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ABSTRACT

India suffers from severe environmental problems with respect to deforestation, flooding, and pollution. These problems are associated with industrialization, lack of money to enforce anti-pollution practices, climatic and population pressures, and cultural factors. Half of India's forests have been cut in the last 40 years. Deforestation is the result of the need for wood for manufacturing and fuel, and the expansion of farmlands. India is prone to both drought and floods, and soil erosion also is a serious problem. Air pollution in both urban and rural areas, originating from fires, factories, and automobiles causes a high national incidence of respiratory and other diseases. Seventy percent of available water in India is badly polluted. Rivers and wells are contaminated by human and industrial waste, causing widespread occurrence of water-related disease. Increased reduction of animal species is yet another environmental problem. The lack of resources to deal effectively with environmental problems and the influence of Indian cultural factors seriously hinder solving these problems. Necessary solutions will require substantial effort and resources. (AS)

ENVIRONMENT AND CULTURE IN INDIA

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Summary.

India is beset with environmental problems. Half the nation's forests have been cut since independence. As a result, rainwater runs off rapidly, causing substantial flooding, and carrying silt which leads to further flooding damage. The rivers are normally polluted from sewage, and floods distribute widely the sewage, and consequent diseases. Air pollution problems are serious throughout large cities, and inside rural homes, which rely heavily on firewood and cow dung for cooking.

Why does India have such pollution problems? One reason is the effort to industrialize, and the lack of money to enforce pollution-reducing practices, a problem India shares with other developing countries. Another reason is the warm humid climate and the dense population. A third reason is the Indian culture, a culture which emphasizes personal cleanliness but relegates community cleanliness to the lowest class.

Introduction.

This report is based upon participation in the Ancient and Modern Culture of India Fulbright program in 1988, and is submitted as aand requirement of that program. The program included six weeks of study in India, including visits to New Delhi, Agra, Jaipur, Udaipur, Aurangabad, Bombay, Bangalore, Mysore, Madras, Mahabalipuram, Calcutta, Varanasi, and Kashmir. I wish to express appreciation to Sharada Nayak, director of the Fulbright program, and her staff, to the many lecturers and performers who met with us, to my fellow Fulbrighters, and to many Indian people, all of whom helped me learn about an ancient and modern culture which was new to me. The authors represented in the bibliography also helped me to understand environmental problems in India. I owe thanks also to my son and to my wife, whose concern with the environment made me more alert to the environment that I saw in India.

Deforestation

The problem of deforestation struck me most strongly in Kashmir. A long-time lover of mountains, I had looked forward to hiking in the Himalayas. The hike seemed anticlimactic, however, and I finally realized that I was walking up a mountain valley which had no trees. I detoured a quarter mile up the hillside to a point where I could actually touch a tree. Continuing on in that small forest, I met a man trying to load a large log on his truck, reducing even further the number of trees in the Himalayas.

Half the trees of India have been cut in the forty years since Independence. Trevor Fishlock (p. 163) noted that: "India [has] reached an ecological crisis through the widespread and indiscriminate destruction of forests and the resulting increase in floods and landslides... much of the

damage has been done by contractors who bribe officials whose job it is to protect the forests."

Wood for manufacture. These contractors are using the wood to meet the economic demands of the country. Tewari (p 87) notes that "there are 100 million ploughs, 95 million other implements, 50 million yokes, [and] 140 million bullock-carts in use in the Country," all requiring timber for their manufacture, and many requiring frequent replacement.

Paper mills, matches, resin, and the packing industry make heavy demands upon forests. Notable is the need of the tobacco industry. "According to the World Health Organisation, in the developing world, for every 300 cigarettes made, one tree is burnt. Twelve percent of the trees cut every year world over are used for tobacco curing.... India is the third largest producer of flue-cured tobacco in the world." (Tewari, pp. 89-90)

Fuelwood. Another important reason for deforestation is the demand for fuelwood, to use the Indian term. Around every city, forests have been trimmed and then cut to provide wood for cooking fires. "The result is that fuelwood now has to be transported from distant places. Delhi, for example... gets firewood from Orissa, Bihar, Maharashtra and Assam." Delhi firewood today costs 16 times what it cost in 1960. (Tewari, p. 78)

Our Fulbright group visited the Hanging Gardens on Malabar Hill in Bombay on a stormy day. In the gardens we heard a loud crack and looked up to see a huge branch falling from a giant old tree. Fortunately no one was killed or injured, but two stalls on an outside wall were demolished. Within ten minutes the entire branch, larger than most trees, had disappeared, with nearby spectators, hawkers and passers-by all rushing to get a portion they could take home.

The problem of securing fuelwood has imposed a particular burden on women. "The culturally accepted division of labour within the family leaves the collection of household needs like fuel, fodder and water to women. As these become increasingly difficult to obtain, women have to spend an inordinate amount of time foraging for them and all this has to be undertaken in addition to household work,... agricultural work and caring for animals." (Tewari, p. 74) "The Centre for Science and Environment calculates that in an average drought-prone village, a women walks 1,400 km [868 miles] a year [or 2.37 miles per day], in search of fuelwood." (D'Monte, p. 72)

Expanding farmland. Another reason for deforestation is, ironically, the success of efforts to grow enough food to feed the Indian people. The "Grow More Food" campaign, started during World War II, resulted in an increase of production by expanding into waste lands and forests. This created a climate that forest lands must yield to the needs for food production. Today, "India has one-seventh of the world's livestock population but only one-fiftieth of world's land surface area. Consequently there has been a tremendous pressure of grazing by the cattle in the forest areas of the country." (Tewari, pp. 85-86) India has become self-sufficient in food production, but at the cost of much of its forest.

Tewari described the problem with his poem (p. 77):

How many white spots make a black cow white?
How many clearings make a forest, grasslands?
A score? More? A coalescing core?
A threshold reached?

Drought. Drought has long been a problem in India. "India has been more affected by drought and associated famine than any other country in the world. Over 80% of the sub-continent is chronically drought-prone." (Tewari, p. 115)

Deforestation is making the problem worse. "Drought is beginning to extract a heavier and heavier price not because the rains are becoming more erratic, but because... more and more people are being pushed on to marginal lands that [should] never have been brought under the plough. (Tewari, p.33)

Floods. Trees break the rainfall so that the moisture soaks in, rather than running off. Without trees, the water runs off into streams and rivers, causing flooding. The water carries more silt with it, which clogs the river beds, resulting in more extensive flooding. "Floods are increasing in India and annual flood losses today are 14 times what they were in 1950s. 'Most floods in India are the direct result of deforestation' flatly proclaims A. K. Dey in the Indian Journal, Disaster Management." (Tewari, p. 135)

The floods create an international problem for India, in that the worst effects are felt in Bangladesh, a low lying delta region at the mouths of the Ganges and Brahmaputra Rivers, which arise in the now heavily deforested Himalayas. One Bangladesh environmentalist concluded, "We can no longer say these floods are a natural phenomenon. They are also man-made." The flood of 1987 was of a magnitude estimated to occur only once every 70 years; the flood of 1988 was far worse. ("Flooding may...")

Soil erosion. The rain, falling directly on deforested soil, runs into streams, carrying the top soil. "The most serious threat to India's land resources is this erosion of top soil by flowing water." Much of the top soil becomes sedimentation further downstream. "The average rate of sedimentation in most reservoirs is 4 to 6 times as high as the rates which were projected at the time they were designed and built." The Hirakund Dam was expected to last for 111 years when it was constructed, but sedimentation has reduced the expectation to only 35 years. (Qazi, p. 18-19)

Reforestation efforts. The losses have been so substantial that the National Remote Sensing Agency found in 1980-82 that only 14 percent of the country was covered by forest (Tewari, p. 79). This finding "makes a mockery of the 1952 forest policy which set out to raise the forest cover from a fifth to a third of the land area." (Fishlock, p. 163)

Some people in India have responded. "Villagers' concern has led them to join a resistance movement, known as Chipko, the Hindi word for hug. In poignant defiance of the contractors they hug trees when the fellers arrive with axes and chainsaws. By wrapping their bodies around trees they hope to draw attention to what is going on; but the movement is too small to make a really effective impact on one of the great threats to the land of India." (Fishlock, p. 164)

Similarly government efforts have been ineffective. One of Rajiv Gandhi's pet projects was to rejuvenate five million hectares of wasteland each year. The project failed, in large part because of conflict between government agencies, reflecting disagreement over whether land should be used for conservation, or for growing fuelwood. (Tiwari)

Our Fulbright group visited a reforestation project in Rajasthan, a project sponsored by an independent group. A small catchment area of 20 acres or so, owned in common by a village, was being reforested. Villagers had planted trees, and dug ditches above the trees to catch the water runoff. A large dam had been built to catch runoff from the entire catchment area. Alas, the dam was dry, and many of the trees were dead or dying, because the area was suffering a continued drought, with only four inches of rain during the past year. Cattle were extremely thin and numerous carcasses of cattle who had not survived could be seen along the roadside. The area, however, had once had many trees, and perhaps the villagers will yet grow trees.

Air Pollution

Jerry Brown, who worked with Mother Teresa after serving as governor of California, described the pollution: "Arriving in Calcutta, the first thing I noticed was the air. It seemed to invade my being: pollution from the fires of a million people cooking their meals outside, particles of dust and charcoal everywhere. I tasted it. It covered my hands and my clothes. (Brown, p. 12) Similarly, air pollution was the environmental problem I noticed most immediately in each of the four major cities -- New Delhi, Bombay, Madras, and Calcutta. Forewarned by a friend, I had taken a face mask, which I used in Calcutta and New Delhi, even though I visited in the summer when air pollution is much less serious than the winter.

"Pollution in Delhi has assumed horrendous proportions. Skyscrapers, denudation of forests, burgeoning factories in congested areas and one million smoke-emitting vehicles have all contributed in making this city a veritable hell. On a day when pollution is high all Delhites smoke an equivalent of one and a half packets of cigarettes. Unless this process is checked it has the foreboding of an atmospheric doom." (Shankar, p. 62. Emphasis added.)

While factories create some of the pollution, automobiles are major contributors, helping to explain why the major metropolitan areas have the poorest quality air. The buses continually belch smoke, and my first small three wheeled taxi created so much pollution and traveled so near the exhausts of the other vehicles that I never took a second ride in such a vehicle. Automobiles in New Delhi are rarely checked for emissions. Checks which have been made find that 40 to 50 percent fail to meet Indian standards, which are far more lenient than those in the United States. In addition, the lead content in Indian gasoline is far higher than in the West. (Chandra, p. 105; Singh, p. 89)

Not surprisingly, metropolitan residents suffer. "The incidence of respiratory diseases in Delhi is 12 times the national average--and 30 percent of Delhi's population suffers from respiratory diseases due to air pollution." (Chandra, p. 105) In Calcutta the situation is even worse: "60 percent of Calcutta's residents suffer from respiratory diseases related to air pollution;" (Tewari, p. 19)

While the air I breathed in rural areas was much cleaner, Indian environmentalists have reported that air pollution is a major problem for rural residents also. Cooking over cowdung or wood fires in poorly ventilated houses creates smoke so thick as to be unbearable for the scientists wishing to measure it. Three hours of exposure to cooking smoke in Guajarat homes provided as much benzopyrene (a suggested carcinogen) as 20 packs of cigarettes: "cooks receive a larger dose than a resident of the dirtiest urban environment." As a result, these women who do not smoke cigarettes are as likely as the men of the villages (three fourths of whom smoke) to suffer heart and lung disease, and to suffer it at an earlier age. (Tewari, p. 157)

Water pollution

Only one brave member of our Fulbright group regularly drank the water in our hotels, though we found special filtering units on the hotel grounds, and observed the water trucks bringing water from "clean" and far distant sources. Water purity is a major problem: "70 percent of all the water available is polluted and about 73 million workdays are lost every year on account of water-related diseases." (Tewari, p. 19) "Over two million persons die of enteric diseases every year, which are caused by drinking polluted water." (Singh, p. 31)

Perhaps we were overly cautious (though most of us became ill at some point). Nevertheless the Yamuna River flooded while we were in New Delhi, and the city suffered from outbreaks of cholera and gastroenteritis. One reason that the floods create problems is that many Indian villages have few or no latrine facilities, so that people defecate in open fields. (From our New Delhi hotel window we could watch people walking into an undeveloped area for their early morning toilets.) The flood waters pick up these feces and distribute them much more widely.

Even without floods, the rivers are polluted. "The poor simply defecate into the river, the rich dispose of industrial wastes and the religious throw their dead bodies into it." (Tewari, p. 38) In urban areas, water for public use is often drawn from a badly polluted river, treated, and then distributed through ancient pipelines subject to seepage from the parallel sewer lines. The other major source of water is wells, rarely tested or treated, often dirty, and also subject to seepage from sewage lines. (Singh, pp. 39-40)

Given the economic and spiritual importance of the Ganga river (often known as the Ganges in the West), the government has wanted to change the procedure in which almost all cities are dumping untreated raw sewage into the river. The Ganga Action Plan proposed cleaning the Ganga through construction of major sewage treatment plants in Hardwar, Kanpur, Allahabad, and Varanasi, all of which discharge untreated sewage into the Ganga. But government agency disagreements over appropriate contractors have led to a postponement of the completion of the plants from 1990 until at least 1994. (Awasthi)

Ironically, the Ganga has a holy significance "For ages there has been the belief among Hindus that bathing in the Ganga, particularly at Varanasi is a safeguard against Cholera, typhoid, fever and other infectious diseases." (Singh, p. 54).

Similarly, devout Hindus try to make a pilgrimage to Varanasi (formerly called Benares) on the bank of the Ganga river during their lifetime. The pilgrimage includes bathing in the purifying water of the Ganga, and one of the tourist attractions is an early morning boat ride to watch the bathers.

Varanasi is a holy city being polluted by its holiness. Hindus have an old and deeply held belief "that if bodies and ashes are immersed into [the] river Ganga, the souls rest in Heaven." As a result, 3,000 human and 6,000 animal bodies are disposed of in the Ganga at Varanasi each year. (Singh, pp 70, 97) The constant cremation of bodies pollutes the city's air. Because cows are sacred, the holy city of Varanasi allows them to roam widely; as a result, walking though the city's narrow lanes is much like walking in a stockyard or corral.

Loss of animal species

India possesses two percent of the world's land mass, but around five percent of the known living organisms on earth. (Qazi, p. 17) Not surprisingly, the deforestation and the population pressure have meant substantial reductions in the numbers of wild things.

The fish catch off the Kerala coast has fallen 30 percent below that of 15 years ago, and the catch of prawns has fallen 70 percent. Much of the reason is believed to be the trawling by large mechanized boats. When introduced in the early 1950s, this process was expected to produce numerous fish for the state and for export." It did for a time, but now the waters have been "fished out". (Menon)

Many of the Indian species have become nearly extinct. A few endangered species have revived and are no longer endangered. Assam now has 5,000 elephants, so many that herds of elephants raid farmers' crops. The population of crocodiles has tripled since 1975, and fishermen worry that the crocodiles will eat all the fish. Near Jodhpur, the blackbuck population has reached a healthy 12,000, and the animals are damaging nearby crops. The tiger population has grown, but is still only 1200 in all of India. On a visit to a wild game preserve near Mysore, the guides spoke of having seen a tiger the previous year.

On the other hand, many other species "have been treated with scant regard. The population of animals like wolves, panthers, snow leopards, jackals, wild dogs and hyenas... has been rapidly dwindling." (Menon)

Population pollution.

"The human population explosion is in fact the worst and basic form of pollution. All the major environmental problems that threaten the future of mankind are caused basically by one factor--too many people." (Singh, p. 141, quoting Swedish naturalist K. Curry Lindahl)

The needs of an expanding population have led to the exploitation of waste lands and forest lands. "Under the relentless onslaught of the burgeoning human population, most of [the wild animal] habitats have been degraded and encroached upon by villages. Traditional corridors, which enabled the animals to move from one forest to the next, have been cut off."

(Chengappa) Forests have been cut down to provide fuelwood for the increasing number of people. Fecal matter from ever more people has polluted all of the major rivers. Smoke from motor vehicles and from cooking has polluted the atmosphere.

The population of India has increased rapidly, doubling in the 40 years since independence. Government efforts at population control have generally failed. The population is so young (the 1981 census indicated that half are 19 years or younger) that "baby booms" are likely to continue unabated for years. The projection in the Seventh Five Year Plan is that shortly after the turn of the century Indian population will exceed one billion. (Statistical Outline, p. 38) This means that India will have added since Independence as many people as live in all of Europe.

Explanations

Why should India have such substantial environmental problems? Three explanations are possible:

1. All developing countries have environmental problems, particularly because they do not have the resources to combat the problems.
2. India's climate and huge population dooms it to continued environmental problems.
3. The culture of India, especially Hinduism, lowers the concern for the environment.

Lack of resources in developing countries. Most developing countries have environmental problems. The efforts to industrialize mean the construction of factories. The efforts to compete with the developed nations result in corner cutting, such as postponing environmental cleanup.

Deforestation, for example, is occurring in much of the developing world. The destruction of forests in India's Himalayan neighbor, Nepal, is occurring so rapidly that the country may lose all its forests in the next ten years. Qazi (p. 18) notes that trees now cover only 12 percent of Java and less than 20 percent of the Philippines. Even so, those percentages are as high or higher than India's percentage. In addition, Qazi (p. 19) points out that China has added 55 million hectares of new forest in the last 30 years, and that South Korea has hardly any deforested land anywhere.

On the other hand, the poverty of India means that Indians scrimp and save all they can. "Indians are, by nature, conservative in use of materials. Women do not throw away the old clothes, [but] exchange [them] for stainless steel utensils and crockery pots. The glasses in the refuse are always picked up by some poor-men...for selling. The old metals are purchased by blacksmiths who go door to door for that.. Thus, all these resources get recycling." (Singh, pp. 134-135)

Climate and population. India's climate may in itself create more environmental problems than would be found in other countries. The seasonality of the rainfall, with wet monsoons and dry periods alternating each year, means that floods are likely to be common. The moist heat creates lots of mold, discouraging efforts at keeping households clean. The year round warmth allows people to use the out-of-doors for their bathing and toilets.

In addition, the dense population creates much pollution, in their

cooking and heating, in their sewage and refuse, and in their expansion into wastelands and forest lands. On the other hand, the density of population for India is, at present, much the same as Western Europe.

Indian Culture. The most intriguing question is whether the Indian culture leads to increased pollution. The pattern was suggested by an Indian friend who pointed out to me that Hindus were very careful about their personal cleanliness, but had little concern about community cleanliness. Time and again, in India, one sees people bathing or washing carefully and conscientiously in community areas, such as lakes, streams or hydrants, that look dirty and polluted.

Singh (p. 6) described his fellow countrymen in much the same terms: "Indians are more or less lethargic in nature. One can find, if there are four rooms in a house, only in one room things are well placed and in others almost scatter[ed,] misusing the space. They throw their rubbish here and there where they find [it] easy. One can also find people... defecating here and there [in] all parts of the country. Open defecation not only gives [a] poor impression but also [a] foul smell to [the] whole of the surrounding. It is, more or less, because there is scarcity of latrines in urban areas and on the other hand non-existence of latrines in rural areas."

Singh also commented (p. 133): "One thing is also noteworthy that people are having no civic sense. In spite of public urinals people sit [to defecate] along the roadside or wherever they [find it] convenient.

V. S. Naipaul (p. 67-68) related this pattern to India's caste system: "Sweepers, the lowest of the low: their very existence, and their acceptance of their function, the especial curse of India, reinforcing the Indian conviction... that it was unclean to clean... We walked without speaking, picking our way between squirts and butts and twists of human excrement. It was unclean to clean; it was unclean even to notice. It was the business of the sweepers to remove excrement, and until the sweepers came, people were content to live in the midst of their own excrement."

Singh (p. 128) described the garbage pickup system in much the same terms: "Household rubbish, carefully swept up in each house, is carelessly thrown outside the main gate on the street or if one lives in a flat it is occasionally thrown from the upper storey to be air-borne and even sometimes to find place on the head of the passers by." In addition, refuse collection bins are located near the markets or in densely populated areas. "These bins brimming with refuse are an open invitation to cows, crows, vultures and pigs to gorge on the filth. They spread it further while looking for [tidbits]." (Singh p. 128)

Nevertheless Singh also provided support for the lack of resources argument when he noted that Varanasi, a city of 700,000 population, had only 12 trucks available to pick up refuse.

Man's relationship with nature. Nevertheless Hinduism strongly emphasizes a strong continuing relationship between man and nature. "The Indian culture...has always looked upon the trees and plants of the earth as the manifestation of God's protecting and preserving power. Man, in his turn, is to reciprocate this vital function by being the protector of trees and plants. This is to be his relationship with all life around him." (Qazi, p. 17, quoting Swami Chidananda)

The importance of nature to Hindus was described by Swami Nirvedananda (pp. 204-05): "God manifests Himself as nature. This is one of the outstanding spiritual truths preached by Hinduism...."An entire mountain range, for example-- the Himalaya or the Vindhya, has to be looked upon as a holy thing. The sea is another holy object. So also are several rivers, such as the Ganges, the Jumna, the Godavari, the Saraswati, the Narbada, the Indus (Sindhu) and the Kaveri. The rivers and mountains are the bodies of their presiding deities who are worshipped by the Hindus. These deities are superior manifestations of God."

The significance of natural objects is indicated in other aspects of Indian culture. The folktales of India demonstrate a continuing interrelationship between animals and humans, even to the point that at times humans give birth to animals (Beck et al.) The title of the book The Speaking Tree comes from the tale of a tree which rebuked Alexander the Great for the futility of conquering India, and foretold his doom. (Lannoy)

The love of nature is found in this poem credited to pious monks of the 5th century B.C. (Basham, p. 457):

"When the drum of the clouds thunders in heaven,
and all the ways of the birds are thick with rain,
the monk sits in the hills in ecstasy
and finds no joy greater than this.

"When by rivers covered with flowers,
and gaily adorned with reeds of varied hue,
the goodly monk sits on the bank in ecstasy
he finds no joy greater than this.

"When the rain pours down at night,
and elephants trumpet in the distant thickets,
the monk sits in the hills in ecstasy,
and finds no joy greater than this.

Mountains have a special significance, as Tewari notes (p. 63): "In India the Himalayas are regarded as the abode of Gods and a source of spiritual inspiration by not only Hindus but followers of other religions too." These beliefs led to cultural patterns. "People living in the hills had... developed a life style in which animal husbandry and agriculture formed the mainstay of the subsistence economy. Natural forests...never let them down even during times of famine.... (Tewari, p. 63)

Similarly Tewari (p. 32) describes the significance of natural things: "It is not for nothing that our ancient scriptures emphasize the importance of preserving and improving plant life. Our ancient sages had the age-old wisdom to realise that trees and plants, apart from having timber and medicinal values maintained essence of life on earth."

If nature is so significant in Hindu culture, why has the environment been so degraded? Tewari (p. 63) credits the British occupation. "[Life styles] changed with the advent of British rule. In the implanted concept of development, which evolved with the industrial revolution in a totally different milieu, nature became just a commodity for use of man. Affluence was regarded as the objective of development. Perhaps, but the greatest depradation has come since Independence. Tewari (p. 65) also points a

finger at other western visitors: "Tourism is another development-activity that has altered the character of hill areas..The influx of uncaring tourists at many places especially in the remote areas, has a very bad effect on the environment." Tewari (p. 65) also suggests a solution: "Environmentalists are unanimous that the solution lies in re-establishing the broken link between man and nature."

In conclusion, the continued strong influence of the caste system hinders environmental cleanup, because community cleanup is relegated to the Untouchables. Apparently, community cleanup by other Hindus would pollute their bodies and souls. In contrast, Hinduism emphasizes strong ties with nature, perhaps helping to explain the success of the efforts to save some endangered animal species. Extending similar efforts to the forests and rivers would fit easily with Hindu philosophy, but will require substantial resources, resources that may be beyond those available to the Indian government, especially in view of the rapidly expanding population. The benefit of improved health may be well worth the cost of sewage cleanup and reforestation, but the resources may be very difficult to secure.

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