniques and market-driven crop diversity training programs should be conducted in local languages to help rice growers.

Policies can enable youth in districts and women in rural areas to develop the traits of an "Agripreneur" through the provision of credits and support. Finally, the geographical identities of Assam-specific products can be developed and promoted at the national and global levels.

The specific agroforestry models promoted under the ADP included bamboo based systems with turmeric, ginger, and vegetable crops on raised bunds and homesteads. Bamboo cultivation helped reduce flooding caused by soil erosion. The cultivation of bamboo also established an income stream for bamboo shoots and poles. Cultivating arecanuts with banana and vegetable crops increases land-use productivity and reduces crop loss due to

erratic rains. The coordination of district departments of agriculture, forestry, and rural development resolved the issue of silos.

This exemplifies how agroforestry can help mitigate climatic challenges and create ecological resilience. Differing agroforestry models for diverse districts work towards Assam's objectives concerning adaptation to the climate by reducing the use of the forest, generating more employment, capturing more carbon, and making farming more secure during floods.

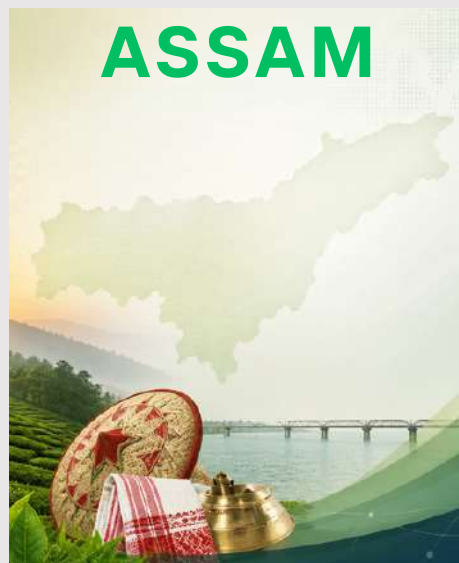
Krishi Vigyan Kendras (KVKs) in Assam are an important agency at the state level to implement agroforestry policies at the grassroots level. In every district, KVKs connect scientific research to farmers by promoting optimal mixes of trees and crops suited to various zones in Assam.

On-farm trials, frontline demonstrations, farmer training on bamboo-based systems, fruit tree intercropping, boundary plantations, and homestead agroforestry are some of the activities undertaken by KVKs.

KVKs promote the cultivation of climate-resilient species such as bamboo, jackfruit, and banana, alongside native timber. This helps farmers adapt to flood and waterlogging conditions. KVKs create

awareness, diversify crops, and help farmers view trees as assets through successful local models. Integrating agroforestry advisory services with weather alerts, soil health cards, and market intelligence strengthens climate-smart agriculture.

A network of institutions supports this decentralized effort. Assam Agricultural University (AAU) in Jorhat leads



in developing region-specific agroforestry models, training extension workers, and offering policy advice to farmers. ICAR institutes contribute expertise in agronomy, horticulture, and natural resource management, whereas the Rain Forest Research Institute (RFRI) focuses on bamboo, timber, and non-timber forest products essential to Assam's agroforestry potential. Collaboration among the State Agriculture Department, Forest Department, KVKs, and FPOs ensures access to quality

planting materials, technical support, and market connections, especially in vulnerable districts.

The Policies on agroforestry support agricultural development with ecological sustainability through agroforestry, which leads to reduced climatic risk at a low environmental cost: good soils, good biodiversity, and good livelihoods off rice paddies. Thus, agroforestry policies will support Assam's overall vision for a more resilient climate, healthy soils, and employment through riverbank stabilization, water retention, and ease of pressure off forests through timber and fuelwood farming. To make sure that there is sustainability for the upcoming generations of the people of Assam so that the people of Assam may come out successful from the clutches of natural calamities such as floods, droughts, and fragmented land so that there exists equilibrium between nature and people, the integrated approach to reforming the climate scenario of Assam, the marketing system of Assam, and the institutions to be followed by the people of Assam have to be applied.