



## Management and prevention of historic monuments with respect to environmental issues in India

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### Abstract

Ashoka Pillar Edicts were one of the earliest efforts in India that focused on respecting and preserving the environment, forests and wildlife.

Yajnavalkya Smriti, a historic Indian text on statecraft and jurisprudence, suggested to have been written before the 5th century AD, prohibited the cutting of trees and prescribed punishment for such acts. Kautalya's Arthashastra, written in Mauryan period, emphasised the need for forest administration. Ashoka went further, and his Pillar Edicts expressed his view about the welfare of environment and biodiversity.

"Happiness in this world and the next is difficult to obtain without much love for the dhamma, much self-examination, much respect, much fear of evil, and much enthusiasm. Beloved-of-the-Gods, King Piyadasi (Ashoka), speaks thus: Animals were declared to be protected – parrots, mainas, aruna, geese, wild ducks, nandimukhas, gelatas, bats, queen ants, terrapins, boneless fish, vedareyaka, gangaputaka, sankiya fish, tortoises, porcupines, squirrels, deer, bulls, okapinda, wild asses, wild pigeons, domestic pigeons and all four-footed creatures that are neither useful nor edible. Also protected were nanny goats, ewes and sows which are with young or giving milk to their young, and so are young ones less than six months old. Cocks are not to be caponised, husks hiding living beings are not to be burnt, and forests are not to be burnt either without reason or to kill creatures. One animal is not to be fed to another. Our king killed very few animals.

— Ashoka's Seven Pillar Edicts

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### Introduction

British rule of India saw several laws related to the environment. Amongst the earliest ones were Shore Nuisance (Bombay and Kolaba) Act of 1853 and the Oriental Gas Company Act of 1857. The Indian Penal Code of 1860, imposed a fine on anyone who voluntarily fouls the water of any public spring or reservoir. In addition, the Code penalised negligent acts. British India also enacted laws aimed at controlling air pollution. Prominent amongst these were the Bengal Smoke Nuisance Act of 1905 and the Bombay Smoke Nuisance Act of 1912. Whilst these laws failed in having the intended effect, British-enacted legislations pioneered the growth of environmental regulations in India. Upon independence from Britain, India adopted a constitution and numerous British-enacted laws, without any specific constitutional provision on protecting the environment. India amended its constitution in 1976. Article 48(A) of Part IV of the amended constitution, read: The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country. Article 51 A (g) imposed additional environmental mandates on the Indian state. Other Indian laws from recent history include the Water (Prevention and Control of Pollution) Act of 1974, the Forest (Conservation) Act of 1980, and the Air (Prevention and Control of Pollution) Act of 1981. The Air Act was inspired by the decisions made at Stockholm Conference. The Bhopal

gas tragedy triggered the Government of India to enact the Environment (Protection) Act of 1986. India has also enacted a set of Noise Pollution (Regulation & Control) Rules in 2000. In 1985, Indian government created the Ministry of Environment and Forests. This ministry is the central administrative organisation in India for regulating and ensuring environmental protection. Despite active passage of laws by the central government of India, the reality of environmental quality mostly worsened between 1947 to 1990. Most of Indian economy was nationalised and owned by India, and regulations were mostly ignored by state run enterprises. Rural poor had no choice, but to sustain life in whatever way possible. The state governments of India often regarded environmental laws enacted by the central government as a mere paperwork formality. Air emissions increased, water pollution worsened, forest cover decreased. Starting in the 1990s, reforms were introduced. Since then, for the first time in Indian history, major air pollutant concentrations have dropped in every 5-year period. Between 1992 to 2010, satellite data confirms India's forest coverage has increased for the first time by over 4 million hectares, a 7% increase.

### Causes

Some have cited economic development as the cause regarding the environmental issues. Others believe economic

development is key to improving India's environmental management and preventing pollution of the country. It is also suggested that India's growing population is the primary cause of India's environmental degradation. Systematic studies challenge this theory. Empirical evidence from countries such as Japan, England and Singapore, each with population density similar or higher than India, yet each enjoying environmental quality vastly superior than India, suggests population density may not be the only factor affecting India's issues.

### Major issues



Fig 1

Floods are a significant environmental issue for India. It causes soil erosion, destruction of wetlands and wide migration of solid wastes. Major environmental issues are forest and agricultural degradation of land, resource depletion (water, mineral, forest, sand, rocks etc.), environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystems, livelihood security for the poor. The major sources of pollution in India include the rampant burning of fuelwood and biomass such as dried waste from livestock as the primary source of energy<sup>[7]</sup>, lack of organised garbage and waste removal services, lack of sewage treatment operations, lack of flood control and monsoon water drainage system, diversion of consumer waste into rivers, cremation practices near major rivers, government mandated protection of highly polluting old public transport, and continued operation by Indian government of government owned, high emission plants built between 1950 to 1980. Air pollution, poor management of waste, growing water scarcity, falling groundwater tables, water pollution, preservation and quality of forests, biodiversity loss, and land/soil degradation are some of the major environmental issues India faces today. India's population growth adds pressure to environmental issues and its resources.

### Population growth and environmental quality



Fig 2

Public dumping of rubbish alongside a road in Kolkata. There is a long history of study and debate about the interactions between population growth and the environment. According to a British thinker Malthus, for example, a growing population exerts pressure on agricultural land, causing environmental degradation, and forcing the cultivation of land of poorer as well as poorer quality. This environmental degradation ultimately reduces agricultural yields and food availability, causes famines and diseases and death, thereby reducing the rate of population growth. Population growth, because it can place increased pressure on the assimilative capacity of the environment, is also seen as a major cause of air, water, and solid-waste pollution. The result, Malthus theorised, is an equilibrium population that enjoys low levels of both income and environmental quality. Malthus suggested positive and preventative forced control of human population, along with abolition of poor laws. Malthus theory, published between 1798 and 1826, has been analysed and criticised ever since. The American thinker Henry George, for example, observed with his characteristic piquancy in dismissing Malthus: "Both the jayhawk and the man eat chickens; but the more jayhawks, the fewer chickens, while the more men, the more chickens." Similarly, the American economist Julian Lincoln Simon criticised Malthus's theory. He noted that the facts of human history have proven the predictions of Malthus and of the Neo-Malthusians to be flawed. Massive geometric population growth in the 20th century did not result in a Malthusian catastrophe. The possible reasons include: increase in human knowledge, rapid increases in productivity, innovation and application of knowledge, general improvements in farming methods (industrial agriculture), mechanisation of work (tractors), the introduction of high-yield varieties of wheat and other plants (Green Revolution), the use of pesticides to control crop pests. More recent scholarly articles concede that whilst there is no question that population growth may contribute to environmental

degradation, its effects can be modified by economic growth and modern technology. Research in environmental economics has uncovered a relationship between environmental quality, measured by ambient concentrations of air pollutants and per capita income. This so-called environmental Kuznets curve shows environmental quality worsening up until about \$5,000 of per capita income on purchasing parity basis, and improving thereafter. The key requirement, for this to be true, is continued adoption of technology and scientific management of resources, continued increases in productivity in every economic sector, entrepreneurial innovation and economic expansion. Other data suggests that population density has little correlation to environmental quality and human quality of life. India's population density, in 2011, was about 368 human beings per square kilometre. Many countries with population density similar or higher than India enjoy environmental quality as well as human quality of life far superior than India. For example: Singapore (7148 /km<sup>2</sup>), Hong Kong (6349 /km<sup>2</sup>), South Korea (487 /km<sup>2</sup>), Netherlands (403 /km<sup>2</sup>), Belgium (355 / km<sup>2</sup>), England (395 /km<sup>2</sup>) and Japan (337/ km<sup>2</sup>).

### Water pollution

#### *Water pollution in India*



**Fig 3**

The Taj Mahal next to the Yamuna river. India has major water pollution issues. Discharge of untreated sewage is the single most important cause for pollution of surface and ground water in India. There is a large gap between generation and treatment of domestic waste water in India. The problem is not only that India lacks sufficient treatment capacity but also that the sewage treatment plants that exist do not operate and are not maintained [18]. The majority of the government-owned sewage treatment plants remain closed most of the time due to improper design or poor maintenance or lack of reliable electricity supply to operate the plants, together with absentee employees and poor management. The waste water generated in these areas normally percolates in the soil or evaporates. The uncollected wastes accumulate in the urban areas cause unhygienic conditions and release pollutants that leaches to surface and groundwater. According to a World Health Organization study, out of India's 3,119 towns and cities, just 209 have partial sewage treatment facilities, and only 8 have full wastewater treatment facilities. Over 100 Indian cities dump untreated sewage directly into the Ganges River.

Investment is needed to bridge the gap between 29000 million litre per day of sewage India generates, and a treatment capacity of mere 6000 million litre per day. Other sources of water pollution include agriculture run off and small scale factories along the rivers and lakes of India. Fertilizers and pesticides used in agriculture in northwest have been found in rivers, lakes and ground water. Flooding during monsoons worsens India's water pollution problem, as it washes and moves all sorts of solid garbage and contaminated soils into its rivers and wetlands.

### Air pollution

#### *Air pollution in India*



**Fig 4**

A rural stove using biomass cakes, fuelwood and trash as cooking fuel. Surveys suggest over 100 million households in India use such stoves (chullahs) every day, 2–3 times a day. It is a major source of air pollution in India, and produces smoke and numerous indoor air pollutants at concentrations 5 times higher than coal. Clean burning fuels and electricity are unavailable in rural parts and small towns of India because of poor rural highways and limited energy generation infrastructure. Air pollution in India is a serious issue with the major sources being fuelwood and biomass burning, fuel adulteration, vehicle emission and traffic congestion. Air pollution is also the main cause of the Asian brown cloud, which is causing the monsoon to be delayed. India is the world's largest consumer of fuelwood, agricultural waste and biomass for energy purposes. Traditional fuel (fuelwood, crop residue and dung cake) dominates domestic energy use in rural India and accounts for about 90% of the total. In urban areas, this traditional fuel constitutes about 24% of the total. Fuel wood, agri waste and biomass cake burning releases over 165 million tonnes of combustion products into India's indoor and outdoor air every year. These biomass-based household stoves in India are also a leading source of greenhouse emissions contributing to climate change. The annual crop burning practice in northwest India, north India and eastern Pakistan, after monsoons, from October to December, are a major seasonal source of air pollution. Approximately 500 million tons of crop residue is burnt in open, releasing smoke, soot, NO<sub>x</sub>, SO<sub>x</sub>, PAHs and particulate matter into the air. This burning has been found to be a leading cause of smog and haze problems through the winter over Punjab, cities such

as Delhi, and major population centers along the rivers through West Bengal. In other states of India, rice straw and other crop residue burning in open is a major source of air pollution. Vehicle emissions are another source of air pollution. Vehicle emissions are worsened by fuel adulteration and poor fuel combustion efficiencies from traffic congestion and low density of quality, high speed road network per 1000 people. On per capita basis, India is a small emitter of carbon dioxide greenhouse. In 2009, IEA estimates that it emitted about 1.4 tons of gas per person, in comparison to the United States' 17 tons per person, and a world average of 5.3 tons per person. However, India was the third largest emitter of total carbon dioxide in 2009 at 1.65 Gt per year, after China (6.9 Gt per year) and the United States (5.2 Gt per year). With 17 percent of world population, India contributed some 5 percent of human-sourced carbon dioxide emission; compared to China's 24 percent share. The Air (Prevention and Control of Pollution) Act was passed in 1981 to regulate air pollution and there have been some measurable improvements. However, the 2012 Environmental Performance Index ranked India as having the poorest relative air quality out of 132 countries.

### Solid waste pollution

#### *Solid waste policy in India*



Fig 5

Trash and garbage disposal services, responsibility of local government workers in India, are ineffective. Solid waste is routinely seen along India's streets and shopping plazas. Image shows solid waste pollution along a Jaipur street, a 2011 image. Trash and garbage is a common sight in urban and rural areas of India. It is a major source of pollution. Indian cities alone generate more than 100 million tons of solid waste a year. Street corners are piled with trash. Public places and sidewalks are despoiled with filth and litter, rivers and canals act as garbage dumps. In part, India's garbage crisis is from rising consumption. India's waste problem also points to a stunning failure of governance. In 2000, India's Supreme Court directed all Indian cities to implement a comprehensive waste-management programme that would include household collection of segregated waste, recycling and composting. These directions have simply been ignored. No major city runs a comprehensive programme of the kind envisioned by the Supreme Court. Indeed, forget waste segregation and recycling directive of the India's Supreme Court, the Organisation for Economic Cooperation and Development

estimates that up to 40 percent of municipal waste in India remains simply uncollected. Even medical waste, theoretically controlled by stringent rules that require hospitals to operate incinerators, is routinely dumped with regular municipal garbage. A recent study found that about half of India's medical waste is improperly disposed of. Municipalities in Indian cities and towns have waste collection employees. However, these are unionised government workers and their work performance is neither measured nor monitored. Some of the few solid waste landfills India has, near its major cities, are overflowing and poorly managed. They have become significant sources of greenhouse emissions and breeding sites for disease vectors such as flies, mosquitoes, cockroaches, rats, and other pests. In 2011, several Indian cities embarked on waste-to-energy projects of the type in use in Germany, Switzerland and Japan. For example, New Delhi is implementing two incinerator projects aimed at turning the city's trash problem into electricity resource. These plants are being welcomed for addressing the city's chronic problems of excess untreated waste and a shortage of electric power. They are also being welcomed by those who seek to prevent water pollution, hygiene problems, and eliminate rotting trash that produces potent greenhouse gas methane. The projects are being opposed by waste collection workers and local unions who fear changing technology may deprive them of their livelihood and way of life. Along with waste-to-energy projects, some cities and towns such as Pune, Maharashtra are introducing competition and the privatisation of solid waste collection, street cleaning operations and bio-mining to dispose the waste. A scientific study suggests public private partnership is, in Indian context, more useful in solid waste management. According to this study, government and municipal corporations must encourage PPP-based local management through collection, transport and segregation and disposal of solid waste.

### Noise pollution

The Supreme Court of India which is in New Delhi gave a significant verdict on noise pollution in 2005. Unnecessary honking of vehicles makes for a high decibel level of noise in cities. The use of loudspeakers for political purposes and for sermons by temples and mosques makes noise pollution in residential areas worse. In January 2010, Government of India published norms of permissible noise levels in urban and rural areas.

### Land or Soil pollution

In March 2009, the issue of Uranium poisoning in Punjab attracted press coverage. It was alleged to be caused by fly ash ponds of thermal power stations, which reportedly lead to severe birth defects in children in the Faridkot and Bhatinda districts of Punjab. The news reports claimed the uranium levels were more than 60 times the maximum safe limit<sup>[43, 44]</sup>. In 2012, the Government of India confirmed that the ground water in Malwa belt of Punjab has uranium metal that is 50% above the trace limits set by the United Nations' World Health Organization. Scientific studies, based on over 1000 samples from various sampling points, could not trace the source to fly ash and any sources from thermal power plants or industry as originally alleged. The study also revealed that the uranium

concentration in ground water of Malwa district is not 60 times the WHO limits, but only 50% above the WHO limit in 3 locations. This highest concentration found in samples was less than those found naturally in ground waters currently used for human purposes elsewhere, such as Finland. Research is underway to identify natural or other sources for the uranium.

### Greenhouse gas emissions

India was the third largest emitter of carbon dioxide in 2009 at 1.65 Gt per year, after China and the United States. With 17 percent of world population, India contributed some 5 percent of human-sourced carbon dioxide emission; compared to China's 24 percent share. On per capita basis, India emitted about 1.4 tons of carbon dioxide per person, in comparison to the United States' 17 tons per person, and a world average of 5.3 tons per person.

### Environmental issues and Indian law



Fig 6

Monsoons scrub India's air, bringing its natural diversity in better view.

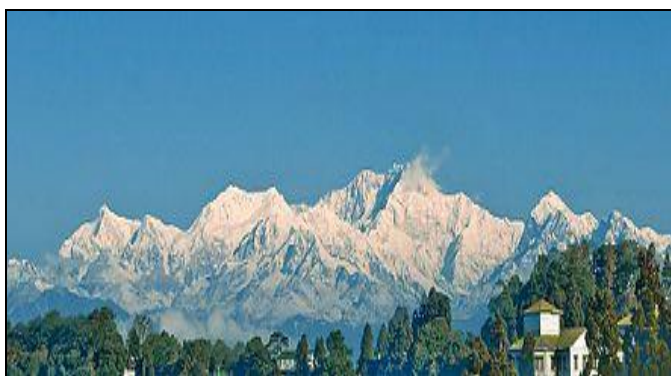


Fig 7: Himalayan peaks in eastern India on a day without haze

Since about the late 1980s, the Supreme Court of India has been pro-actively engaged in India's environmental issues. In most countries, it is the executive and the legislative branches of the government that plan, implement and address environmental issues; the Indian experience is different. The

Supreme Court of India has been engaged in interpreting and introducing new changes in the environmental jurisprudence directly. The Court has laid down new principles to protect the environment, re-interpreted environmental laws, created new institutions and structures, and conferred additional powers on the existing ones through a series of directions and judgments. The Court's directions on environmental issues goes beyond the general questions of law, as is usually expected from the highest Court of a democratic country. The Supreme Court of India, in its order, includes executive actions and technical details of environmental actions to be implemented. Indeed, some critics of India's Supreme Court describe the Court as the *Lords of Green Bench* or *Garbage Supervisor*. Supporters of India's Supreme Court term these orders and the Indian bench as pioneering, both in terms of laying down new principles of law, and in delivering environmental justice. The reasons for the increasing interjection of India's Supreme Court in governance arenas are, experts claim, complex. A key factor has been the failure of government agencies and the state owned enterprises in discharging their Constitutional and Statutory duties. This has prompted civil society groups to file public interest complaints with the Courts, particularly the Supreme Court, for suitable remedies. Public interest litigation and judicial activism on environmental issues extends beyond India's Supreme Court. It includes the High Courts of individual states. India's judicial activism on environmental issues has, some suggest, delivered positive effects to the Indian experience. Proponents claim that the Supreme Court has, through intense judicial activism, become a symbol of hope for the people of India. As a result of judicial activism, India's Supreme Court has delivered a new normative regime of rights and insisted that the Indian state cannot act arbitrarily but must act reasonably and in public interest on pain of its action being invalidated by judicial intervention. India's judicial activism on environmental issues has, others suggest, had adverse consequences. Public interest cases are repeatedly filed to block infrastructure projects aimed at solving environmental issues in India, such as but not limiting to water works, expressways, land acquisition for projects, and electricity power generation projects. The litigation routinely delays such projects, often for years, whilst rampant pollution continues in India, and tens of thousands die from the unintended effects of pollution. Even after a stay related to an infrastructure project is vacated, or a court order gives a green light to certain project, new issues become grounds for court notices and new public interest litigation. Judicial activism in India has, in several key cases, found state-directed economic development ineffective and a failure, then interpreted laws and issued directives that encourage greater competition and free market to reduce environmental pollution. In other cases, the interpretations and directives have preserved industry protection, labour practices and highly polluting state-owned companies detrimental to environmental quality of India. Proactive measures should be taken to conserve the depleting environment.

Forests and conservation



**Fig 8:** Greater adjutant perched on a pile of trash and solid waste in Assam.



**Fig 9:** The world's rarest monkey, the golden langur.



**Fig 10:** Forests of India's Western Ghats



**Fig 11:** Forests of Kerala. Western part of the Indian peninsula is one of the 32 ecological hotspots of the world.

**Wildlife in India**

Ecological issues are an integral and important part of environmental issues challenging India. Poor air quality, water pollution and garbage pollution – all affect the food and environment quality necessary for ecosystems. India is a large and diverse country. Its land area includes regions with some of the world's highest rainfall to very dry deserts, coast line to alpine regions, river deltas to tropical islands. The variety and distribution of forest vegetation is large. India is one of the 12 mega biodiverse regions of the world. Indian forests types include tropical evergreens, tropical deciduous, swamps, mangroves, sub-tropical, montane, scrub, sub-alpine and alpine forests. These forests support a variety of ecosystems with diverse flora and fauna. Until recently, India lacked an objective way to determine the quantity of forests it had, and the quality of forests it had.

**Forest cover measurement methods**

Prior to the 1980s, India deployed a bureaucratic method to estimate forest coverage. A land was notified as covered under Indian Forest Act, and then officials deemed this land area as *recorded forest* even if it was devoid of vegetation. By this forest-in-name-only method, the total amount of recorded forest, per official Indian records, was 71.8 million hectares. Any comparison of forest coverage number of a year before 1987 for India, to current forest coverage in India, is thus meaningless; it is just bureaucratic record keeping, with no relation to reality or meaningful comparison. In the 1980s, space satellites were deployed for remote sensing of real forest cover. Standards were introduced to classify India's forests into the following categories:

- Forest Cover: defined as all lands, more than one hectare in area, with a tree canopy density of more than 10 percent. (Such lands may or may not be statutorily notified as forest area).

- Very Dense Forest: All lands, with a forest cover with canopy density of 70 percent and above.
- Moderately Dense Forest: All lands, with a forest cover with canopy density of 40–70 percent
- Open Forest: All lands, with forest cover with canopy density of ten to forty percent.
- Mangrove Cover: Mangrove forest is salt tolerant forest ecosystem found mainly in tropical and sub-tropical coastal and/or inter-tidal regions. Mangrove cover is the area covered under mangrove vegetation as interpreted digitally from remote sensing data. It is a part of forest cover and also classified into three classes viz. very dense, moderately dense and open.
- Non Forest Land: defined as lands without any forest cover.
- Scrub Cover: All lands, generally in and around forest areas, having bushes and or poor tree growth, chiefly small or stunted trees with canopy density less than 10 percent.
- Tree Cover: Land with tree patches (blocks and linear) outside the recorded forest area exclusive of forest cover and less than the minimum mapable area of one hectare.
- Trees Outside Forests: Trees growing outside Recorded Forest Areas.

The first satellite recorded forest coverage data for India became available in 1987. India and the United States cooperated in 2001, using Landsat MSS with spatial resolution of 80 metres, to get accurate Indian forest distribution data. India thereafter switched to digital image and advanced satellites with 23 metres resolution and software processing of images to get more refined data on forest quantity and forest quality. India now assesses its forest distribution data biennially. The 2007 forest census data thus obtained and published by the Government of India suggests the five states with largest area under forest cover as the following:

- Madhya Pradesh: 7.64 million hectares
- Arunachal Pradesh: 6.8 million hectares
- Chhattisgarh: 5.6 million hectares
- Orissa: 4.83 million hectares
- Maharashtra: 4.68 million hectares

India hosts significant biodiversity; it is home to 7.6% of all mammalian, 12.6% of avian, 6.2% of reptilian, and 6.0% of flowering plant species. In recent decades, human encroachment has posed a threat to India's wildlife; in response, a system of national parks and protected areas, first established in 1935, was substantially expanded. In 1972, India enacted the Wildlife Protection Act and Project Tiger to safeguard crucial habitat; further federal protections were promulgated in the 1980s. Along with over 500 wildlife sanctuaries, India now hosts 14 biosphere reserves, four of which are part of the World Network of Biosphere Reserves; 25 wetlands are registered under the Ramsar Convention.

These laws did not have the effect they intended. In 1985, India created the Ministry of Environment and Forests. This was followed by a National Forest Policy and the major government reforms of the early 1990s. Over the last 20 years, India has reversed the deforestation trend. Specialists of the United Nations report India's forest as well as woodland cover has increased. A 2010 study by the Food and Agriculture Organisation ranks India amongst the 10 countries with the

largest forest area coverage in the world (the other nine being Russian Federation, Brazil, Canada, United States of America, China, Democratic Republic of the Congo, Australia, Indonesia and Sudan). India is also one of the top 10 countries with the largest primary forest coverage in the world, according to this study. From 1990 to 2000, FAO finds India was the fifth largest gainer in forest coverage in the world; whilst from 2000 to 2010, FAO considers India as the third largest gainer in forest coverage.

### **National Forest Commission and India's afforestation programme**

In 2003, India set up a National Forest Commission to review and assess India's policy and law, its effect on India's forests, its impact of local forest communities, and to make recommendations to achieve sustainable forest and ecological security in India. The report made over 300 recommendations including the following:

- India must pursue rural development and animal husbandry policies to address local communities need to find affordable cattle fodder and grazing. To avoid destruction of local forest cover, fodder must reach these communities on reliable roads and other infrastructure, in all seasons year round.
- The Forest Rights Bill is likely to be harmful to forest conservation and ecological security. The Forest Rights Bill became a law since 2007.
- The government should work closely with mining companies. Revenue generated from lease of mines must be pooled into a dedicated fund to conserve and improve the quality of forests in the region where the mines are located.
- Power to declare ecologically sensitive areas must be with each Indian state.
- The mandate of State Forest Corporations and government owned monopolies must be changed.
- Government should reform regulations and laws that ban felling of trees and transit of wood within India. Sustainable agro-forestry and farm forestry must be encouraged through financial and regulatory reforms, particularly on privately owned lands.

India's national forest policy expects to invest US\$26.7 billion by 2020, to pursue nationwide afforestation coupled with forest conservation, with the goal of increasing India's forest cover from 20% to 33%.

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