Administering agroforestry at the district level

Ayyandar Arunachalam, S. Suresh Ramanan and A. K. Handa

India is the first country to have adopted a national level policy on agroforestry in 2014. Now other countries like Nepal and Mexico are following a similar approach[1,2]. It is needless to highlight the positive aspects of agroforestry in terms of biodiversity conservation, carbon sequestration, soil and water conservation, nutrient recycling and importantly, as a tool against climate change adaptation and mitigation while also ensuring food and nutritional security. According to the India State of Forest Report (2013)[3], 11.15 hectare (m ha) of land is under agroforestry, while ICAR-Central Agroforestry Research Institute (CAFRI), Jhansi reported 13.75 m ha in 2013 (ref. 3). The estimate on agroforestry area by the Forest Survey of India (FSI), Dehradun did not take into account allied agroforestry practices such as block plantations. Moreover, its estimates were based on 14 physiographic zones of India whereas estimates of the CAFRI were for 15 agro-climatic zones of the country. CAFRI further recorded 23.37 m ha in 2019 and 26.33 m ha at present[4]. Meanwhile, another study showed that about 11.5–25.3 m ha area is suitable for agroforestry in India[5].

The trees outside forests (TOFs) are the only possible way to increase green cover to the national desired level of 33% and is pre-empted as the sustainable way to meet our growing wood demands, keeping in view the continuing ban on unregulated felling in natural forests by the Supreme Court of India[6]. Agroforestry accounts for a predominant share in the TOFs area. For instance, in a state like Haryana that has the thinnest forest cover in the country, recorded farm forestry share on total growing stock of trees to be around 41% (ref. 7). A recent report by the Centre for Science and Environment, New Delhi states 'TOFs provide the meat of India's timber needs, and agroforestry and farm forestry are the backbones of TOFs'. The report recorded 44.34 million m^3 of wood for the year 2011 as available from the TOFs in India[8]. All these invariably led to the constitution of an Expert Committee under the Ministry of Environment, Forest and Climate Change, Government of India (GoI) in 2018, to formulate a strategy for increasing the green cover/tree cover outside recorded forest areas, i.e. TOFs. The Committee explicitly recorded that agroforestry is the most viable solution to promote tree cover outside the forest[9].

Recognizing the importance of agroforestry as a viable venture, policymakers are now encouraging its adoption, which is a subject matter dealt by the Ministry of Agriculture and Farmers Welfare, GoI. A dedicated Sub-mission on Agroforestry under the National Mission on Sustainable Agriculture (NMSA) is being implemented to encourage adoption of agroforestry in all states of the Indian Union. Broadly, the sub-mission promotes: (i) nursery development for quality planting material, (ii) peripheral and boundary plantations, (iii) low density plantation on farmlands, (iv) high density block plantation, and (v) demonstration of agroforestry models by enabling capacity building and training programmes for the stakeholders. Several other national programmes, including the National Bamboo Mission, National Mission for Green India, National Horticulture Mission, Van Dhan Vikas Yojana, etc. also promote tree farming.

CAFRI through its All-India Coordinated Project on Agroforestry has identified promising agroforestry trees species[10] and developed scalable agroforestry models suited to different agro-ecological regions of the country[11]. So prescribing suitable agroforestry tree species or systems needs to commensurate with the climate analogue maps. However, with 'districts' being the administrative units at present, we need to migrate to this unit in the lines of Agricultural Credit Plan, District Agricultural Plan and Agricultural Contingency Plans.

Ecologically, the districts are bound to have intra-district variability in edaphic and microclimatic conditions. So, recommending suitable agroforestry tree species or systems needs to be analogued appropriately. Nonetheless, to upscale agroforestry we need to identify potential land without compromising food security at the district level. This calls for bringing available wasteland in the ambit of tree-based ecosystem. Here comes the acid test for agroforestry to identify the right species that befit the degraded ecology in the wastelands, and enable further reclamation and restoration for sustainability. Our experience of working with different levels of degradation suggests that vegetation degradation, salinity and waterlogging are the significant contributors (3.38–100%) in different states of India[12]. In all, agroforestry emerges as an eco-friendly option for the reclamation and/or restoration of degraded lands.

In accordance with the National Agroforestry Policy, the country calls for the best agroforestry systems and trees at the district level for different degraded ecologies by exploiting potential multi-purpose tree species as a base for provisioning goods as well as ecosystem services, thus ensuring both livelihood and environmental security. Meanwhile, we need to emphatically identify appropriate agroforestry trees or systems also based on the market prospects, by enabling storage, certification and inter-state movement of the agroforestry produce. These will assure the overall quality and pricing. In this regard, CAFRI's experience with the Consortium of Industrial Agroforestry (CIAF) developed by the Tamil Nadu Agricultural University, Coimbatore through ICAR's National Agricultural Innovation Project[13] has proven to be successful in bringing farmers, tree growers, industries, financial institutions and research institutions together as a value-chain model in agroforestry[14]. So far, assured buy-back or provision by the dependent wood industries has given popularity for upscaling agroforestry in a region. This mechanism has led to the development of production clusters at the village level.

Designing and developing agroforestry systems, i.e. tree–crop combination at a smaller scale at the district or farm level must be done diligently. This is because the constraints like market availability, farmer's perception and lack of awareness about agroforestry play a major role in challenging the upscaling of agroforestry at the district level. In this regard, a blanket approach of recommending a few trees species for an entire state may not be viable. Also, it would be pragmatic only if the recommendations are at the district level at the least. In this regard, CAFRI has recommended agroforestry trees based on the performance evaluation of multipurpose tree species in selected

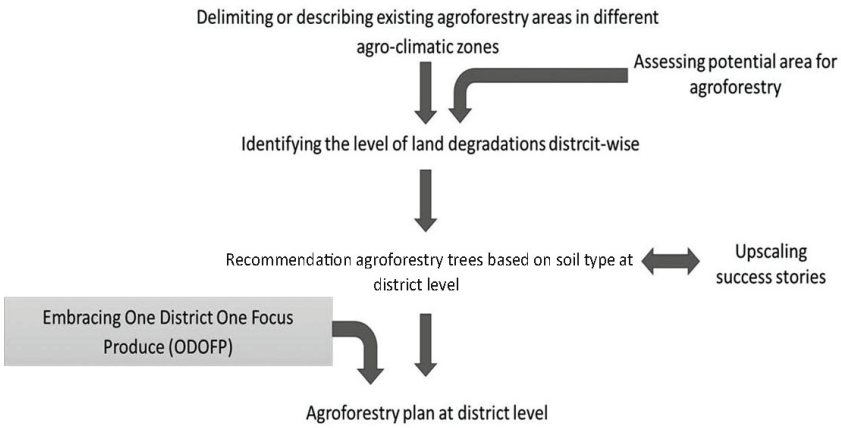

Figure 1. Strategy framework to upscale agroforestry at district level.

districts of different agro-climatic zones across the country[15]. Likewise, identification of promising tree species for different degraded ecologies could be another approach. The third approach could be assessing potential land area for agroforestry and analogue its prospective species by also considering the climate, soil and other parameters at local level[16]. Recently, GoI has come up with the idea of one district one focus produce (ODOFP). It aims at cluster-based production for increasing farmers' income. The selected produce includes cereal crops, fruit trees, vegetables, fish, milk and dairy products, and even minor forest products, including bamboo. Thus, 728 districts of India have some agricultural produce and a few districts in the country are known for certain specific agricultural produce. For example, Lucknow is known for mango and Nagpur for Mandarin, orange, which are otherwise potential agroforestry species. There are more than 200 produce from the list of perennial crops in the ODOFP initiative. Thus, it will be prudent to align model agroforestry recommendation with this market orientation. Figure 1 shows the strategic framework to upscale agroforestry at district level.

This agroforestry planning exercise would require multiple datasets with spatial and temporal variations to estimate agroforestry trees species/system for a given district. Nevertheless, the choice of the farmers in a given socio-economic setting would finally decide the agroforestry roadmap of the country.

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Ayyandar Arunachalam, S. Suresh Ramanan and A. K. Handa are in the ICAR-Central Agroforestry Research Institute, Jhansi 284 003, India.*
**e-mail: a.arunachalam@icar.gov.in*