

# Investigation of the Indian Forest sector's performance during the last three and half decades

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**Abstract.** About seventy years ago, independent India's first National Forest Policy, 1952 clearly mentioned covering one-third of the country's geographical area under forest cover, but going by the trend of growth in forest cover during the past three and half decades, it is evident that this target is not going to be fulfilled in the near future. The quality of the country's forests in terms of average productivity, per capita availability, growing stock, and forest type/composition have also declined during the last 35 years as evident from available research articles/reports through secondary literature survey. A multi-pronged strategy giving more emphasis to agroforestry, adopting an innovative result-based Telangana state afforestation model, creating sustainable green funds by different states, and restoring degraded forest lands by strengthening participatory forest management has been suggested in the paper to achieve forest and tree cover target and for improving forest quality.

**Keywords:** Forest cover, tree cover, forest productivity, per capita forest availability, biotic pressure, afforestation, forest types, forest composition.

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## 1. Introduction

Independent India adopted its first National Forest Policy (NFP) in 1952. One of the main planks of the policy was to achieve a target of one third of India's geographical area under forest and tree cover (Joshi et al., 2011). The Policy also set general targets for different terrains. In hill and mountain slopes where there remain dangers of soil erosion, forest cover must be two-thirds of the available land. In plains, where land use pressures are assuming alarming proportion, the Policy set a modest target of 20%. The National Forest Policy 1952 was succeeded by the National Forest Policy 1988, which is still in force after three decades of its promulgation. A lot of new challenges in the form of climate change, water security, global warming, sustainable forest

management, biodiversity conservation, forest rights, rapid urbanization etc. have emerged during this period (i.e. after 1988) but the NFP 1988, which fails to adequately address these issues, is yet to be reviewed and replaced. Coming to the growth in national forest cover during successive years, the target of having 33% of the country's geographical area under forest cover, as envisaged in 1952 policy, seems to be a distant dream (Table 1).

During the 12 years between 1987 and 1999, the forest cover declined from 640,819 km<sup>2</sup> to 637,293 km<sup>2</sup>. Later, some improvement was seen between 1999 and 2003, when the total area under forest cover rose to 678,333 km<sup>2</sup>, i.e. 20.64% of the country's total area. At this juncture, Government of India set a goal of achieving 25% forest cover by 2007 and 33% by 2012 (NFCR, 2006). However, by 2021, India had

**Table 1.** India's forest cover during 1987–2003

Year	Forest cover (km <sup>2</sup> )	% of total area of country	Increase (+) or decrease (-) (%)
1987	640,819	19.49	-
1989	638,804	19.43	(-) 0.31
1991	639,364	19.45	(+) 0.09
1993	639,386	19.45	No change
1995	638,819	19.43	(-) 0.08
1997	633,397	19.27	(-) 0.85
1999	637,293	19.39	(+) 0.61
2001	675,538	20.55	(+) 6.0
2003	678,333	20.64	(+) 0.4

only 21.71% area under forest cover and 24.62% area under forest and tree cover (ISFR, 2021) (Table 2). There remains a significant gap between the planned and achieved targets even after the seven decades since 1952.

## 2. Status of Indian forests during 1987–2021

The Forest Survey of India, an organization under Ministry of Environment, Forests and Climate change, Government of India, initiated the preparation of India State of Forest Report (ISFR) on a biennial basis starting 1987, providing an assessment of the latest forest cover (tree cover was included later 2001 onwards) in the country and monitoring changes in the same. The organization works as a nodal agency for collection, compilation, storage and dissemination of the spatial database on forest resources of India. It is an interesting exercise to assess the condition of India's forests between 1987 and now on a few important parameters like productivity, per capita forest availability, growing stock, forest and tree cover, and forest composition based on available research papers/studies/reports through secondary literature survey. Average annual production of wood per ha (i.e. average productivity) of forests in 1987 was 0.69 m<sup>3</sup>, nearly one third of world's average of 2.1 m<sup>3</sup> (ISFR, 1987). Presently, the above parameter is shockingly low at 0.045

m<sup>3</sup>/ha/year (Soujanaya & Saxena, 2017). Per capita forest availability has come down from 0.064 ha in 1987 to 0.058 ha during late twenties (SFI, 2019). Growing stock of India's forests was 65 m<sup>3</sup>/ha as per ISFR 1987, which has moved down to 56.6 m<sup>3</sup>/ha as per ISFR 2021. The area occupied by tropical moist deciduous forests as a fraction of the country's overall forest area was about 37% in 1987, whereas that of tropical dry deciduous forests stood at 28.6% (ISFR, 1987). These two figures have appreciably changed now – the proportion of tropical moist deciduous forests has come down to 30.3% and that of tropical dry deciduous forests has increased to 38.2% (ISFR, 2021). Similarly, tropical thorn forest, comprising Acacias, Prosopis and thorny bushes, has increased from 2.6% in 1987 to 6.7% in 2021 (ISFR, 1987 and ISFR, 2021). All these facts indicate overall degradation in the Indian forest ecosystem due to various factors, prominent being intense biotic pressure in the form of overgrazing, firewood and fodder collection, illicit felling, forest fires, invasion of weeds, climate change, and pressure on forest lands for diversion for development purposes. The observations on the illegal cutting of trees, put forth by the Parliamentary committee on Science & Technology, Environment & Forests in its 324<sup>th</sup> report, were scathing (SFI, 2019). Vide para 6.10, the committee mentioned that Government has been spending billions of rupees in the name of environment protection, while the issue of illegal cutting and transportation of trees has been plaguing our forests. The committee directed the environment ministry to take cognizance of this in different parts of country and in coordination with the concerned state governments/ UT administration, prepare an action plan for tackling the menace. Besides, time and again, environmentalists have said that deforestation in the country is generally under-reported. Only in cases where afforestation exceeds deforestation, net increase is reported (Ravindranath et al., 2012). When natural forests are converted into plantations or orchards, the forest and tree cover remains constant, and such deforestation is not highlighted (Balaji et al., 2022).

Forest fires have been on an uptrend for the past several years. Indian forests reported a total of 3,45,989 forest fires

**Table 2.** India's forest cover during 2011 to 2021 (ten years) Source: FSI Reports 2011 to 2021

Year of publication of FSI report	Forest cover (km <sup>2</sup> )	% of total area of country	Increase (+) or decrease (-) (%)	Tree cover (km <sup>2</sup> )	% of total area of country	Forest and tree cover (km <sup>2</sup> )	Increase (+) or decrease (-) (%)
2011	692,027	21.00	-	90,844	2.76	782,871	-
2013	697,898	21.23	(+) 0.85	91,266	2.78	789,164	(+) 0.80
2015	701,673	21.34	(+) 0.54	92,572	2.82	794,245	(+) 0.64
2017	708,273	21.54	(+) 0.94	93,815	2.85	802,088	(+) 0.98
2019	712,249	21.66	(+) 0.56	95,027	2.89	807,276	(+) 0.64
2021	713,789	21.71	(+) 0.22	95,748	2.91	809,537	(+) 0.28

between November 2020 to June 2021 (ISFR, 2021). This is the highest recorded in the country for this period so far. Around 2,58,480 forest fires were reported during the same months in 2018–19 (Rajya Sabha query response, December 16, 2021), indicating a sharp rise. Global warming and climate change may be one of the reasons leading to high summer temperatures, but forest fires are also caused due to negligence on the part of local villagers, dry grass burning, and for ease in collection of Non-Timber Forest Produce (NTFP).

The situation is indeed alarming as for ecological stability; one third of geographical area must be under forest and tree cover and we are still far away from the target. Going by the statistics of forest cover during last ten years (2011 to 2021, Table 2), it is observed that during this period country could achieve an increase in forest and tree cover just @ 3.34 % (ISFR, 2011–2021). At this pace, the target of achieving 33% forest cover by 2030 looks unlikely even by 2040. The quality of India's forests, according to critics, is also questionable (Balaji et al., 2022). Only 10.88% of country's geographical area is having forest cover with canopy density greater than 40% in 1987 (ISFR, 1987) (tree cover concept originated in 2001), which can be said to be a real forest for emanating forest ecosystem services namely provisioning (timber, firewood, fodder, genetic resources, clean water etc.), regulating (carbon storage, climate regulation, pollination, soil erosion prevention, water purification etc.) cultural (recreational, aesthetic, educational etc.) and supporting kinds of ecosystem services (soil formation, nutrient cycling etc.). The situation is not different even today as only 12.37% of our forest cover has greater than 40% canopy density (ISFR, 2021). As the definition of a forest includes any hectare of land with a canopy cover of 10 per cent or more, forest areas would include commercial plantation crops such as coconut, tea etc. The increase in forest cover between 2019 to 2021 may not be from natural forests like in reserved or protected forests but can also emanate from commercial crop plantations (DTE, 2022). This shows that the natural forest is gradually decreasing across the country and quality of natural forests is going down (Ravindranath et al., 2014; Chakraborty et al., 2018). India committed in 2015 (COP 21, Paris at UNFCCC as intended nationally determined contribution or INDC) to create additional carbon sinks by way of forest and tree cover that can absorb 2.5–3.0 billion tonnes of CO<sub>2</sub>-equivalent by 2030. This is to be achieved by adding to India's existing forest and tree cover. But given the above pace of progress, it appears that this target will not be met. Many environmentalists have described this commitment as over ambitious and the forest cover statistics during the past three and half decades also support their viewpoint.

The North Eastern Region (NER) of India comprises eight states – Arunachal Pradesh, Assam, Manipur, Meghalaya,

Mizoram, Nagaland, Sikkim and Tripura. This region NER is a part of Indo-Burma 'hotspot' and is the world's second largest, next only to the Mediterranean basin, with an area 2,206,000 square km. Physiographically, it is categorized as the Eastern Himalayas and is home to 51 forest types, broadly classified into six major types — tropical moist deciduous forests, tropical semi evergreen forests, tropical wet evergreen forests, subtropical forests, temperate forests and alpine forests. These forests harbour 8,000 out of the total 15,000 species of flowering plants of the country (Prasain & Zou John, 2015). According to the Indian Red Data Book, published by the Botanical Survey of India, 10 percent of the flowering plants in the country are endangered. Of the 1500 endangered floral species, 800 are reported from North East India (Upadhyaya & Raj, 2013). The region is home to around 220 ethnic communities and harbours immense cultural and linguistic diversity (Baruah, 2007). As per the India State of Forest Report 2021 (ISFR), the forest cover of the North Eastern Region (NER) has declined by 4,257 km<sup>2</sup>. over the last ten (2011–2021) years (Table 3) (ISFR, 2011–2021). Considering the high biodiversity values, ecosystem services and livelihood dependence on the NER forests, this decline has serious consequences for the future.

**Table 3.** Decline in the forest cover in North Eastern Region of India

Year	Forest Cover of North Eastern Region	Decline in Forest Cover	Cumulative Decline in Forest Cover
2011	173,219	549	549
2013	172,592	637	1,186
2015	171,964	628	1,814
2017	171,306	658	2,472
2019	170,541	765	3,237
2021	169,521	1,020	4,257

### 3. Way forward

Government of India's budgetary resources are limited where many other priority sectors other than forestry like health, education, rural development, agriculture, infrastructure development, defence, communications, railways etc have to be taken care of. A sizeable investment on afforestation has been made by way of government schemes like National Mission for Green India (GIM), National Afforestation Programme (NAP), Plantations under Net Present Value (NPV) component of CAMPA (other than compensatory plantation in lieu of forest land diverted for non forestry purposes), Green Highway Mission, Namami Gange Mission, Nagar Van Yojna, School Nursery Yojna etc (AR, 2021–22).

Besides this, billions of plants have been planted in forest and non forest areas under Van Mahotsava celebrations in the country every year since independence. But the end result of achieving 33% target is still elusive. Higher biotic pressure with high human and cattle density is among the most significant reasons for poor forest cover. Unsustainable fuelwood and fodder removal, lack of regeneration, overgrazing, fire incidences are also major issues with India's forests leading to poor forest cover. Government of India and respective state governments have to think seriously about devising human population and unproductive cattle control policy to reduce pressure not only on forests but on other resources of the country also.

Unsustainable fuel wood collection from Indian forests is a major issue many last decades which is leading to forest degradation and poor forest cover. There are different estimates in this regard e.g. Forest survey of India, Dehradun mentions it as 216.4 million tonnes per year (ISFR, 2011) whereas according to another report from FAO of United Nations it is between 227–298 million tonnes per year (Saxena, 1997). A Parliamentary standing committee in 2019 has also expressed serious concern on this matter and observed that LPG cylinders were still not available to a large number of forest dwellers and BPL (below poverty line) household living near forests. Vide para 6.26, the committee recommended that the environment ministry must impress upon Ministry of Petroleum and Natural Gas to make efforts to bring more and more households under Ujawalla scheme to reduce pressure on forests (SFI, 2019).

Innovative and out of box ideas/schemes like Telangana state's Haritha Haram model of sustainable greening, promoting agro forestry in farmers' land, strengthening participatory forest management are the need of the hour to increase forest and tree cover in the country leading to fulfillment of India's INDC of additional carbon sink creation by 2030. The phenomenal success of Haritha Haram scheme in Telangana has been assessed by the ISFR 2021, where Telangana state has been credited with 6.85% increase in forest cover since 2015 and 14.52% increase in tree cover since 2015 (ISFR, 2021). Total increase in forest cover in the state roughly translates to an increase of 3,36,000 acre (Kumari, 2022). Moreover, capital city of Hyderabad has been awarded the "Tree City of the World" by Arbour Day Foundation and Food and Agriculture Organisation (FAO) of the United Nations Organisation for two consecutive years 2020 and 2021 (Kumari, 2022). Another path-breaking initiative has been taken by Telangana Government by setting up a dedicated Green fund called "Telangana Haritha Nidhi". The fund will be free from budget control, thereby avoiding bureaucratic delays of fund releasing in time for plantation related activities. Monies into this fund is being collected by way of contributions from MPs, MLAs, MLCs, Members of

Zilla Parishad, Mandal Parishad, Municipal corporations, councils as well as from government employees (Kumari, 2022). All contractors who undertake government works have to contribute 0.1 per cent of their contract value to the fund. The government collects an additional Rs 50 from every transaction during all registrations such as property, vehicle registrations etc. It also collects Rs 1,000 towards green fund during renewal of licenses for business establishments. Other Indian states can emulate this kind of funding mechanism of Telangana state to help increase overall green infrastructure.

The trees outside forests (TOFs) are the only possible way to increase forest and tree cover to the national target of 33% and agroforestry accounts for a predominant share in the TOFs area in states like Haryana and Punjab (Arunachalam et al., 2021). ICAR-CAFRI (Central Agroforestry Research Institute) has reported about 26.33 m ha area under agroforestry in the country at present and another area of about 25 m ha has the potential in the country to develop suitable agroforestry models according to different climatic zones (Ahmad et al., 2019). Yamuna Nagar city of Haryana is called capital city of Plywood in India due to presence of number of plywood and veneer industries besides one paper mill. Farmers grow sufficient quantities of Eucalyptus and Poplar trees in their fields to feed these mills. Moreover, recently Haryana Government has decided to give licenses to more such mills, thereby promoting further agroforestry in the region around Yamuna Nagar, Jagadhari and Kurukshetra districts. Other state governments can emulate the Yamuna Nagar model of promoting such mills by encouraging farmers to grow suitable agroforestry trees. Providing farmers with quality planting stock, buy back arrangement by industries are the necessary prerequisites for this kind of endeavor. Providing minimum support price (MSP) by the respective state governments to the tree growers can help convert barren landscapes to greener ones in most farm lands of the nation. Boosting agroforestry shall also help in saving precious foreign reserves to the tune of about US \$ 4.5 billion per year and would be a win-win situation for the government, farmers and the industry.

It is clear from above discussion that ongoing national programmes have failed to improve forest and tree cover of the country in desired way, therefore, afforestation should be promoted aggressively through joint forest management (JFM, peoples' participation) of forests. Participation of people, particularly those dependent on forests for their livelihood, needs to be encouraged. The decade of 1990–2000 was an era of upward trajectory of JFM where degraded forests were revived; benefits flowed to communities in the form of employment, wages and non-timber forest products. But after that JFM has been experiencing a declining phase (Bhattacharya et al., 2010). Most important reasons being hand picking of JFM communities by the state forest

departments, lack of conflict resolution mechanism, absence of poor people's participation, inefficient institutional arrangement and lack of trust between communities and state forest departments (Behera, 2009; Singh et al., 2011).

#### 4. Conclusion

Policy makers, politicians, bureaucrats and State forest departments have to take steps to resolve above mentioned issues of JFM, emphasizing promoting agroforestry by involving farmers, creating a sustainable & dedicated green fund learning from Telangana state afforestation model for overall management, protection, conservation and betterment of Indian forests to achieve the target of covering one third of the country's area with forest and tree cover and for quality forests.

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