International Journal of Policy Sciences and Law

Volume 1, Issue 3

Existential Repercussions of Development: Deforestation caused by Haphazard Urbanisation and Rapid Industrialisation

Mehar Pandya[1] and Kushagra Didwania[2]

1 *B.A Programme, Political Science and English Literature, Kirori Mal College, University of Delhi, India*
2 *Welham Boys School, Varanasi, India*

Abstract

In developing countries, deforestation is rising at an alarming rate. The dwindling forest cover of India has had various consequences; a vicious cycle of the causes and effects of deforestation can be observed. Factors like urbanisation, industrialisation, agricultural activities, commercial logging, mining and forest fires, all seem to stem from the increased demand for goods and services borne out of population growth. This paper reviews some of the most concerning incidents of deforestation in India and analyzes the relationship between deforestation and its prime causes. Through two case studies of large scale deforestation in Hasdeo Arand Forest and Uttar Kannada, it aims to bring out the complexity of various factors which play a major role in the depletion of forest cover. In the short term, deforestation is caused due to population growth (developmental activities) and agricultural expansion, aggravated over the long term by wood harvesting for fuel and export. The paper also critically reviews the existing governmental laws and policies which seek to regulate deforestation and promote the regeneration of forests. This paper concludes with some recommendations which strive to enhance the existing efforts made by authorities and other relevant entities, highlighting the primary aspects of the problem which need to be focussed upon.

Keywords: *Deforestation, Urbanisation, Industrialisation, Development, Environmental Degradation, Forest Cover, Environmental Legislation in India*

1.0 Introduction

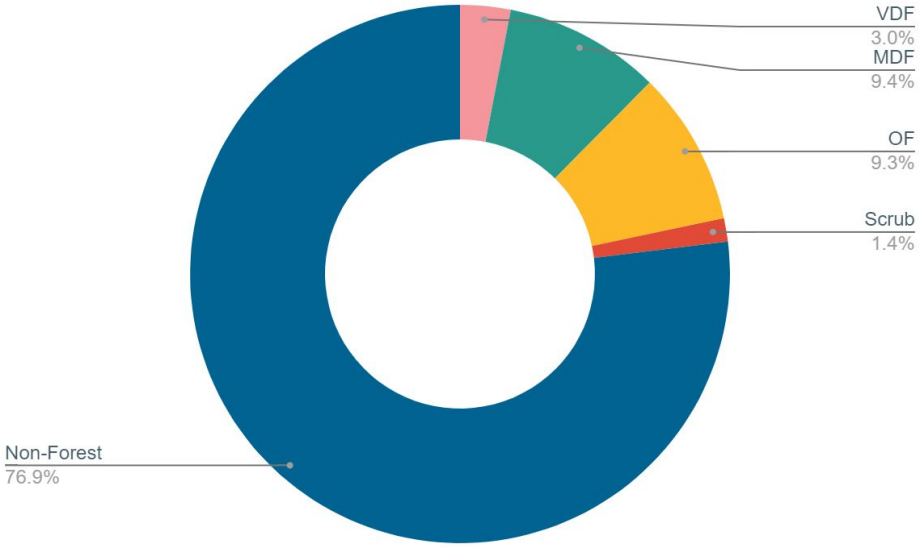
Deforestation is one of the major factors contributing to the global existential emergency that the current generation is facing, i.e., climate change. It broadly refers to the activity of clearing out a forest area for non-forest use or purpose. Our entire ecosystem has been built and sustained through these natural forests and an unplanned way of clearing out massive areas of such natural forests inevitably results and will continue to result in perilous consequences. With the onset of the Industrial Revolution as well as the Green Revolution in India, there was a sharp fall in the forest cover of our country. The natural forests have been cleared out for agricultural uses and methods like shifting cultivation have led to a decline in soil fertility.

Moreover, with the rise in population, followed by the rise of urbanisation, the unorganised expansion of the settlement areas have occurred at the cost of the environment and ecology. Similarly, the rise of industries, mining activities and lack of strict regulation has heavily contributed to deforestation.

The removal of natural forests has inevitably led to habitat destruction; the sudden habitat loss often has a fatal impact on biodiversity, further leading to disastrous consequences affecting several species including humans. With the aim of imposing necessary control and regulations on land use, the Government of India has implemented various policies and laws such as the Forest Conservation Act 1980, Wildlife Protection Act 1972, and the like. However, the relaxation or violation of certain laws with regard to clearing out natural forests is often overlooked due to the notion of development. Through a few case-studies (inductive method) and predominantly qualitative research, this paper aims to provide an in-depth understanding of deforestation which leads to a colossal imbalance in the ecology, significantly impacting aspects of health, biodiversity and the environment. It also seeks to provide recommendations to regulate land use and preserve the existing natural forests.

2.0 Deforestation in India

The total forest area of the world stands at 4.06 billion hectares, forming 31% of the global land area, (United Nations, 2020, p. 1). In the Indian State of Forest Report (ISFR) from the Ministry of Environment Forest and Climate Change, (2019, chapter 2, p. 22), the total forest cover of India expands to over 7,12,249 sq/km, forming 21.67% of the total geographical area. The ISFR has also stated that the 'recorded forest area', i.e., land notified as forest by the government, in the tribal districts (comprising 60% of India's forests), is decreasing. The ideal forest cover of 33% has not yet been achieved by our country and deforestation can still be observed, with a myriad of factors resulting in the same.



The above-given Pie Chart is based on the data provided by the Indian State of Forest Report 2019

As per the data given in the ISFR 2019, the Very Dense Forests (VDF), Moderately Dense Forests (MDF) and Open Forests (OF) from the forest cover, together constituting 21.76% of geographical area (7,12,249 sq km). Scrub constitutes 1.4%, covering 46,297 sq km of land. While the Non-Forest area constitutes 76.9% of the geographical area of our country, encompassing 25,28,923 sq km of land.

2.1 Urbanisation

Urbanisation is one of the primary characteristics of a rapidly developing economy like India. However, along with the positive impacts, haphazard urbanisation tends to result in adverse consequences which heavily result in environmental degradation. In India from 2001 to 2019, 4.5% of tree cover loss occurred in areas where the dominant drivers of loss (primary drivers being urbanisation, commodity-driven deforestation and shifting agriculture) resulted in deforestation (The Sustainability Consortium, World Resources Institute, and University of Maryland. “Tree Cover Loss by Driver.”).

2.1.1 Migration from rural areas to urban areas

"Urbanisation is a form of social transformation from traditional rural societies to modern, industrial and urban communities. It is a long term continuous process. It is the progressive concentration of population in urban units. Kingsley Davies has explained urbanisation as a process of switching from the spread-out pattern of human settlements to one of concentration in urban centres" (Ali, Ershad. (2020). Urbanisation in India: Causes, Growth, Trends, Patterns, Consequences & Remedial Measures. 10.13140/RG.2.2.19007.05284). The census of 2011 states that 31% of the country's population resides in urban areas. While a survey by the United Nations forecasts that by 2030, approximately 40% of the population would have migrated to urban areas. This increasing rate of migration of the population from rural areas to urban areas has resulted due to the overall desire to achieve better standards of living. This includes not only basic necessities like adequate housing, clothing, healthcare, education, transportation and increased employment opportunities but also improved social status in accordance with the societal norms.

"Seven of every 10 Indians live in settlements designated as 'rural.' The spatial expansion and penetration of urban development in rural hinterlands is leading to reduced farmlands and changing occupational patterns of villagers, seen in a shift to non-agricultural work" (Aijaz, 2021). Due to the rush of migrants to urban areas, an expansion of urban settlements is being observed. This augmentation, accumulation and spatial extension of urban settlements into rural areas have led to several socio-economic and environmental changes. The occupational shift from the primary sector to secondary and majorly tertiary/service sector has severely impacted the land-use in our country with the decrease in farmlands and the increase in the influence of industrialisation. These extended settlement patterns due to the inflow of the migrated population have inevitably resulted in construction activities at the cost of the environment. As per the Economic Survey 2017-18, the construction and the real estate sector together form the 2nd largest employment providing sector of the country. In 2019, Fitch Solutions had also predicted that the buildings sector would grow by 6.6% in the following year due to a combination of government policies focussed on providing housing as well as heavy fiscal support.

The unregulated rise in construction activities, in and around farmlands and suburbs of the city is undoubtedly contributing to the loss of green cover of the city. Ignorance of relevant regulations has led to unchecked deforestation and a rise in air, water, land and noise pollution levels.

2.1.2 Population growth resulting in increased demand

As per the latest data provided by the World Bank, the population of India in 2019 stood at 1,366,417.75. "India is expected to add nearly 273 million people between 2019 and 2050, surpassing China as the world's most populous country around 2027" (United Nations, 2019, pp. 1–12). The rate of population growth is said to be gradually declining however the population of the country is projected to grow and in about six years become the most populated country globally. Population growth and migration to urban areas are two interrelated aspects while referring to the hazardous impact of urbanisation on the environment.

"One conservation challenge is that average population density and growth rates are significantly greater in areas with high biodiversity than in the other habitable parts of Earth's surface. For instance, in sub-Saharan Africa, human population density is greatest in areas with the highest number of species of birds, mammals, snakes, and amphibians. Some of these species are threatened with extinction. Nearly 20 per cent of the world's population (1.2 billion people) lives in these 'biodiversity hotspots.' This leads to conflict between biodiversity and forest conservation, population, and makes development almost impossible to avoid." (Population Growth and Deforestation: A Critical and Complex Relationship – Population Reference Bureau, 2004) The rise in population, especially in biodiversity hotspots, leads to the rise in demand for basic necessities including natural resources. Basic necessities comprise adequate infrastructure for housing, healthcare, education, transportation, etc. along with natural resources such as food, water and the like. The increased demand as well as the extension of urban settlements undoubtedly leads to unregulated deforestation for adequate infrastructure and housing require clearing out of either agricultural lands or natural forests. In such cases (especially the latter), the concept of compensatory afforestation is introduced, however, planting more trees in and around the cities might try to increase the tree cover but would not succeed in replacing the ecosystems which are lost.

2.2 Industrialisation

The main cause for the depletion of forest lands is that the developing countries are emptying them to accommodate their ever-growing population, fulfilling their infrastructural and industrial needs. The use of forestry resources by the human population is done generally in two ways. Firstly, the human population uses forest resources to fulfil the growing demand for fuel, fodder for cattle required for milk production, medicine, etc. directly by cutting trees, plants, herbs, grasses, etc. without clearing the forest land. Secondly, for the development of infrastructure, forest stands are cut in large segments to construct farmhouses, cattle farms, housing colonies, health and recreation centres, to set up industrial units, to use the land for agriculture, etc. The number of such projects related to development increases immensely as population density increases leading to the augmentation of industrialization. If the focus is on the wood-based industries, forest trees are used for manufacturing logs, planks, wooden tiles, furniture etc. by cutting forest stands (Modelling the Depletion of Forestry Resources by Population and Population Pressure Augmented Industrialization, 2009).

Over the last 30 years, forests nearly two-thirds the size of Haryana have been lost to encroachments (15,000 sq km) and 23,716 industrial projects (14,000 sq km), according to government data, and artificial forests cannot be replaced, as the government recently acknowledged (Himadri Ghosh, IndiaSpend.com, 2016).

2.2.1 Effects of toxins released by various industries

Toxic chemicals are substances that can be poisonous or have an ill effect on health as they don’t break down easily in the environment. These chemicals end up constituting a part of the tissues of small organisms, which can move up through the food chain. Toxic waste can harm people, animals, and plants, whether it ends up in the ground, in streams, or even in the air. Some toxins, such as mercury and lead, persist in the environment for many years and accumulate over time. In the past, many hazardous wastes were only loosely regulated, allowing substantial contamination of communities and the environment. In India, toxic waste has been overseen by the Ministry of Environment, Forest and Climate Change (MoEFCC), as well as state departments of environmental protection. It now requires that hazardous waste be handled with special precautions and be disposed of in designated facilities.

The United States Environmental Protection Agency (EPA) regulates more than 80 toxins released by various industries, from asbestos and dioxin to lead and chromium (Folk, 2020). Caged compounds are molecules or ions of physiological interest, e.g. ATP, IP3, cAMP, cGMP, GTP and Ca2+ rendered inactive by chemical modification. The modification introduces a photochemically labile bond, which on exposure to ultraviolet light cleaves rapidly, releasing the active compound (Flash Photolysis of Caged Compounds: New Tools for Cellular Physiology, 1989).

2.3 Agricultural Activities

Every year, industrial agriculture is contributing to deforestation in over five million hectares of forest lands, a new analysis has shown (Curtis et al., 2018). Various attempts have been made to reduce deforestation, the amount of forest land taken over by industrially valuable crops, like palm oil trees, has remained steady from 2001 to 2015. The real players behind the deforestation pattern are the corporates. Destruction of forests for the plantation of selective crops that are profitable lies at the core of the issue. Although corporate commitments on reducing deforestation have had some positive effect in the Amazon basin, the current trend hints towards its inadequacy. Five major causes of agricultural deforestation are wildfire, large-scale agriculture, small-scale agriculture, urbanisation and logging of trees. Agricultural production in developing countries has increased by 3.3–3.4% annually over the last 2 decades, whereas gross deforestation has increased agricultural area by only 0.3%, suggesting a minor role of forest conversion in overall agricultural production. A spatial delinking of remaining forests and intensive production areas should also help reconcile conservation and production goals in the future (Folk, 2020).

Drivers of deforestation can be divided into so-called “immediate” and “underpinning” drivers. The underpinning drivers are as follows:

- Demographic factors: population growth and density, urbanization and migration
- Economic factors: changes in relative prices, economic structures, shifts in demand for commodities, infrastructure development

- Technological factors: technological progress to increase agricultural production
- Policy and institutional factors: macro-economic policies, tenure rights, corruption, access to loans, education
- Cultural factors: public and individual attitudes and values, lack of concern about forests, rent-seeking, frontier mentality

2.3.1 Case Study- Uttar Kannada

"Uttar Kannada is a heavily forested district in the state of Karnataka in the western part of the country. Roughly 80 per cent of the land here is still under forest cover. The district is unique in that it traverses five important terrestrial ecozones. From the west to the east there is the narrow coastal plain, the evergreen and moist deciduous forests of the Western Ghats, the dry deciduous forests and further east the scrublands, making it one of the important centres of biodiversity in the Western Ghats. People have traditionally been involved in agroforestry and have maintained unique multi-tiered spice orchards dominated by betel nuts (Areca catechu).

1) Destruction of the Forests - Forest cover in the area has been steadily coming down over the last several decades. The major causes have been many developmental projects like the paper industry, hydro projects and even a nuclear power plant. The West Coast paper mill has been responsible for the disappearance of a large chunk of forests. The mill has unfairly high subsidies and has been allowed to go on in spite of not having adequate effluent treatment facilities. They have even managed to get portions of the Dandeli Wildlife Sanctuary denotified for the purpose of bamboo extraction and continue to press for more de-notifications of the protected areas. The Supa dam was built over the river Kali in 1976 and large tracts of forests were submerged in the reservoir. The townships that were created for the government employees and for the dam also resulted in further destruction. There is a proposal for a similar project over the river Sharawati but it has met with stiff opposition from the local communities. The forest department, too, has played a major role in forest decimation, particularly with large-scale commercial forestry operations, which are among the largest in the state.

2) The action of the Local Communities - In the late 1970s local communities got together and began protesting against the indiscriminate destruction of the forests which had been relatively intact over centuries. They launched a movement called Appiko, akin to the popular Chipko movement of the Himalayas (Hedge, 1998). Since then various local groups have become involved in forest-related research and activism. In recent years they have also protested against coastal destruction; lobbying against major aquaculture projects, a barge-mounted power plant and a huge five-star tourist resort. They have also exposed some of the harsh realities of the capital intensive Overseas Development Agency (ODA) funded Joint Forest Management (JFM) project in the area. Pandurang Hegde who spearheaded the Appiko movement and is now with the Parisara Samarakshana Samiti will be conducting the case study on the underlying causes of deforestation in the district along with other volunteers, individuals and groups."
(Hegde, P. 1998. Chipko and Appiko: how people save the trees. Nonviolence in Action Series; Quaker Peace and Service.).

2.4 Commercial Logging

Logging is the commercial felling of trees to manufacture products. Deforestation, on the other hand, is defined as the complete removal of the forest and all of its associated life forms. In other words, logging is an action and deforestation is the end result. The massive, unsustainable illegal logging industry makes its millions by meeting the rampant demands for cheap lumber, paper products, and fuel. Trees are good for all three, and so few people understand that the price for cheap and readily available paper towels is the inexorable destruction of about 27 soccer fields worth of trees every minute (Krosofsky, 2020). Tropical deforestation continues at a very alarming rate. Certain forms of deforestation are economically desirable, but economic criteria alone are not sufficient for deciding whether a deforestation project is desirable or not. Previous studies on deforestation mechanisms have been grouped into four general categories, i.e. Neo-Malthusian, government-failure, microeconomic and macroeconomic approaches. The Neo-Malthusian approach sees population pressure as the underlying cause of tropical deforestation. The government-failure approach looks at misdirected policies that result in unintended deforestation and the government's inability to prevent deforestation.

The microeconomic approach examines how, under various forms of market failure, an agent's economic behaviour can lead to deforestation. The macroeconomic approach explores the possible links between debt and deforestation. We also present micro-level evidence of a case where deforestation can be associated with farmers' capital accumulation behaviour, and poverty is a deterrent to, not a cause of, deforestation (*Deforestation Mechanisms: A Survey | Emerald Insight*, 1999).

2.5 Mining

Mining refers to the activity of extracting minerals and other geographic materials from the Earth which are of great economic significance to the miner. This industry contributes about 2.4% of the country's GDP (Menon & Nair, 2018). "The value of mineral production (excluding fuel minerals, atomic minerals and minor minerals) at Rs. 7046 crore in February 2020 increased by 1.9% as against Rs.6913 crore in the previous month; the value at Rs.68577 crore during April 2019 - February 2020 increased by 3.5% as compared to the corresponding period of the previous year. Of the total value of mineral production in February 2020, iron ore accounted for Rs. 4765 crores or 67.6%, limestone Rs. 768 crore or 10.9%, zinc conc. Rs. 579 crore or 8.2%, chromite Rs. 270 crore or 3.8%, manganese ore Rs. 176 crore or 2.5% and lead conc. Rs. 154 crore or 2.2%. These six minerals together contributed 95.2% of the total value of mineral production. The remaining 4.8% was shared by the rest of the minerals." (Indian Bureau of Mines, 2020, p. 6).

Mining inevitably requires clearing out of forest lands in order to extract the relevant minerals, thereby becoming one of the primary reasons behind deforestation. "Of the 14,000 sq km of forests cleared over three decades, the largest area was given over to mining (4,947 sq km), followed by defence projects (1,549 sq km) and hydroelectric projects (1,351 sq km), according to data from the Compensatory Afforestation Fund Management and Planning Authority (CAMPA), run by the ministry of environment and forests." (Himadri Ghosh, IndiaSpend.com, 2016). "Along with legally sanctioned mining, large-scale illegal mining, often allowed under political patronage, forms another major source of deforestation.

A recent study of mining-driven deforestation covering over 300 districts points out that **states that account for about 35 per cent of India's forest cover - Odisha, Chhattisgarh, Madhya Pradesh, Karnataka, and Jharkhand— also produce large amounts of coal and iron**. Some of these states have consistently recorded forest cover decrease in the recent past according to official forest cover data. Districts with coal mining – Chhattisgarh, Jharkhand, and Madhya Pradesh- have witnessed 519 km2 of forest cover reduction compared to districts that do not have coal mines." (India: Mining, Deforestation and Conservation Money | WRM in English, 2019).

Mining activities are supposed to be adequately regulated by the government bodies; the entire process of receiving the approval for felling trees for mining purposes is said to be elaborate and extensive. The Forest Conservation Act, 1980 and the Forest Rights Act, 2006 focuses on keeping proper checks on this sector however very often these rules and regulations are found to be ignored by the relevant authorities, thus resulting in illegal mining.

2.5.1 Case Study - Hasdeo Arand Forest in Chhattisgarh:

Chhattisgarh, a state which significantly contributes to the country's forest cover (comprising forests in about 40% of its geographical area), has fallen prey to rapid coal mining. Severe deforestation can be observed in the Hasdeo Arand Forest wherein the land is being allowed to be put to a "non-forest use", thereby detrimentally influencing not only the existing biodiversity and the ecology overall but also the forest cover of the entire country.

"The recent approval of 1.7 lakh hectares of forest land in the Hasdeo Arand forest stretch in Chhattisgarh for open cast coal mining (non-forest use) has raised concerns for the future of the country's forests. The government's decision is indeed alarming, as the total forest land diverted for non-forest use in Chhattisgarh between 1980 and 2003 was 1.71 lakh hectares, out of which 67 per cent was for mining, according to the report (submitted in 2009) of the Committee of Land Reforms and State Agrarian Relations (CLSR). The committee, in its report, had expressed alarm over the trend of diversion of forest land for non-forest use and the total amount of land which has been diverted thus far in the country as a whole.

The committee noted that the situation has only worsened since 1976 when the central government issued new guidelines to states for consultation of the former before diversion of more than 10 hectares of forest land for non-forest use. As compared to the period between 1952 and 1976, when a total of 4.3 million hectares of land was diverted from the corpus of forest land, total land diverted between 1976 and 2008 stood at 7.76 million hectares. This is a 40 per cent increase in the total forest land diverted per year. The report reveals that the maximum diversion, **55 per cent of the total forest land diverted**, was recorded between 2001 and 2008. It also notes that the **environmental cost of loss of forest for this diversion was estimated at Rs 30,923 crores**. It further suggested that institutional mechanisms to reduce the impact of forest diversions such as the rehabilitation and resettlement policy, the system of compensatory afforestation and the concept of Net Present Value have been **'less than satisfactory**.'

It highlights as a case in point that **only 7.38 per cent of the target has been achieved** for compensatory afforestation between 1980 and 2004. In this period, in a total of 10,807 cases, 9,54,839.026 hectares of forest land were diverted and the total area stipulated for compensatory afforestation was 96,452.48 hectares. The actual target achieved was 71,224.85 hectares. Up to 1994, the year till which the data was available to the committee, **a total area of 2.53 lakh hectares had been degraded due to industrial and mining waste. A whopping 571.55 lakh hectares of land was degraded due to water erosion.**

The report notes that both these types of land degradation happen due to 'felling of trees and industrial establishments which do not have any waste management.' It is concerning that **the data after 1994 is not available** for land degradation, especially in light of the fact that the forest land diversion for mining and other non-forest purposes has rapidly picked up pace since then. Between 2000 and 2015, **a total of 518 proposals were received** by the Ministry of Environment and Forests (MoEF) for mining projects, including coal and iron ore mining. Out of these, a total of **423 proposals were approved**, while 40 were rejected with **an approval rate of 81.7 per cent**. With such a high approval rate for the diversion of forest lands, it becomes pertinent to highlight the observations made in the CLSR report regarding the quality of clearances. It says that 'forest clearances' given by the MOEF indicate a 'neo-liberal agenda,' putting critical pressure on forest land.

Unhappy with the Environmental Impact Assessment provisions, the report terms them as 'typically very lax' and unable to serve the 'desired purpose of accountability'. Private players get a huge share of allocations of forest lands. As per the information provided by the Minister of State for MoEF, Anil Madhav Dave, in response to a question asked in Rajya Sabha by Harivansh in 2016, said that the **total area allocated to the private sector** from the forest land utilised since 1980 was **1.2 million hectares**. The maximum land diverted was in Madhya Pradesh, more than three times the land diverted in Chhattisgarh and Maharashtra which were on the second and third position respectively.

Interestingly, in 2009, the Hasdeo Arand forest area had been declared **a no-go zone for mining**, even though it irked the mining lobby. The CLSR report, which was submitted in 2009 to the central government and the **Prime Minister's Office** (PMO), red-flagged the environmental and ecological problems with the forest land diversion. Along with this committee, a National Council of Land Reforms, to be chaired by the prime minister, was also appointed, which was supposed to go over the recommendations of the CLSR report. In almost a decade's time since then, neither has the National Council for Land Reforms met even once nor has the PMO made any progress in acting on the report, as reported earlier by this correspondent. Conversely, a decade after the submission of the CLSR report and the Hasdeo Arand patch being declared a 'no-go' zone, **its diversion for mining is perhaps the single largest diversion ever**." (Chaturvedi, 2019)

Similarly, the Dehing Patkai Wildlife Sanctuary in Assam, located in one of the major rainforests of India, is observing a negative impact on the environment and its biodiversity due to coal mining. Moreover, the health of the tribal community residing there has also been affected due to the mining activities and the disturbances caused in the environment due to the same. Such case studies in the country bring forth a plethora of factors involved in the cause-effect relationship between mining and the geographical area on which it is practised.

Apart from massive environmental degradation consisting of deforestation, habitat destruction, biodiversity loss, land fertility loss and ecological imbalance, mining also has led to an impact on humans who are either employed in this sector or reside in the area where it is taking place.

A direct detrimental impact on human health has resulted from the contamination of natural resources such as land and water surrounding the mining location. Cases of human-animal conflict often arise when the forests are fragmented (primarily due to mining and other industrial activities) and different species confront human settlements (causing further disarray in farmlands and small villages), having been displaced due to sudden loss of their habitat. Thus, a profusion of complexities is brought about by reckless mining practices, adversely affecting both the environment and human society.

2.6 Forest Fires

"Forest Fires or Wildfires refer to any uncontrolled and non-prescribed combustion or burning of plants in a natural setting such as a forest, grassland, brushland or tundra, which consumes the natural fuels and spreads based on environmental conditions (e.g., wind, topography). Wildfires can be triggered by lightning or human actions" (Integrated Research on Disaster Risk, 2014, p. 20). Forest fires had been initially associated with natural causes; known as controlled fires, sometimes forest fires actually helped stimulate the forest's growth and evolution, balancing out the ecosystem. However, in recent years, human activities have significantly impacted the environment and the ecosystem, and have thereby inevitably influenced forest fires as well.

Climate change and the increase in greenhouse gases have led to the heating of the Earth. A rise in temperatures has been yearly observed in India when every year ends up being the hottest year ever experienced. There is a close relationship between the temperature or the weather and forest fires. Forest fires usually start in dry weather, notably during summers, when even the slightest spark in dry leaves and burst into flames. Dry leaves, shrubs and the like act as fuel which further propel and spread the fire. These fires result in the destruction of the thick forest cover, habitat destruction, biodiversity and vegetation loss, along with the societal impact on human health and economic damage. "**Global heating is contributing to forest fires, and those fires are stoking further heating**: **a deadly cycle**. Observations over the past twenty years show that the increasing intensity and spread of forest fires in Asia were largely related to rises in temperature and declines in precipitation, in combination with increasing intensity of land use (IPCC 2007).

Globally, the length of the fire season increased by nearly 19 per cent between 1979 and 2013 (Karlekar, 2020). In India, record-breaking temperatures have driven the forest fire season to an early start, with most forest fires being reported during the summer season. Forest fires greatly increased in number and extent between 2014 and 2018. 2015 (+0.42°C), 2016 (+0.71°C), and 2017 (+0.53°C) were the warmest years on record. Accordingly, forest fires, too, have increased in scale over the same period: 2015 saw 24,817 cases, 2016 saw 35,888 cases, and 2017 had 37,059 cases." (A. Srivastava, 2020).

"According to the India State of Forest Report 2019, over 30,000 incidents of forest fires were reported in India in 2019. Additionally, more than 36 per cent of Indian forest cover (657,000 sq km area) is prone to frequent forest fires and of this, 10 per cent are highly prone, according to a Forest Survey of India (FSI) report on fire-prone forest areas. Around 21 per cent of the total forest cover is high to extremely fire-prone, adds the latest forest survey." (K. Srivastava, 2020)

In India, it is believed that over 95% of fires are of an anthropogenic origin (K. Srivastava, 2020). Several agricultural practices (done to eradicate pests, stimulate the growth of grass, etc), especially if carried out around forest lands, can cause uncontrolled fires. Moreover, sometimes people residing in forests may also set the forest on fire out of vengeance, if they are cast out or unemployed as a daily-wage earner. However, these minor fires are quelled in their initial stages. On the other hand, recent reports suggest the influence of climate change and the rising temperatures on the increasing frequency of forest fires. Conditions of low rainfall or drought, frequent heat waves, and relatively hotter or drier weather conditions resulting from the imminent climate crisis, have led to recurrent uncontrollable forest fires.

3.0 Government of India - Existing Laws and Regulations

Laws and policies revolving around the country's forests had been formulated and implemented even during the colonial rule, before India's independence. Forests form one of the most pivotal components of our country's development and economic progress, providing not only material benefits out of the natural resources but also ensuring the maintenance of a balance in the ecosystem which forms the basis of survival of all species. Historically, civilisations in this country have flourished near a natural resource, predominantly around river banks.

The ancient scriptures and historical biographies of previous rulers reveal the importance of the environment that was preached even at that point in time. Environmental consciousness prevalent years ago can also be found in some of the religious texts and traditions which deify natural elements present in the surroundings.

3.1 Indian Forest Act, 1865

In 1865, the first Indian Forest Act was passed (revised again in 1878); it was considered to be one of the initial attempts of the British colonial powers to introduce 'Environmental Legislation' in India.

3.2 National Forest Policy, 1894

Passed during the colonial era, this policy seemed to highlight the importance of maintaining the forest cover and meeting the rural needs of people dwelling in the forests. However, it emphasized timber management, revenue generation and the importance of agriculture and cultivation over forests.

"The Forest Policy, 1894 advocated that the 'claims of cultivation are stronger than the claims of forest preservation' for all types of forests. The forest policy had its main concern on the growth of agriculture over forestry which not only led to the obliteration of forests from which local inhabitants should have acquired their timber and fuel but "also made the land lose its natural defence" from erosion by wind and water. Whenever the land for agriculture was required for the obtaining of food for the increasing population, the forest area was put up for agricultural use. This was its major drawback because it prioritized agriculture over forestry and put a hold on the forest conservation for the promotion of agriculture which resulted in large scale clearing up of the forest lands for agriculture and other purposes." (International Journal of Legal Developments and Allied Issues, 2019).

3.3 Indian Forest Act, 1927

Another modified Indian Forest Act, 1927 was passed, which gave the state governments the ability to convert private forests into public in the interest of "public good". It also identified three types of forests - Reserved Forests, Village Forests and Protected Forests.

Furthermore, Non-Government Forests are also mentioned in this act, referring to those forests which are not owned by the government but the State possesses the authority to regulate the same in public interests. Before India achieved Independence, such acts or laws did not focus on the conservation of the forest cover but rather reflected the colonial ideas prevalent at the time, of extracting resources and generating material profits. These Acts emphasized more on the cutting of trees and earning an income out of the same along with extracting forest produce. It did not take into account the communities residing in forests and their dependent livelihoods on the same. Thus, such revenue-oriented laws smoothly paved a way for the capitalist entities to exploit the natural resources of the forest instead of 'regulating' the same.

3.4 National Forest Policy, 1952

Passed right after Independence, this policy sought to improve its predecessor by addressing the need for regulation of land use, from agricultural to industrial activities. It introduced the adequate percentage of forest cover the aggregate geographical area of our country should ideally possess, i.e., 33% - 60% of land in hills and 20% of land in fields. It stated how national interest was superior to that of local interest and pointed out the need for balancing land use and encouraging social forestry. However, in the name of 'national interest', the government ended up carrying out various industrial, agricultural, transportation and defence related projects; this marked a great increase in the income generation of the country but inevitably it was at the cost of the environment.

3.5 Forest Conservation Act, 1980

The Forest Conservation Act, passed in 1980, aimed to address the issue of the alarming decrease in the country's forest cover. It stressed the government approval which is needed to utilize forests for a non-forestry purpose, which is usually linked to developmental activities such as irrigation projects, railway lines, transmission lines, defence projects, mining and the like. "Prior to 1980, the rate of diversion of forest lands for non-forestry purposes was about 1.43 lakh hectare per annum. However, with the advent of the Forest (Conservation) Act, 1980, the rate of diversion of forest lands was controlled to a certain extent." (International Journal of Legal Developments and Allied Issues, 2019).

In case of such land diversions for non-forestry purposes, this Act suggested the practice of compensatory afforestation which would be taken up by the relevant entity that is clearing out trees for a developmental purpose.

3.6 National Forest Policy, 1988

This policy aimed to ensure that sustainable efforts are taken across the country in order to preserve as well as regenerate forests. Joint Forest Management programmes were initiated, wherein villages and forest departments collaborated together in managing the forests, ensuring the rural needs are met and making efforts to revive forests, limiting human disturbances in forests and increasing land fertility. A Compensatory Afforestation Fund Management and Planning Authority (CAMPA) was constituted in 2009 to take frequent follow-ups and ensure the implementation of compensatory afforestation in case of land diversions for non-forestry purposes. State CAMPAs are supposed to allocate the received funds in compensatory afforestation activities, conservation and protection of forests, wildlife and natural regeneration.

3.7 The Scheduled Tribe And Other Traditional Forest Dwellers (Recognition Of Forest Rights) Act, 2006

This Act emphasized the rights to land and other resources of tribal or other communities residing in forests, which they were denied due to the influence of colonial laws still prevalent in India (International Journal of Legal Developments and Allied Issues, 2019). Some of the rights which were recognized in the Act are:

- right to **hold and live in the forest land** under the individual or common occupation for habitation or for self-cultivation for livelihood;
- right of **ownership**, access to collect, use, and dispose of minor forest produce;
- other community rights of uses or entitlements such as **fish, grazing and traditional seasonal resource access** of nomadic or pastoralist communities;
- **rights in or over disputed lands** under any nomenclature in any State where claims are disputed;

- right to **protect, regenerate, conserve or manage any community forest resource** which they have been traditionally protecting and conserving for sustainable use;
- right of **access to biodiversity** and community right to **intellectual property** and traditional knowledge related to biodiversity and cultural diversity;
- right to **in situ rehabilitation** including alternative land in cases where the Scheduled Tribes and other traditional forest dwellers have been illegally evicted or displaced from forest land of any description without receiving their legal entitlement to rehabilitation. (Ministry of Law and Justice, 2006, p. 4)

3.8 Draft of National Forest Policy 2018

The latest draft of the National Forest Policy was released in 2018 for public speculation. The draft seems to emphasize the global nature of the environmental crisis that we are facing on this planet, addressing issues like the declining forest cover, animal-human conflict and climate change overall. Apart from suggesting stricter regulations on forests being put for non-forestry purposes, it also puts forth several models revolving around public-private participation, which would aim at several forest regeneration activities like afforestation. However, the draft appears to be a little vague when it suggests private afforestation activities, subtly hinting at the privatization of natural resources. Furthermore, Wildlife Protection Act of 1972, National Mission for a Green India, National Afforestation Program, Mines Act of 1952, Environmental Protection Act of 1986, National Conservation Strategy and Policy Statement on Environment and Development of 1992, National Environmental Policy of 2006 and Biological Diversity Act of 2002, are some of the other major governmental regulatory acts or policies which have been introduced (*India | Forest Legality*, 2014).

4.0 Recommendations

1. There should be regular consistent data collection and analysis when it comes to the forest cover of the country. Methods of quantifying such data should be selected after careful analysis of its implications. Inherently flawed systems of quantifying data result in inaccurate findings. The definitions and scope of technical terms should be revised and updated. Outdated and inconsistent quantified data about the forests of India lead to major hindrances and irregularities during the process of policy formulation which might impact the environmental ecosystem of the country.
2. Land-use regulations should be made as stringent as possible.
    a. Proper research and analysis should be done city-wise; urban planning authorities should focus on developmental planning which is sustainable in nature.
    b. Immediate actions should be taken in the cities to keep a check on its forest cover, make efforts to increase it, promote social forestry and other sustainable elements which can be incorporated in corporate offices of urban areas.
    c. State governments and the relevant authorities must impose strict regulations on land being used for non-forestry purposes in the name of 'development.' Residential schemes and industrial infrastructure introduced by builders and industrialists, especially in areas around the suburbs of the city (where the forest cover usually lies) or national parks and sanctuaries, must be controlled; environmental impact assessments have to be carried out, with thorough research and analysis, before giving the approval. Ignorance or violation of such regulations would have to be severely penalised. Compensatory Afforestation is flawed in nature as it might increase the tree cover in some areas but it would never be able to replace the forests and its ecosystem loss.
3. Environmentally Related Taxation can be properly initiated in India. India has the 4th lowest environmentally related tax revenue as of 2014 (Centre for Tax Policy and Administration, 2014, p. 1). It has been observed that the countries which receive high amounts of environmentally related tax revenue have noticed a reduction in carbon emissions. For India, in-depth research should be carried on activities revolving around industrialisation and urbanisation which deleteriously impact the environment.

Such pollutants should then be significantly taxed in order to disincentive the big corporates or industrialists from taking up those particular projects which lead to a fall in the forest cover as well as a huge ecological loss.

4. Land productivity with regard to agriculture needs to be worked on in order to reduce deforestation. Land fertility and low rate of yield have to be improved in the existing agricultural lands instead of clearing out forests and converting them for agriculture and irrigation purposes. Food and energy security is undoubtedly one of the major concerns and goals of the government with the rising levels of population. Thus, thorough research needs to be carried out in this field of combating low productivity of land; unconventional methods of agriculture, technological innovation, sustainable farming and the like must be focussed upon across the entire country.

5.0 Conclusion

This research paper focused on highlighting six major factors directly resulting in the depletion of the forest cover in India, namely - urbanisation, industrialisation, agricultural activities, commercial logging, mining and forest fires. Migration of population from rural areas to urban areas of the country along with the growth in population is leading to haphazard urbanisation. This further leads to unorganised urban planning, a rise in construction activities and clearing out of farmlands and forests. Growth in population has also contributed significantly to industrialisation because of the rise in demand. The rise of large scale industrial projects from the private sector or at times in collaboration with the government undoubtedly is followed by a depletion of the forest cover.

The agricultural sector and commercial logging activities associated with the same impacts the forests detrimentally as well. Due to the fall in land productivity, forests are being cleared out in order to be converted into agricultural lands. Extracting mineral resources from the Earth through reckless mining activities and the focus on revenue generation instead of ecological conservation contribute to the depletion of forest cover. Massive felling of trees of forests results in loss of biodiversity, habitat destruction, rise in CO2 emissions, and cause colossal damage to the ecology of that area. The rising levels of wildfires across the globe, are also considered to be both a cause and effect of large scale deforestation.

A change of priorities can be observed in the policy-making process of the government throughout the years, from the pre-independence era to the 21st century. The current policies and laws which are formulated, appear to drift away from the colonial ideas of environmental legislation (which predominantly focussed on revenue generation). Instead, a more global perspective is reflected in the recent policies, which highlight the imminent climate crisis faced by the planet. However, there seems to be a gap between the drafting process of such policies and the implementation of the same.

"To protect natural forests from unsustainable use requires the combination of a sound regulatory framework, law enforcement and involvement of stakeholders." (UN-REDD Programme, 2009, p. 3). Deforestation must be combated by the country in order to conserve wildlife and biodiversity, preserve natural resources, help mitigate the climate crisis and restore ecological balance.

References

Aijaz, R. (2021, January 19). *Managing India's urban transition in 2021*. ORF. https://www.orfonline.org/expert-speak/managing-india-urban-transition-2021/

Ali, Ershad. (2020). Urbanisation in India: Causes, Growth, Trends, Patterns, Consequences & Remedial Measures. 10.13140/RG.2.2.19007.05284.

Centre for Tax Policy and Administration. (2014). *Environmentally Related Taxes - Taxes on Energy Use*. OECD.

Chakravartty, A. (2020, November 4). *Assam's tribal communities lost land and forest to mining*. Mongabay-India. https://india.mongabay.com/2020/11/assams-tribal-communities-lost-land-and-forest-to-mining/

Chaturvedi, S. (2019, April 1). *Allocating forest land in Chhattisgarh for coal mini..eforestation has risen significantly in recent decades*. Firstpost. https://www.firstpost.com/india/allocating-forest-land-in-chhattisgarh-for-coal-mining-is-cause-for-alarm-deforestation-has-risen-significantly-in-recent-decades-6367581.html

Curtis, P., Slay, C., Harris, N., Tyukavina, A., & Hansen, M. (2018). Classifying drivers of global forest loss. Science. https://doi.org/10.1126/science.aau3445

FAO. 2020. Global Forest Resources Assessment 2020 – Key findings. Rome. https://doi.org/10.4060/ca8753en

Forest Survey of India. (2019). *India State of Forest Report*. Ministry of Environment, Forest and Climate Change.

Hegde, P. 1998. Chipko and Appiko: how the people save the trees. Nonviolence in Action Series; Quaker Peace and Service.

Himadri Ghosh, IndiaSpend.com. (2016, June 4). *In just 30 years, India has lost large forests to 23,716 industrial projects*. Scroll.In. https://scroll.in/article/809286/in-just-30-years-india-has-lost-large-forests-to-23716-industrial-projects

Karlekar, H. (2020, December 26). Forests in flames. The Pioneer. https://www.dailypioneer.com/2020/columnists/forests-in-flames.html

Krosofsky, A. (2020, December 29). What Is the Difference Between Deforestation and Logging? Green Matters. https://www.greenmatters.com/p/deforestation-vs-logging#:%7E:text=Trees%20are%20good%20for%20all,worth%20of%20trees%20every%20minute.

India | Forest Legality. (2014). World Resources Institute. https://forestlegality.org/risk-tool/country/india

India: Mining, Deforestation and Conservation Money | WRM in English. (2019). World Rainforest Movement. https://wrm.org.uy/articles-from-the-wrm-bulletin/section1/india-mining-deforestation-and-conservation-money/

Indian Bureau of Mines. (2020). *Monthly Statistics of Mineral Production*. Ministry of Mines.

Integrated Research on Disaster Risk. (2014). *Peril Classification and Hazard Glossary*. IRDR DATA Publication No. 1).

International Journal of Legal Developments and Allied Issues. (2019, June 26). *Forest Laws in India – Policy and Assessment*. The Law Brigade Publishers. https://thelawbrigade.com/environmental-law/forest-laws-in-india-policy-and-assessment/#ABSTRACT

Menon, N., & Nair, K. (2018, July 18). *Mining in India*. Lexology. https://www.lexology.com/library/detail.aspx?g=6e1b8cb8-f7bd-4905-9d0e-13a304d9cb4d

Meyerson, F. A. B. (2004). *Population Growth and Deforestation: A Critical and Complex Relationship – Population Reference Bureau*. Population Reference Bureau. https://www.prb.org/populationgrowthanddeforestationacriticalandcomplexrelationship/#:%7E:text=Both%20population%20and%20per%20capita,local%20forests%20and%20land%20use.&text=In%20spite%20of%20significant%20human,net)%20through%20tree%20plantation%20programs.

Ministry of Law and Justice. (2006). *THE SCHEDULED TRIBES AND OTHER TRADITIONAL FOREST DWELLERS (RECOGNITION OF FOREST RIGHTS) ACT, 2006*. Government of India.

P. (2018, January 29). *Realty, construction to generate 15 million jobs by 2022: Economic Survey*. The Economic Times. https://economictimes.indiatimes.com/jobs/realty-construction-to-generate-15-million-jobs-by-2022-economic-survey/articleshow/62696169.cms?from=mdr

P. (2019, December 30). *India's buildings sector to expand by 6.6% next year driven by fiscal support, govt policies: Fitch*. The Times of India. https://timesofindia.indiatimes.com/business/india-business/indias-buildings-sector-to-expand-by-6-6-next-year-driven-by-fiscal-support-govt-policies-fitch/articleshow/73029016.cms

Srivastava, A. (2020). *Forest fires in India*. The Ecologist. https://theecologist.org/2020/sep/11/forest-fires-india

Srivastava, K. (2020, February 29). *Most forest fires in India on account of human activity*. Mongabay-India. https://india.mongabay.com/2020/01/most-forest-fires-in-india-on-account-of-human-activity/

The Sustainability Consortium, World Resources Institute, and University of Maryland. "Tree Cover Loss by Driver." Accessed through Global Forest Watch on 28/01/2021. www.globalforestwatch.org.

UN-REDD Programme. (2009). *Agricultural Expansion and Deforestation*. United Nations.

United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Highlights (ST/ESA/SER.A/423).