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Agroforestry contribution to the improvement of rural community livelihoods in India

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Abstracts

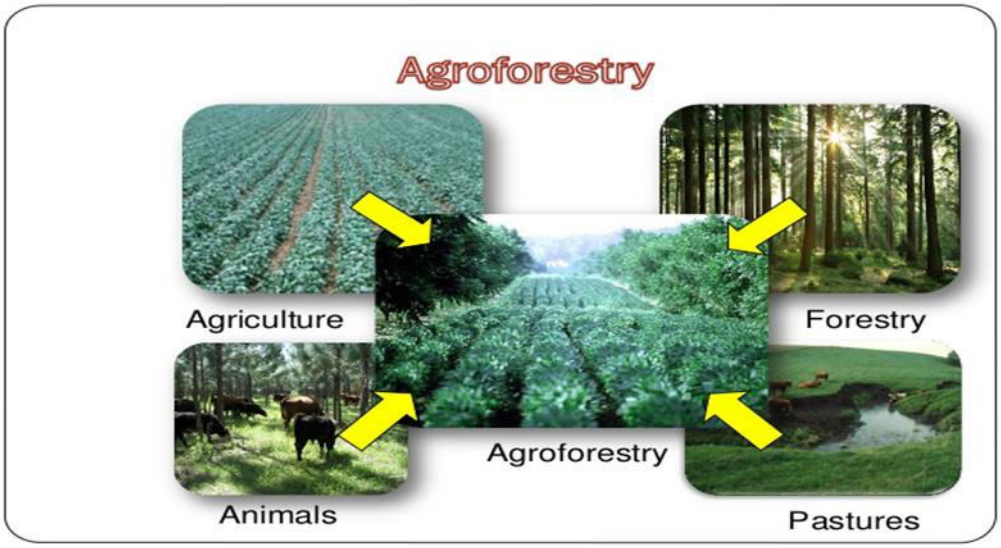
Agroforestry, as science and practice, has the potential to contribute to the improvement of rural livelihood, due to capacity of its various forms to offer multiple alternatives and opportunities to small holders farmers to enhance farm production and income, while protecting the agricultural environment.As mitigation strategy to climate change as well as rehabilitation of degraded land, the conversion of unproductive grasslands and cropland to agroforestry is a major opportunity as its helps for carbon sequestration and makes land productive and reduce soil degradation. The analysis presented here gives identification of the advance made in understanding and appreciation the potential of agroforestry.

Keywords: Agroforestry, rural livelihood, potential, opportunity, carbon sequestration

Introduction

Agroforestry in India contributes to the target set by the Indian council of agricultural research for increasing forest cover from present level of 23% of land area to 33%. The report of the task force of greening India for livelihood security and sustainable development (planning commission 2001) suggested that 10 million ha of irrigated land and 18 million ha of rainfed land should be managed under agroforestry system. As per the world bank 2004 report an estimated 1.2 billion rural people practise agroforestry on their forms and their communities and depends upon its products. Almost 10% of agricultural area is area under agroforestry system, whereas estimated the total area under agroforestry was 2.35 billion ha (Nair *et al.*). At present agroforestry meets almost half demands of fuelwood, two third of that for small timber, 70-80% wood for plywood, 60% raw materials for paper and pulp and 9-10% of green fodder requirement of livestock, besides meeting the subsistence needs of households for foods, fruit, fibre etc. However, at present the biomass productivity per unit area is less than $2tha^{-1}yr^{-1}$ agroforestry practice have demonstrated that this could safely increase to$10tha^{-1}yr^{-1}$ by carefully selecting tree-combination.

Agroforestry is also playing the greatest role in maintaining the resource base and increasing overall productivity in the rainfed areas in general and arid and semi-arid regions in particular. Changing priorities in avenues like green energy, employment generation, carbon sequestration, and optimization of farm productivity are now focused through agroforestry.



Agroforestry for food and nutritional security

Solving the problems of food and nutritional security require among other interventions a range of interconnected agricultural approaches, including improvement in staple crop productivity, the bio-fortification of staples, and the cultivation of a wider range of edible plants the provide fruits, nuts, vegetable etc., for more diverse diets (Frison*et al.*2011).

The country's food production has increased many fields since independence but recent improvement in food supply have been insufficient to fulfil the nutritional needs of the common person in an ever increasing population of the country. The different agroforestry system provide the desired diversification options to increase the food security and act as insurance against the low production during drought and other stress conditions agroforestry products such as timber, fruit, food, fiber, fodder, medicine and other are progressively meeting the subsistence needs of households and providing the platform for greater and sustained productivity.

Carbon sequestration potential of Agroforestry

Global climate change is a major issue in the world. Climate change due to increasing concentration of greenhouse gases (GHG) that includes carbon di oxide, methane, nitrous oxide etc. The global average of atmospheric carbon di oxide was 402±0.1 parts per million in 2016 (Lindsey, 2017). As compared to 392 parts per million in 2012. Due to increasing concentration warming at atmosphere and oceans, diminishing snow and ice, rising sea levels is happening. The area under agroforestry may further increase as option to mitigate climate change. The best way sequesterC by preventing deforestation is by adopting agroforestry system on underutilized sites. This may be best opportunity for small holder farmers by selling the produce from agroforestry system. Also enhancement of local livelihoods of small holder farmers, the world bank initiated the community development carbon fund due to its ability to enhance the resilience. In agroforestry system large amount of biomass is added to soil in the form of litter etc that helps in stabilizing soil organic matter. It is estimated that total soil C pool in the form of soil organic carbon (SOC) and soil inorganic carbon (SIC) is 1462-1548pg and 659-748pg is (Batjes, 1996) suggesting that agroforestry can increase soil carbon pool that would have significant impact on reducing the adverse effect of climate change.

Biodiversity conservation through agroforestry

Agroforestry systems and the heterogeneous mosaic landscapes of which they are part have recently attracted the interest of conservation biologists and other investigators working on the interface between integrated natural resource management and biodiversity conservation (e.g., Gajaseni*et al.* 1996; Perfecto *et al.* 1996; Rice and Greenberg 2000). On both theoretical and empirical grounds, increased biodiversity has been suggested as making plant communities more resilient (McCann 2000) and thus as having a direct link with productivity gains in the long run. More importantly, as natural ecosystems shrink and remaining patches of natural vegetation are increasingly reduced to isolated habitat islands (protected or not in parks) in a matrix of agricultural land, it becomes crucial to understand what land use systems replace the natural ecosystems and the nature of the matrix surrounding the remaining fragments. In these fragmented landscapes, agroforestry could play a role in helping to maintain a higher level of biodiversity, both within and outside protected areas, when compared with the severe negative effects resulting from more drastic land transformations. Where landscapes have been denuded through inadequate land use or degraded agricultural areas have been abandoned, revegetation with agroforestry practices can promote biodiversity conservation.

Agroforestry for livelihood security and employment opportunities

Agroforestry system due to diverse options and products opportunities for employment generation in rural areas. Dhayani*et al.(*2003) have highlighted the role of agroforestry products environmental services to meet the subsistence needs platform for generation and sustained livelihood of the society. Increased supply of wood in the market has triggered a substantial increase in the number of small-scale industries dealing with the wood and wood based products in the near past. Such as industries have promoted agroforestry and contributed significantly to increasing area under farm forestry. Recognizing agroforestry as a viable venture, many business corporations, limited companies such as ITC, WIMCO, West Coast paper mills Ltd., financial institute such as IFFCO have entered into the business and initiated agroforestry activities in collaboration with farmers on a large scale. Besides the existing agroforestry practice, there is tremendous potential for employment generation with improvement agroforestry system to tune of 943 million person days annually from the 25.4 Million hectre of a agroforestry area (NRCAF,2007). Dhayani*et al.*(2005) have indicated the potential development and employmentgeneration to the tune of 5.763 million human days/year from Indian Himalayas alone.

Promotion of Agroforestry

Government of India is promoting Agro forestry and orchards in all States of the country under various missions/ schemes namely Mission for Integrated Development of Horticulture (MIDH) and National Mission for Sustainable Agriculture (NMSA) of Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW), Ministry of Agriculture & Farmers Welfare, Green India Mission under Ministry of Environment, Forest & Climate Change (MoEF&CC) and Special Central Assistance to Tribal Sub-Plan under Ministry of Tribal Affairs.

Conclusion

Agroforestry play vital role to resource conservation, improvement of environmental quality, rehabilitation of degraded lands and providing multiple outputs to meet the day to day demand of rural population. Therefore agroforestry to be backbone of marginal farming for self reliant and sustainable agriculture. Agroforestry to contribute to adaptation to climate change is rudimentary at best.

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