

Urban forestry: Urban forestry is the art and science of **managing trees and forest resources in and around urban community ecosystems** for availing physiological, sociological, economic and aesthetic benefits trees provide for society. Urban Forestry concentrates on all tree-dominated as well as other green resources in and around urban areas, such as **woodlands, public and private urban parks and gardens, street tree and square plantations, botanical gardens and cemeteries.**

Gandhinagar leads in per capita urban greenery among Indian cities with Chandigarh taking second. Cities renowned for their urban green spaces often have 20% to 35% coverage of total geographical area. For Chandigarh it is 35%, Delhi 20% and Gandhinagar it is 57.13%.

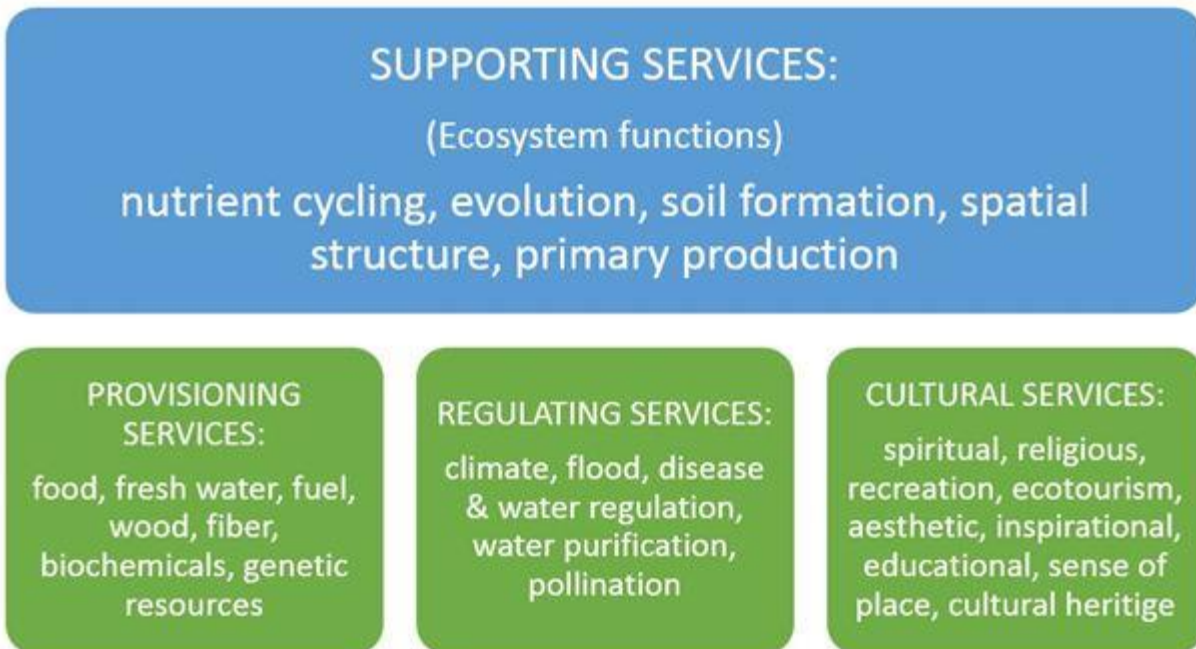
Why Urban-Forestry is Needed? The urban population growth of 31.8 % during 2001–2011 is far ahead of simultaneous national population growth of 17.6 %. Cities are already facing multiple problems and about 40% population will be residing in urban areas by 2030 which will further aggravate urban problems. Some problems associated with lack of urban greenery are:

- **Increased Carbon Emissions:** Cities occupy less than 3% of the global terrestrial surface but accounts for 78% of the carbon emissions.
- **Climate change Induced Heat Waves and Dust storms:** Heat waves aggravate thermal discomfort and culminate in health issues.
- **Creation of 'Micro-Climates' and Urban Heat Islands (UHI):** Reduced potential for evaporative cooling increases the net heat stored in urban environment and leads to UHIs, thus developing a peculiar 'micro climate' in and around urban landscape.
- **Decreasing Biodiversity:** Depletion of green cover has caused habitat loss and shrinking shelter for various fauna.
- **Reduced Ecosystem Services:** Forests provide a variety of ecosystem services which are lost due to absence of green cover in and around cities.
- **Check Unsustainable Development:** Unplanned, explosive and pressurized development has resulted in loss of essential ecology and its components including wetlands, absence of which reduces natural mitigation of disasters. E.g. Chennai Floods.

Benefits: Ecological Benefits:

- **Microclimate and Urban Heat Island effect:** Urban trees can help to improve the air quality by cooling and cleaning the air, reducing smog, ground-level ozone and greenhouse effect. They can mitigate the heat island effect by giving green lungs to cities.
- **Carbon Sequestration:** Urban forests can sequester huge amounts of carbon by capturing carbon dioxide from atmosphere.
- **Biodiversity:** Trees and forests present in urban areas can provide shelter and habitat to many important animals especially avifauna.

- **Management of Urban Hydrological Cycle:** Through water provisioning, regulating, recharging and filtering role, urban forests play key roles in supporting water management in and around urban settlements.
- **Ecosystem services:**



Social Benefits:

- **Checks Haphazard Urbanization:** Urban forests can check rapid and unplanned urbanization; development of slums by demarcating city limits and industrial spaces.
- **Aesthetic Benefits:** Urban trees enhance beauty and environmental quotient of city contribute to aesthetic quality of residential streets and community parks.
- **Improves Mental Alertness And Reduce Stress:** Green areas reduce stress and improve physical health for urban residents while providing spaces for people to interact.
- **Education:** Urban forests in the form of parks, botanical gardens, zoological gardens, avenue trees and other urban green spaces are centres of education on flora and fauna.
- **Recreation:** Green parks provide a break from the busy, tiring, often repetitive and tedious routine jobs and works for people and safe playgrounds for children
- **Cultural Regeneration:** Urban green spaces can enhance cultural activities by providing venues for local festivals, civic celebrations, political gatherings and theatrical performances.

Economic Benefits:

- **Real estate prices:** Landscaping with trees—in yards, in parks and greenways, along streets, and in shopping centers—can increase property values and commercial benefits
- **Employment:** Tree planting and maintenance in urban forests can be labour intensive and provide work opportunities which may be especially important in poorer cities.
- **Reduced energy consumption:** Urban forest offers significant benefits in reducing building air-conditioning demand and reducing energy consumption.

Challenges: There are many challenges which restrict the realization of urban forestry development in India. The problems of urban forestry are to an extent similar to those afflicting the social forestry and agro-forestry development in India.

Social Forestry

Agro-forestry

<ul style="list-style-type: none">• It is forestry outside conventional forests, which primarily aims at providing continuous flow of goods and services for the needs of local people.	<ul style="list-style-type: none">• Agroforestry is the management and integration of trees, crops and/or livestock on the same plot of land.
<ul style="list-style-type: none">• Social forestry was first recognized as an important component of forestry development in the Interim Report of the National Commission on Agriculture 1976 and later in National Forest Policy 1988.	<ul style="list-style-type: none">• It combines agriculture and forestry by planting viable tree shelter belts along agricultural lands.
<ul style="list-style-type: none">• Objectives: To organize local communities in their struggle for socio-economic development and to integrate economic gains in the distribution of their benefits to the rural society.	<ul style="list-style-type: none">• It is dynamic, ecologically based, natural resource management system that diversifies and sustains production

Social Forestry

Agro-forestry

	<p>in order to increase social, economic and environmental benefits for land users.</p>
<ul style="list-style-type: none"> • It includes raising wind breaks on dry farm lands, planting trees along roadsides, planting in village common lands and waste lands, planting along railway lines and canal banks, planting on common community lands like religious places, educational areas and panchayat lands etc. 	<ul style="list-style-type: none"> • Agroforestry is derived from concept of ecology and places an emphasis on interaction between different plant species. Agroforestry results in higher overall yields and reduced operational costs. In the Tarai area of Uttar Pradesh, Taungya cultivators harvested higher yields of crops such as maize, wheat, pulses etc. without fertilizer.
<ul style="list-style-type: none"> • Benefits of social forestry include: <ul style="list-style-type: none"> o Fuel, fodder, timber, supplementary food and income from surplus forest products and tree derived resources for rural people. o Form villagers into a well-knit community and increased social cohesion. o Reclamation of waste lands and degraded lands along with soil conservation and green cover. o Protection of agricultural fields from winds and dust storms. o Check desertification. 	<ul style="list-style-type: none"> • Benefits of agroforestry: <ul style="list-style-type: none"> o Maintain soil organic matter and biological activity at levels satisfactory for soil fertility. o Control runoff and soil erosion and maintains required soil moisture. o Maintain more favorable soil physical properties than agriculture, through organic matter maintenance and the effects of tree roots. o More closed nutrient cycling than agriculture and hence to more efficient use of nutrients. o Nitrogen-fixing trees and shrubs can substantially increase nitrogen inputs to agro forestry systems. o Decomposition of tree and pruning can substantially contribute to maintenance of soil fertility. o Helps in income diversification thereby reducing agricultural dependency of farmers.

Earlier policies failed due to following challenges:

- **Small Size of Holdings and Land Fragmentation:** Average size of agricultural land holding in India is around >2 hectare, which makes agro forestry unviable option for small and marginal farmers.
- **Lack Of Adequate Quality And Quantity Of Seeds:** Good quality seeds are too expensive for small farmers to buy without government support and only 10% of quality planting material reaches the resource-poor in remote regions.
- **Insufficient Research, Extension and Capacity Building:** Research results on agroforestry, available in the public and private domain do not regularly reach the farmers due to lack of a dedicated extension system.
- **Lack of Planning:** Green cover planning is often neglected during planning stage.
- **Lack of Financial Support:** There is inadequate financial support for urban forestry development and research work.
- **Unmindful Selection of Tree Species:** Agroforestry is not region-climate specific as some species like eucalyptus are common trees used in agroforestry which are water intensive, reduce water available for other species, toxic, invasive and nutrient intensive.
- **Lack of Insurance, Harvesting and Marketing Support:** The agroforestry produce is neither covered under agricultural insurance schemes nor entitled to marketing support.
- **Lack of Uniformity among State Laws:** Lack of uniformity in the policies and regulations relating to felling and transporting farm-grown timber and other products in different states hinders intra-state timber trade.
- **Low Private Sector Participation:** Private sector ensures market availability for agroforestry products but its participation is limited in some pockets like cardamom in North East India and home gardens in Kerala, pulp and paper in Tamil Nadu etc.
- **Development v/s Ecology:** Deforestation is an evident consequence of any development associated works which eventually defeats the original intent and purpose of afforestation. E.g. South Delhi deforestation.

Government efforts at improving Social and Agroforestry

- - **National Forest Policy 1988:** Envisages increasing forest cover to 33% from current levels of under 25%.
 - **National Agricultural Policy, 2000:** Farmers are encouraged to take up farm/agroforestry for higher in-come generation by

evolving technology, extension and credit support packages and removing constraints to development of agroforestry.

- **National Bamboo Mission (NBM), National Horticulture Mission (NHM), National Biofuel Policy:** For integrating forestry components on farmlands .
- **National Bank for Agriculture and Rural Development (NABARD):** Provides financial and banking institutional support for social forestry, farm forestry and afforestation of wastelands.
- **National Medicinal Plants Board (NMPB) under Ayurveda, Yunani, Siddha and Homeopathy (AYUSH):** Lays emphasis on integrating medicinal plants and trees along with agricultural crops.
- **The National Afforestation and Eco-development Board (NAEB) :** Promotes agroforestry practices on farm and wastelands.
- **National Mission for a Green India (GIM):** The mission has the broad objective of both increasing the forest and tree cover by 5 million ha, as well as increasing the quality of the existing forest and tree cover in another 5 million ha of forest/ non forest lands in 10 years.

National Agroforestry Policy 2014: It aims at making agroforestry an instrument for transforming the lives of the rural farming population, protecting ecosystem and ensuring food security through sustainable means. It maintains that agroforestry is perhaps the only alternative to meet target of achieving 33 per cent tree cover from present level of less than 25 per cent, as envisaged in the National Forest Policy (1988). **Goals of the policy:**

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- Setting up a National Agroforestry Mission or an Agroforestry Board to implement the Policy by bringing convergence and synergy among various existing missions and agencies pertaining to agriculture, environment and forestry.
- Improving the productivity, employment, income and livelihood opportunities of rural households, especially of the smallholder farmers through agroforestry.
- Meeting the ever increasing demand of timber, food, fuel, fodder, fertilizer, fibre, and other agroforestry products; conserving natural resources and increasing the forest / tree cover

The major highlights of the Policy are:

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- **Establishment of Institutional Setup at National level to promote Agroforestry:** to bring convergence in various programmes, schemes, missions catering to agroforestry under

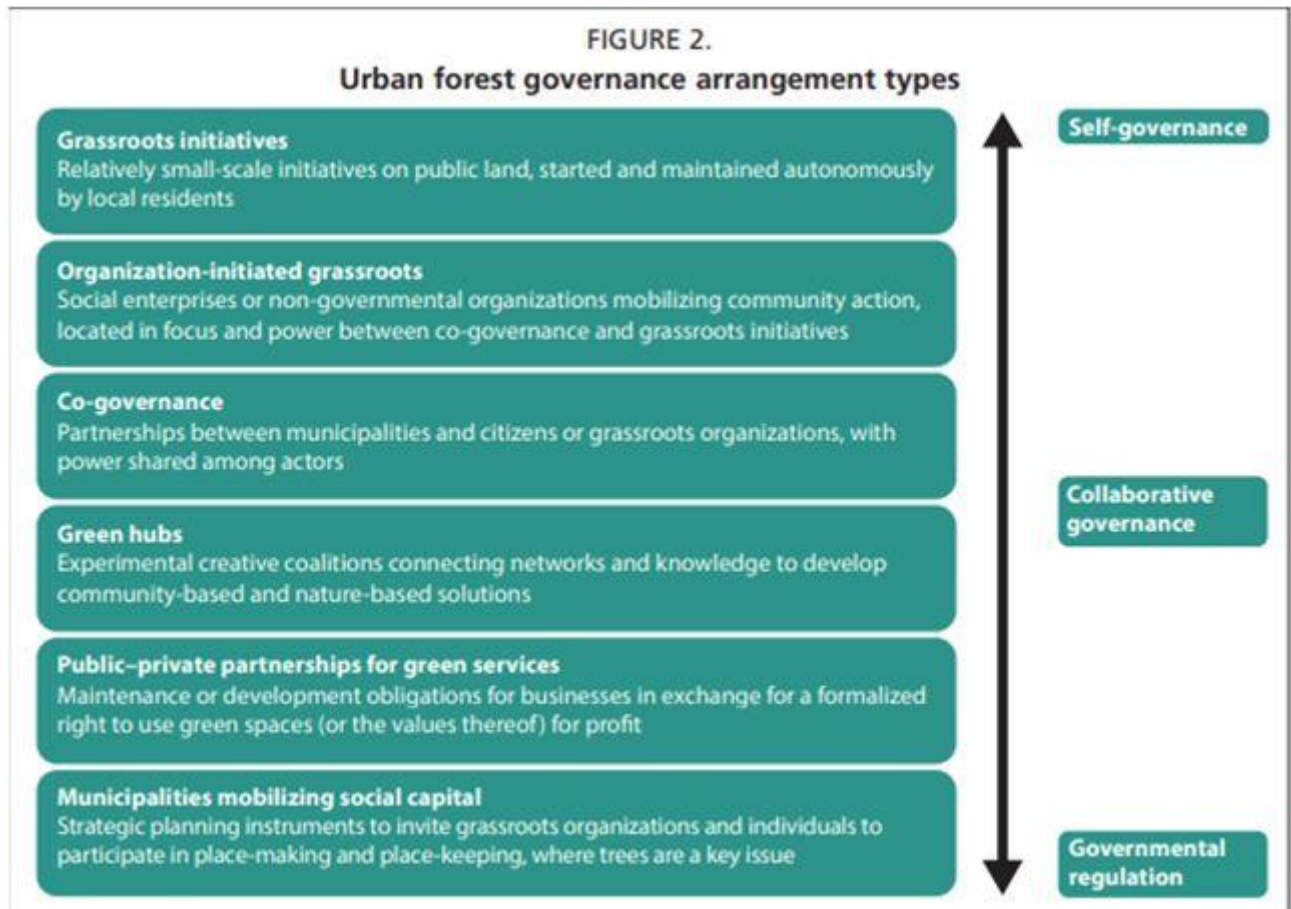
one platform functioning in various departments through setting up of a National Agroforestry Mission/ Board under the Department of Agriculture and Co-operation, Ministry of Agriculture

- **Simplifying regulations and availability of land credit:** Simplifying regulations related to harvesting, felling and transportation of trees grown on farmlands; institutional credit and insurance cover to agro-forestry practitioners. Dedicated Farmers Producers Organizations (FPO) be promoted to organize farmers to take up agroforestry at economies of scale
- **Security of land tenure:** Ensuring security of land tenure and creating a sound base of land records and data for developing an market information system (MIS) for agro-forestry.
- **Capacity building:** Investing in research, extension and capacity building and related services; access to quality planting material;
- **Marketing and private participation:** Increased participation of industries dealing with agroforestry produce, and strengthening marketing information system for tree products.
- **Removal of restrictions on tree species:** 20 important multipurpose tree species have been identified at the national level to be exempted from all restrictions related to harvesting, transportation and marketing grown under agroforestry systems.
- **Extension services:** Policy also suggests massive extension programmes in order to broadcast the outcomes of intensive R&D activities in the field of agroforestry.
- **Improving farmers' access to quality planting material:** Institutional mechanism for registration of nurseries and their accreditation should be established and the private sector participation should be encouraged in production and development of supply chain of quality planting materials.
- **Incentives to farmers for adopting agroforestry:** Incentive and support structure, such as the input subsidy, interest moratorium, etc. during the gestation period for promotion of agroforestry be provisioned to encourage farmers.

Solutions:

- **Better research and development:** Active exchanges and interactions with relevant overseas universities, research institutions and governmental agencies for improved quality of research in urban forestry and agroforestry aspects like climate resilient tree species.
- **Availability of finances:** Finance is a crucial component for effective and efficient roll out of urban, agro and social forestry especially for quality procurement, maintenance and awareness generation.

- **De-regulation of forest produce:** Bansal Committee in 2011 recommended relaxation in transit and felling permission for the species preferred by the farmers and agro-foresters.
- **More power to local governments:** Local governments should be encouraged to practice urban forestry, they should be allowed to recover costs incurred on urban forestry by trading in carbon credits.



- **Shared Commitment:** Healthy and resilient green cities and urban forests provide benefits to all and are managed with a shared commitment by all members of a community.
- **Forest Regulatory authority:** Establishing an authority for effective development of market mechanism for urban forest based products, identification and quantification of ecological services, identification of key beneficiaries, designing ecological service charges for beneficiaries from urban forests.

Case Study: **National forest cities in China** China’s State Forestry Administration officially launched the “National Forest City” programme in 2004 with the aim of advancing urban and rural ecological development. The programme represents a new model of urban forestry development, with both strong national policy support and

successful local community involvement. Its main strategy is known as “one theme, two goals”, in which the theme is “bringing forests into cities and letting cities embrace forests” and the two goals are planting trees and growing “green minds” among citizens. By 2015, more than 170 cities and 12 provinces were actively involved the National Forest City programme. Tree cover in these urban communities had increased to 40 percent or more, up from less than 10 percent in 1981.

- **Location-specific agroforestry:** Planning should be location-specific like khejri-based system for arid ecosystem, alder-based systems in the northeastern Himalayas and poplar based in Indo-Gangetic plains.
- **Incentivizing people:** Individual recognition to people for their green efforts is an efficient way of promoting people’s participation like a West Bengal government agency asked people to plant trees in Kolkata’s urban forests with their names engraved on the trees they plant.
- **Engagement of all stakeholders:** Engagement of NGOs, civil society, media and corporate groups (CSR) are necessary to extend urban green cover.
- **Promoting rooftop plantation:** Increasing awareness about rooftop plantation for reducing city’s average temperatures during summers