Capacity Building for Entrepreneurship Centered Around Trees Outside Forests

Module 2:Tree plantation and Cultivation

Lecture 4: Models of Tree cultivation

Introduction

Tree is a woody perennial plant, having one well-defined stem and a more or less definitely formed crown.

Tree cultivation involves various techniques and practices to improve growth, sustainability and productivity. The current population of India is 1.44billion (National Commission on Population) and the forest cover is 21.76% (FSI) and tree cover has an area of 3.41% (FSI) of the total area. Thus, to meet the demand of soaring population, increase in tree and forest cover and to mitigate climate change tree cultivation becomes important.

Traditionally, tree cultivated by natural regeneration and shifting cultivation. Contemporarily, new models have been adopted for the purpose

Models of tree plantation:

Traditional Models

1. Natural Regeneration: On temporarily unstock lands, when forest establishes through natural succession it is natural regeneration.. Expansion in such conditions are thorough natural succession on the particular land.
   E.g. Natural regeneration on agricultural fields.

2. Shifting Cultivation: It is a technique where farmers clear land for agricultural purpose for a periods of time and allows it to rejuvenate till the land regains fertility.

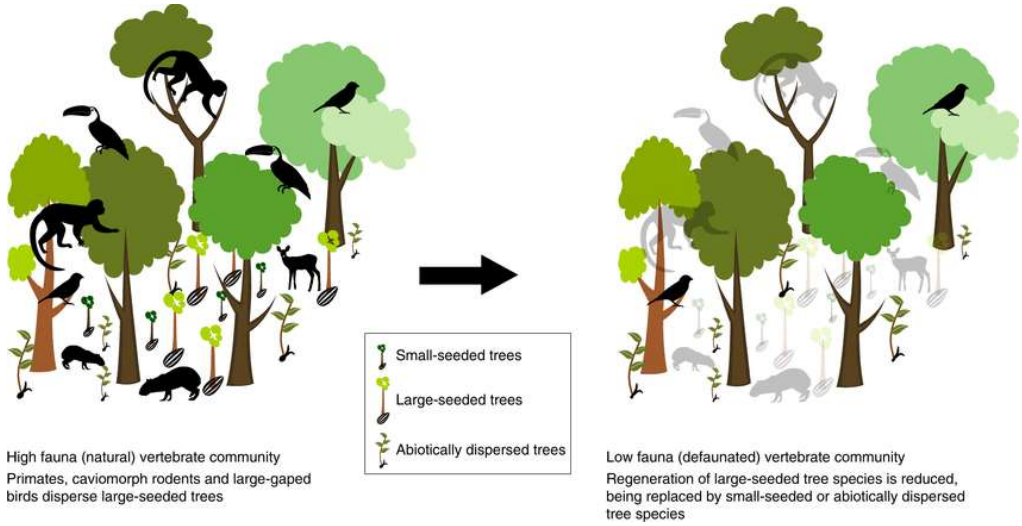


Fig 1: Natural regeneration

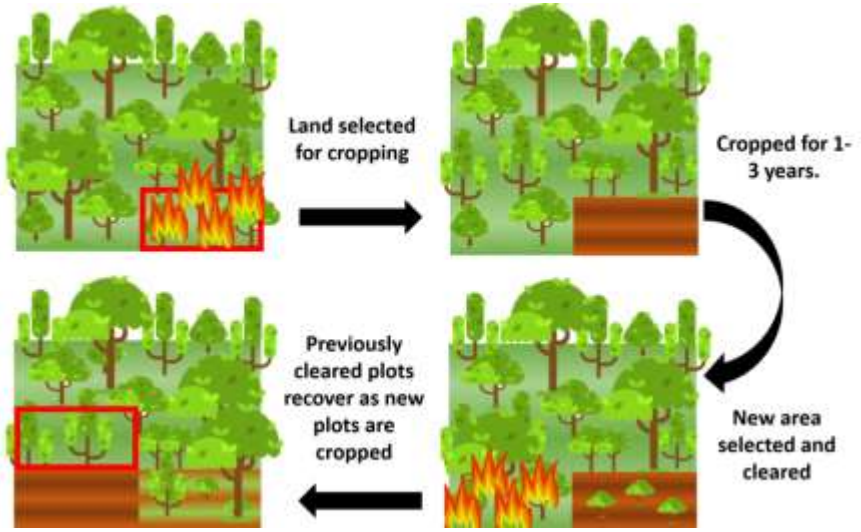
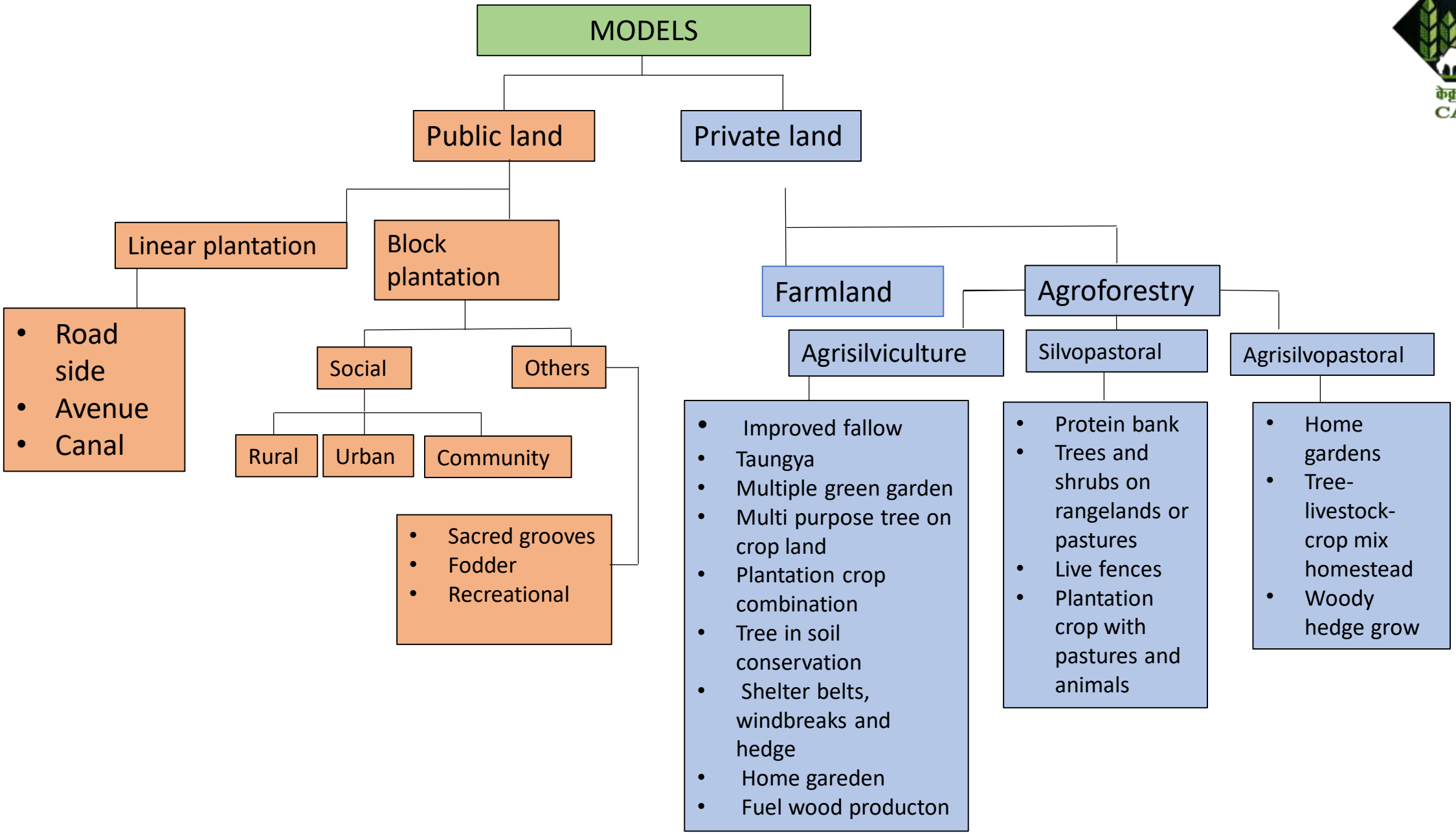


Fig 2: Shifting cultivation


MODELS
Public land
Private land
Linear plantation
Block plantation
Road side
Avenue
Canal
Social
Others
Rural
Urban
Community
Sacred grooves
Fodder
Recreational
Farmland
Agroforestry
Agrisilviculture
Silvopastoral
Agrisilvopastoral
Improved fallow
Taungya
Multiple green garden
Multi purpose tree on crop land
Plantation crop combination
Tree in soil conservation
Shelter belts, windbreaks and hedge
Home gareden
Fuel wood producton
Protein bank
Trees and shrubs on rangelands or pastures
Live fences
Plantation crop with pastures and animals
Home gardens
Tree-livestock-crop mix homestead
Woody hedge grow

1. Linear plantation: Plantation of fast-growing species on linear strips of land on the sides of public roads, canals and railways. Important tree species are *Delonix regia*, *Melia azedarach*.

2. Community wood lots: Plantation of fuel wood and other NTFP's producing trees on the community village land. In Karnataka at Uttara Kanna , village community reclaimed 28% of degraded land under JFM program.

3. Sacred grooves: Patches of forests or natural vegetation that are protected by local community due to their religious and cultural significance. Sacred grooves of Meghalaya.

4. Social forestry: Afforestation of all lands other than crop lands, available outside forest area aimed at helping in environmental, social and rural development as against the traditional objective of obtaining profit. First used in 1976 by National Commission on Agriculture.

5. Farm Forestry: Process under which farmers grow trees for commercial and non-commercial purposes on their farm land in the form of tree on bund or boundaries of field, creating wind breaks .

6. Agroforestry: A land use system where woody perennials are deliberately used on the same land management unit as agricultural crops/livestock. This system is practiced in different temporal and spatial arrangements as mentioned :

i. **Agrisilviculture**: The most prominent agroforestry system in India, practiced in seven agro-climatic regions. These are production techniques that combine the growing of crops with simultaneously raised and protected tree crop.
ii. **Agri-horticulture**: Practiced in six agro-climatic regions; it combines fruit trees with crops.
iii. **Agri-silvi-horticulture**: Practiced in two agro-climatic regions; it combines trees, fruit trees, and crops.
iv. **Agri-silvi-pasture**: Practiced in two agro-climatic regions. This is a collective name for land-use systems, involving the deliberate association of a woody component (trees or shrubs) with cattle on the same land unit.
v. **Boundary plantation**: Where trees are planted at a vast distance around agricultural fields.
vi. **Block plantation**: Practiced in the Eastern plateau and hills and Central plateau and hills, tree plantations with closed spacing in compact blocks of more than 0.1 hectare on lands outside recorded forest areas.
vii. **Energy plantation**: Practiced in the lower Gangetic plains, in this system, trees with crops are grown for fuel and fiber production .
viii. **Alley cropping**: A system in which species of shrubs or trees are planted at relatively close spacing within rows and widely spaced between rows, to leave room for herbaceous cropping in the alleys in between.
ix. **Silvi-olericulture**: A combination of trees and vegetables.
x. **Horti-pasture**: This system combines fruit trees with pasture or animals.
xi. **Horti-olericulture**: Combines fruit trees and vegetables.
xii. **Silvi-pasture**: An agroforestry practice that integrates livestock, forage production, and trees on the same land management unit.

xiii. **Forage forestry**: Combines forage trees and pasture.
xiv. **Shelter-belts**: Practiced in the East Coast plateau and hills and Western dry regions for protection from high velocity winds, also from devastations like the ones caused by tsunami, and serve the purpose of sand binders and prevent sand erosion..
xv. **Wind-breaks**: Combine trees and crops, trees function as shelter belts to reduce wind speeds
xvi. **Live fence**: Shrubs and under-trees form the boundary.
xvii. **Silvi or Horti-sericulture**: Trees or fruit trees for rearing of silk.
xviii. **Horti-apiculture**: Fruit trees for rearing honeybees to produce honey.
xix. **Aqua-forestry**: Trees combined with fisheries.
xx. **Homestead**: Multiple combinations of trees, fruit trees, vegetables, etc.

Example from Agroforestry in India:

In India, agroforestry has gained traction, particularly in states like Karnataka, where farmers cultivate coffee alongside diverse tree species. This model not only enhances biodiversity but also improves soil health and provides shade for crops. By integrating trees with agriculture, farmers achieve sustainable yields and increased resilience against climate change.

Challenges in Tree Cultivation

- **The importance of Sustainable Practices** in tree cultivation is essential for balancing ecological health with economic viability. By prioritizing methods that enhance biodiversity, improve soil health, and reduce chemical inputs, farmers can ensure long-term productivity and resilience. Emphasizing sustainability not only benefits the environment but also supports the livelihoods of future generations.

- **Future Trends in Tree Farming** are likely to focus on agroforestry, mixed-species plantations and the integration of technology for precision agriculture. Innovations such as drone monitoring and genetic improvements will enhance productivity and resilience. Additionally, increasing awareness of climate change will drive demand for sustainable forestry practices worldwide.

- **Call to Action for Responsible Cultivation Practices** to secure a sustainable future for tree cultivation, all stakeholders must commit to responsible practices. This includes adopting agro-ecological methods, supporting local initiatives, and advocating for policies that promote sustainable forestry. By working together, we can protect our forests, enhance biodiversity, and ensure that tree farming remains viable for generations to come.

Conclusion

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- India has a diverse agro-climatic zones and socio-economic condition. With a unique landscape on each zones and thus, implementing models according to the strengths.
- Models help in achieving the sustainable goals, reducing poverty, climate mitigation and enhancing livelihood in the modern industrial times where resources are scarce.
- To maximize the benefit it is crucial to adopt balanced approach i.e., is in harmony with environment and socio-economic benefit.
- Embracing innovations, inclusive models and tailoring tree cultivation according to needs can pave a way for greener and more sustainable future.

Cafri, ICAR, Jhansi Agroforestry models