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Conservation status of forests in India: A cause for worry?

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Abstract

In the last few decades there has been a growing concern about the alarming increase in the rate of deforestation of the tropical forests and its impact on their biodiversity. This concern seems to be well placed considering that the tropical forests, which account for only about 7% of the total area, contain over 50% of the earth's biodiversity. In this paper, we address the conservation status of forests in India in the light of the worldwide view on this problem. We examine the changes in the forest area in the country for two time periods: (a) between 1900 and 2000, and (b) between 1990 and 1995. Our analyses suggest that the status of Indian forests in post-independence India has deteriorated far less when compared to pre-independence period, as also far less when compared to countries such as Brazil and Indonesia. However, it is necessary to continue keeping a close vigil on the rates of deforestation and formulate stronger conservation strategies that would strengthen further the conservation status of the forests in the country.

Keywords: Forest status, deforestation, pre- and post-independence, forest conservation, India.

1. Introduction

The last quarter of the 20th century has witnessed an alarming rate of deforestation of the tropical forests of the world and its impact on their biodiversity. Accounting for only 7% of the earth's land area, the tropical forests contain over 50% of the earth's biodiversity.[1] Almost all of the tropical forests lie in some of the most economically underdeveloped and heavily populated countries in the world. Consequently, the forests in these regions face extreme pressures due to an increasing demand on the forest resources by the developing economies.[1] In the last couple of decades there have been several efforts to quantify the extent of deforestation worldwide and to identify the major drivers of this loss so that appropriate mitigation strategies could be arrived at. It is estimated that nearly 1,32,000 km^2 have been lost due to deforestation at the end of 1991.[2] It is widely recognized that continuing deforestation of tropical forests is expected to lead to profound global consequences, including changes in the climatological patterns and the distribution of biodiversity. As is with many issues concerning the north–south divide, the countries in the tropics have come under intense international pressure to safeguard their forests and biodiversity.

In this paper, we address the conservation status of forests in India in the light of the worldwide concern about the increasing rates of deforestation of the tropical forests. First we

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review briefly the status of the forests and biodiversity in India and the threats faced by them. We then analyse the rates of loss of forest over the last 100 years in the country. We also analyse the relative changes in the forest area over a more recent time period (1990–1995) and compare them with those of other countries. Our studies show that while there might not be a serious cause for worry over the status of forest in India, there is a need for continued caution on the indiscriminate use of the forest in order to maintain the current status of the forests of the country.

2. Status of forests in India: riches and threats

The forests in India collectively account for about 1% of the world's forest area and are estimated to contain about 500,000 of the 10 to 30 million species on earth.[3] Containing two of the world's biodiversity hot spots in the forests of Western Ghats and in the eastern Himalayas, the country is regarded as one of the 12 megabiodiversity centres in the world.[2] This richness of the biota is, however, seriously undermined by the population that the forests have to sustain. The country's 940 million people, about 18% of the world's population, exert tremendous pressure on the forest area for agriculture, plantations and perennial crops. With the current forest holding, there is approximately only 0.08 ha of forest area per person compared to the world average of about 0.8 ha per person.[4] Along with China, India supports the highest number of people per unit of biodiversity elements (Ganeshaiah and Uma Shaanker, unpublished). Assuming that the forests are the major repositories of biodiversity, it is clear that there is an increasing threat to the biodiversity of the country. While the above statistics is very revealing, as it is disturbing, we propose that it would be worthwhile to review the status and examine if there exists hope for the conservation of the forests of the country.

3. Status of forests in the last 100 years

Definitive data on the forest and the geographical area of the Indian sub-continent were made available with the institution of the Indian Forest Act (1878), which officialized the forestry sector in the country and periodically provided quantitative estimates. However, this information, as with other historical data, is riddled with problems such as non-uniformity of scale, change in policies, and change in geographical area through growth and development of the country. Nevertheless and despite these shortcomings, historical data might be very valuable in offering rich insights into the general patterns of forest status of the country and the implications thereof. We analysed the state of forests in India for the period 1900 to 2000 based on a large set of historical data compiled from numerous forest records. The total geographic area and the total forest area were recorded for different time intervals for which the data were available. We compared the change in percentage area under forest between the pre-independence (1900 to 1947) and the post-independence periods (1948 to 2000). Based on these estimates we also computed the change in per cent forest area per capita between the pre- and post-independence periods.

Our analyses showed that compared to a monotonic decrease in per cent forest area during the pre-independence period (from 24 to 19%), there was a monotonic increase in per cent forest area in the country during the post-independence period (from 19 to 23%, Fig. 1). The general pattern of change seems to be reflected in the data on a few individual regions as

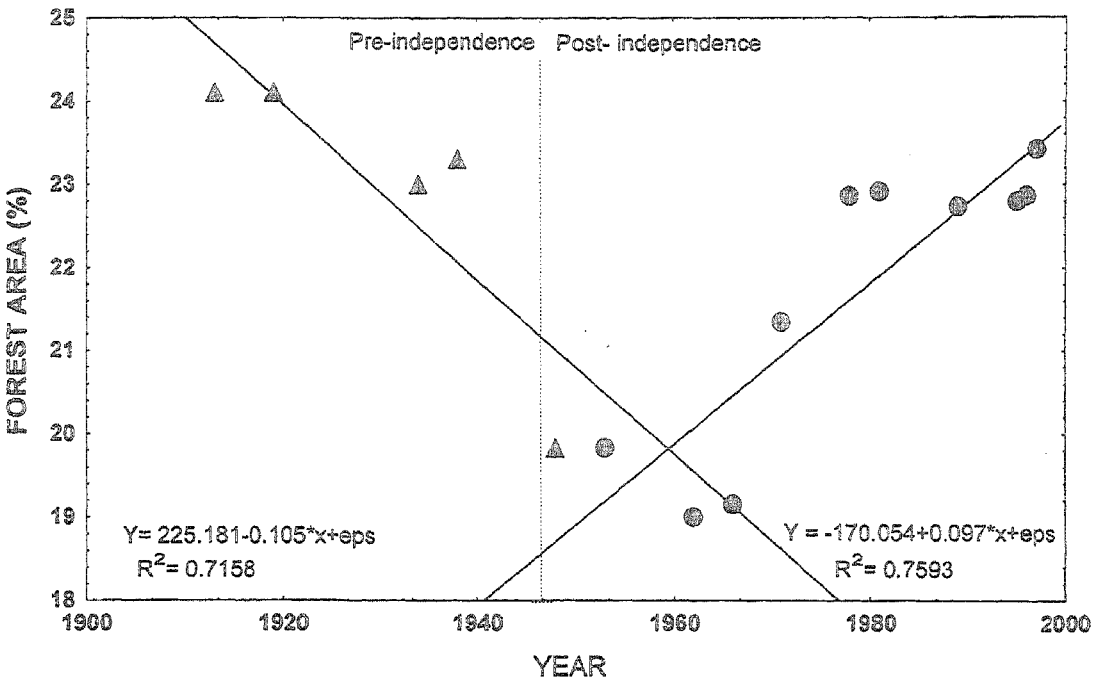

FIG. 1. Percentage area under forest between 1900 and 1998. Data on the geographical area and total forest area for different periods were compiled from the forest department records and other archival sources (including *Indian Forester*). Because of differences in geographical area between years, for each time period, the percent geographical area under forest (per cent forest area) was computed. The regression of percentage forest area with years have been analysed separately for pre- (triangle) and post-independence (solid circles) periods.

well. For example, during the pre-independence period there was a decrease in per cent forest area in regions such as Coorg and Assam, while after independence the per cent area under forest was either maintained or, in fact increased (Fig. 2). In Coorg, for instance, beginning with nearly 55–60% in 1890, the area under forest decreased to 30% in 1940s and has remained thereabout through the 50 years after independence.

The decrease in the per cent forest area in the first 50 years of the century could primarily be attributed to the intensive extraction of the forests for timber and other uses by the British colonial power. It is well known that the British empire depended heavily on the forest resources of its colonies to earn revenue and meet its needs during the two world wars. Timber and bamboo were extracted to build bridges, piers, wharves and railway sleepers. In just over a year, nearly 228,076 tonnes of timber were extracted and exported to help military operations in Egypt and Iraq during the First World War.[5] The death knell to the forest before independence was dealt during the Second World War when there was an unprecedented extraction of wood from the forests of the Indian subcontinent, including from the Himalayas and the dense forests of the western ghats.[5] Considering the replacement rates of tropical trees with average life span of about 100 to 150 years, it is likely that the effects of these extractions are still being felt to this day.

The increase in the per cent area under forest during the post-independence period could be due to newer unscheduled area being brought into protection and/or through afforestation. Fol-

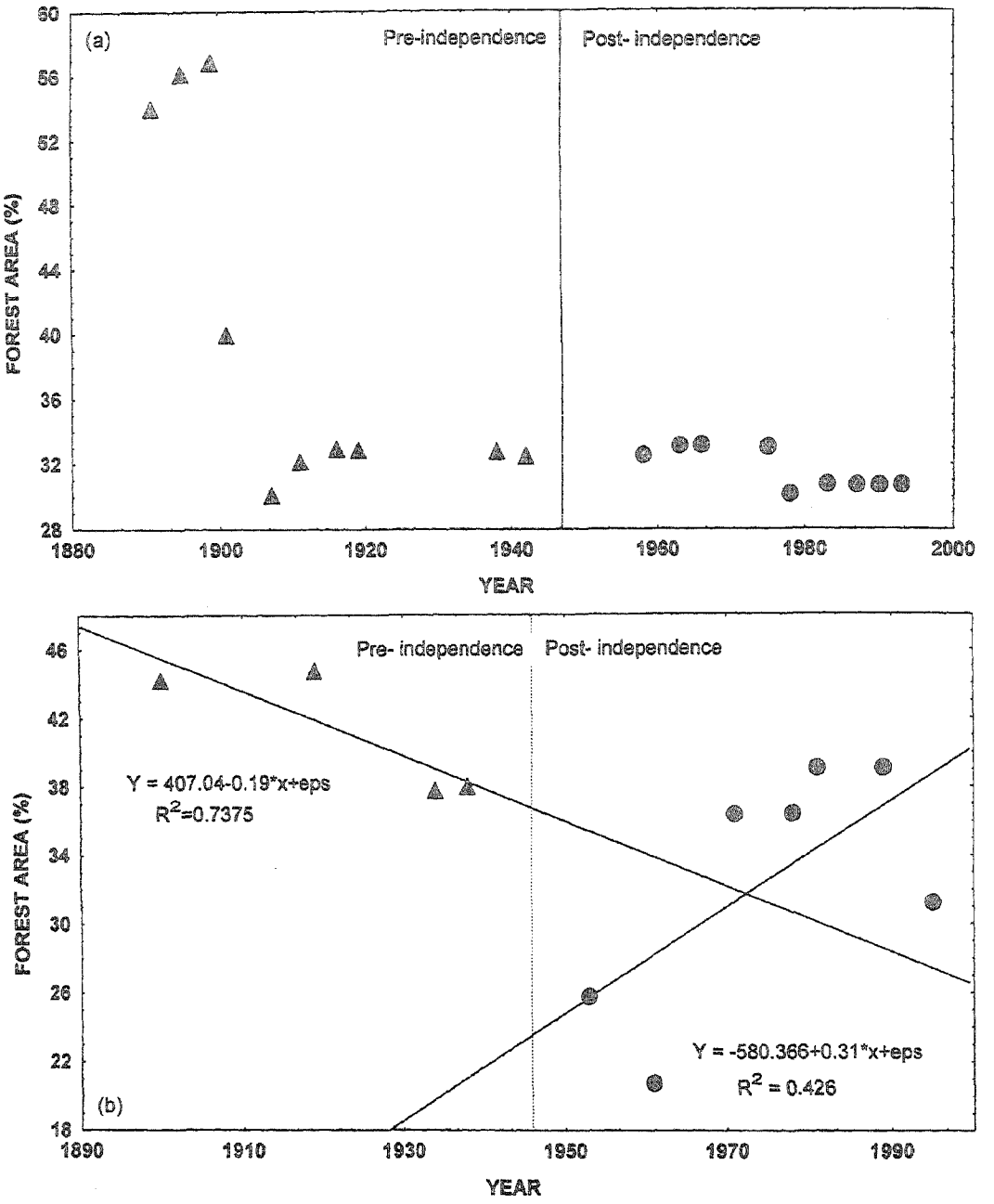

FIG. 2. a) Percentage area under forest in Coorg during pre- (triangle) and post-independence (solid circle) period, b) Percentage area under forest in Assam during pre- (triangle) and post-independence (solid circle) period. The data sources for these analyses were obtained as mentioned in Fig. 1.

lowing independence, a number of ex-princely and ex-proprietary forests were accorded a legal status. Thus, in 1946–47 the recorded area of forest in the provinces of British India was 39.94 million ha. However, with the addition of the private holdings the recorded area of forests increased to 68.02 million ha in 1950–51 and 75.18 million ha in 1986–87.[6] Afforestation of

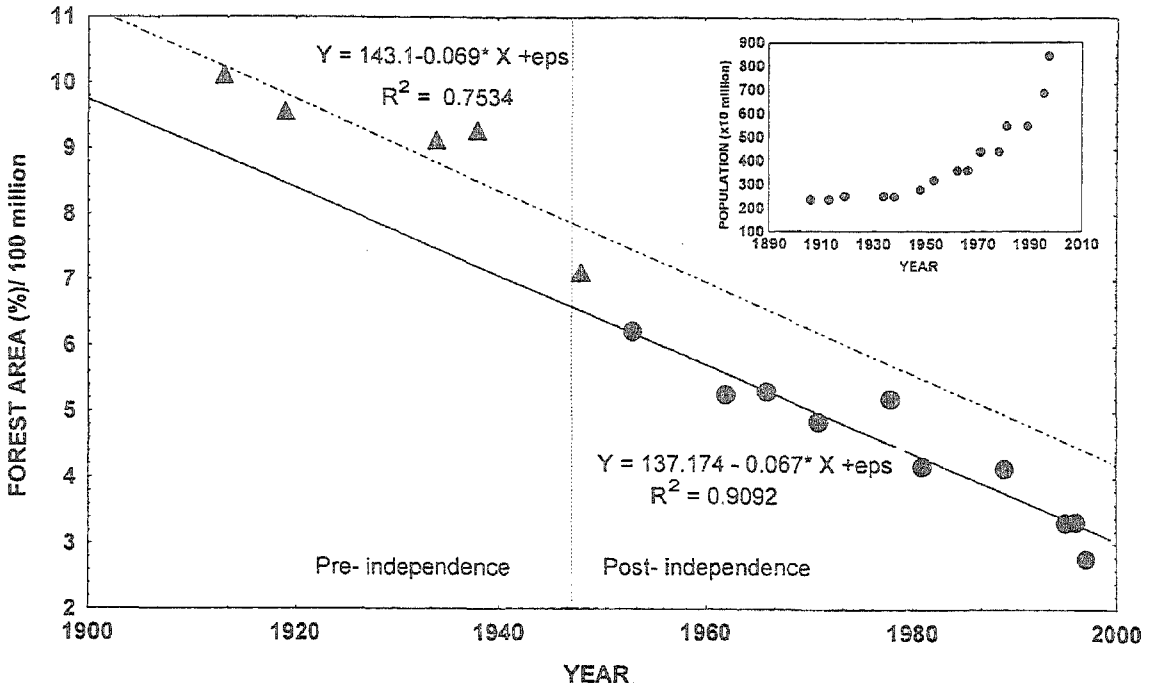

FIG. 3. Percentage forest area per 100 million population between 1900 and 1998 (triangle: pre-independence; solid circle: post-independence). Inset shows the population of the country for 1900–1998.

wastelands and other landforms accorded legal status has also contributed to an increase in the forest area. It is estimated that the annual rate of afforestation between 1981 and 1990 was 1.44 million hectares.[7]

Intriguingly, the rate of loss of forest per capita is comparable between the two periods (pre- and post-independence, $p > 0.05$), despite a nearly four-fold increase in the population in the post-independence period (Fig. 3). It appears that the relative constancy in the rates of loss of forest in the post-independence period is due to the strong policy of forest protection enunciated by the country. The post-independence India saw vigorous forest conservation campaigns, including the famous Chipko movement that effectively prevented the large-scale destruction of forests. The banning of tree felling over the last two decades by the forest departments of several states might have also contributed to the maintenance of per cent forest area in the country.

4. Status of forests in recent times (1990 to 1995)

In recent years, several attempts have been made to quantify the forest loss for the entire country. However, these estimates are widely disparate. For example, an FAO study estimated an annual deforestation rate of 0.6% between 1981 and 1990, while another study suggests that India's total forest area declined by only 0.04% between 1982 and 1990.[8] Disparity in the estimates of deforestation might result from differences in methodology, in definition and classification of forest and land use types, and unavailability or inaccessibility of accurate maps.[9]

We attempted a comparative analysis of forest loss between 1990 and 1995 in different countries. In many ways, the data for this period could be treated as by far the most reliable, because of the extensive use of satellite imagery to compute the relative area under different categories of forest. During this period, globally there has been a loss of about 101,724 km^2 of forest area annually, amounting to an average annual per cent deforestation of 0.3%.[10] In Asia alone there has been a nearly 1316 km^2 loss of forest annually during 1990–1995 (about 0.2% deforestation rate).[10] On a gross scale the per cent deforestation rates over this 5-year period ranged from as low as –0.2% (in high-income group countries) to 0.6% annually (in low-income group countries).[10]

In India, during the years 1990–1995, there has been virtually no loss of forest. In fact, there has been a marginal increase of about 72 km^2. These results seem to be corroborated by an independent assessment by the Forest Survey of India (FSI).[11] The FSI estimates based on the visual interpretation of remotely sensed imageries showed no deforestation in the country between 1989 and 1995; however, these estimates did not distinguish between the natural forest cover and plantations.[9]

In contrast, the extent of deforestation in many other parts of the world has been substantial. In countries such as Brazil, Mexico, Malaysia and Indonesia, which contain substantial tropical forests, the rate of deforestation has been very rapid. For example, between 1990 and 1995, Malaysia lost 4002 km^2 of forest (2.4%), while Brazil lost about 25,544 km^2 of forest (an area roughly equivalent to the state of Meghalaya or half of Punjab). However, as per cent of the land area this amounts to about 0.5% only. Among the countries of tropical Asia, the per cent area deforested per year ranged from as low as 0.1–0.3 in countries such as Bhutan, Papua New Guinea and India to as high as 3.5–4.3 in countries such as Nepal, Sri Lanka.[12] Thus, compared to other countries with comparable economies, the forests in India seem to

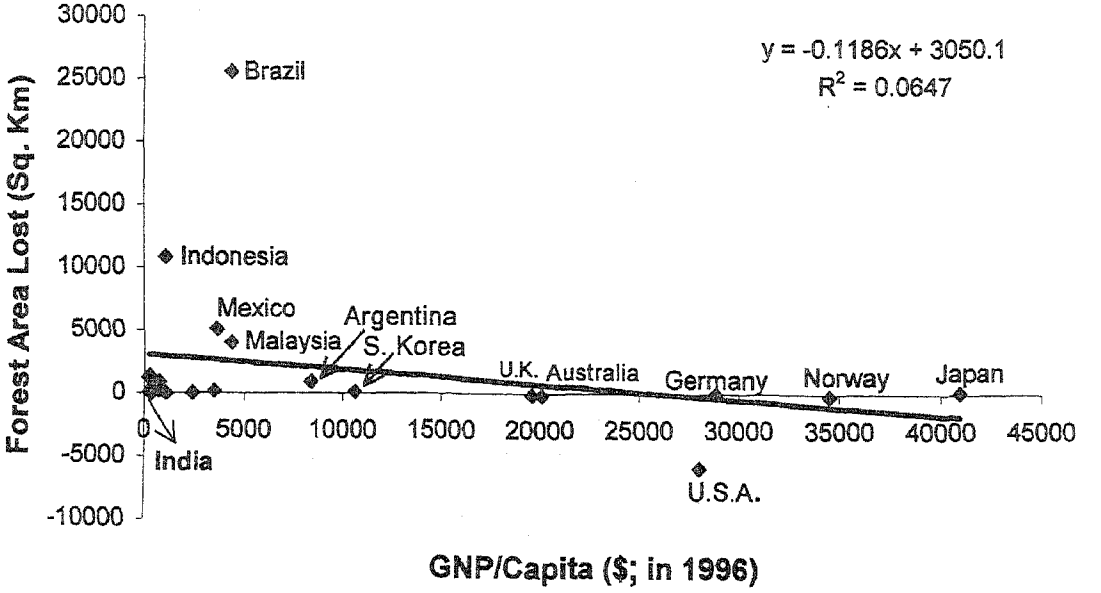

FIG. 4. Area of forest lost (sq. km) and GNP per capita ($). Note that compared to countries with similar and low levels of GNP per capita, India had not recorded any loss of forest area between 1990 and 1995.

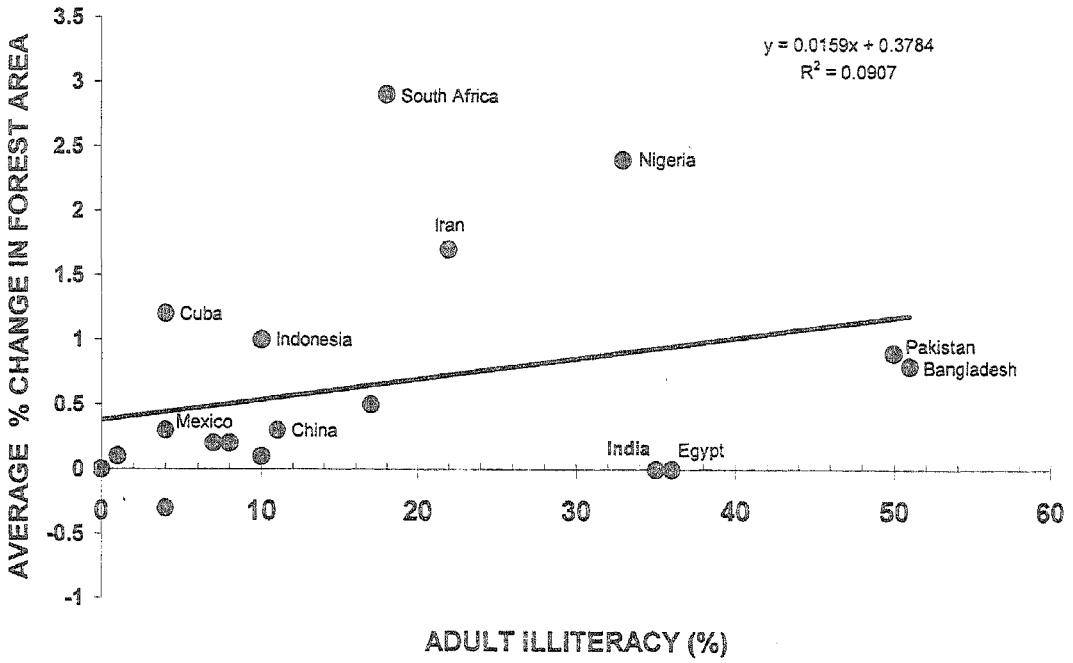

FIG. 5. Average per cent change in forest area between 1990 and 1995 and percentage adult illiteracy.

have been protected better despite the tremendous pressure the forests face from the rapidly expanding population.

5. Demographic and socioeconomic drivers of forest loss: India as an outlier?

Any discussion on the extent of deforestation has to take into account the socioeconomic parameters driving the change. Several workers have indeed identified and analysed the relative contribution of the various drivers to the loss of forest, especially of the tropical forests.[13, 14] We examined the influence of three major drivers on the forest loss of India *vis-a-vis* other countries. First, the extent of deforestation has been shown to be generally negatively correlated with the GNP per capita;[10] while this is borne out of our analysis also, we find that compared to countries (Indonesia and Brazil) with nearly similar levels of GNP per capita as in India, there is considerably lesser (in fact, zero) level of deforestation in India (Fig. 4). Second, in contrast to countries with similar and high levels of illiteracy, India has managed to protect its forest (Fig. 5). Finally, despite a high population pressure, India along with the world's most populous country, China, has maintained a no net change in the forest area between 1990 and 1995 (Fig. 6). In fact, compared to countries with nearly similar levels of population pressure per unit forest area, India seems to have again not lost any forest during the period 1990–1995 (Fig. 7). Thus, none of the major drivers of forest change that generally determine the extent of deforestation across countries seems to be applicable to India; in effect, the country seems to be an outlier in all these relationships.

Among the several reasons that might have contributed to the maintenance of the forest area in the country is the strong legislation imposed by the government in protecting the forest

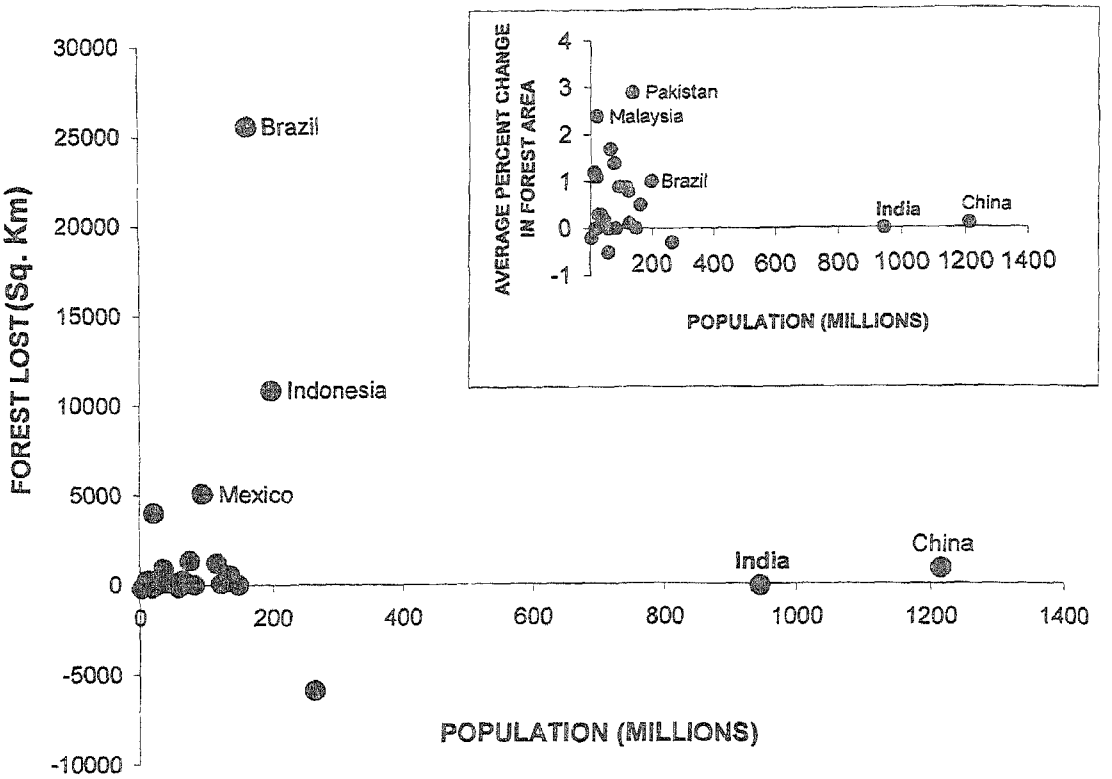

FIG. 6. Relation between total forest lost (sq. km) from 1990 to 1995 and the population. Inset shows the average per cent change in forest area with population.

irrespective of their categorization and, of course, the successful implementation of the many policies. Second, it is likely that the extent of deforestation incurred during earlier years has been steadily made good by the vigorous afforestation programmes in addition to the social forestry programmes. While it is not clear whether these areas have been included in arriving at estimates of the forest area, it is probable that these efforts have contributed to the maintenance of forest area in the country in the last decade. Finally, the maintenance of forest area could also be due to conservative consumptive use pattern of the people.

6. Conclusions

The forest resources of India, as might of any other country, have undergone a sea change since the last thousands of years, primarily through their use or misuse by the successive rulers of the country. A particularly tumultuous period in the change was during the British rule, which saw one of the largest organized destructions of the forest in the country. Unfortunately, because of the lack of formal records of these operations, it has been difficult to convey the magnitude of the loss in a quantitative sense. The institution of the Indian Forest Act of 1878 made available quantitative records of the forest area in the country. However, much of these data are scattered over a large number of forest records and are not easily accessible. In recent years, a few attempts have been made to reconstruct the changing forest scenario of India.[5, 6,15]

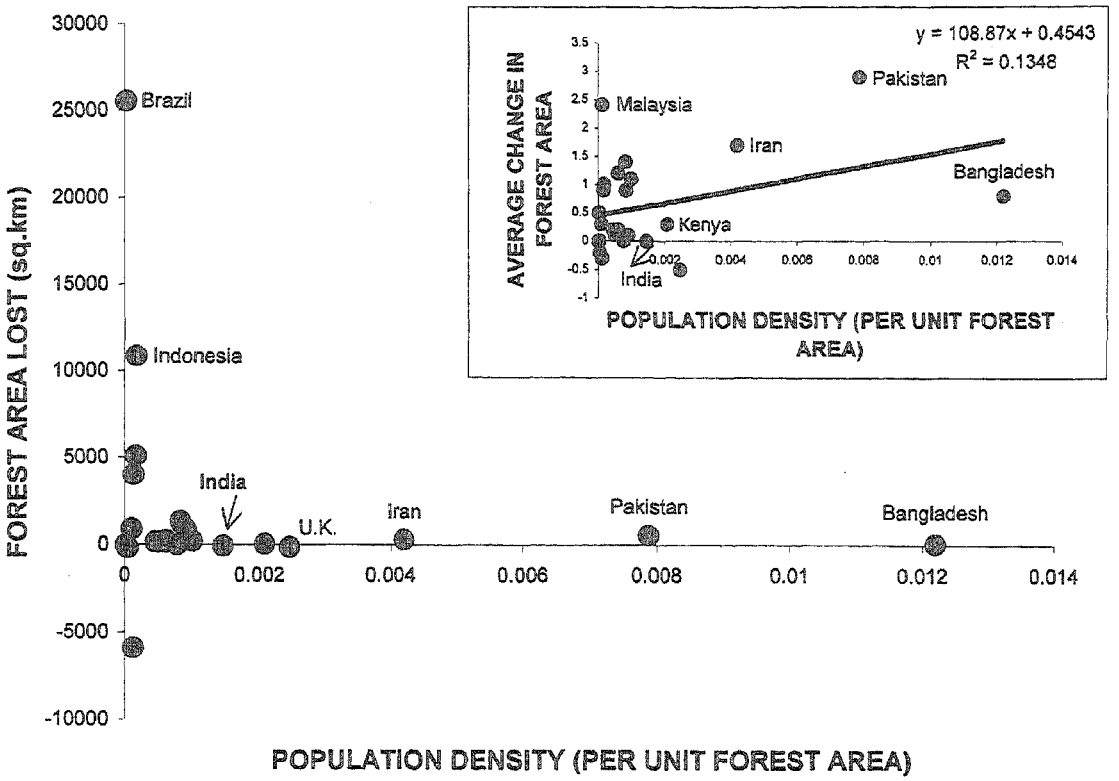

FIG. 7, Relation between total forest lost (sq. km) from 1990 to 1995 and the population density (millions per sq. km of forest). Inset shows the average per cent change in forest area with population density.

We have attempted in this study to reconstruct partially the scenario of the forest status over the last 100 years and more critically for a small period between 1990 and 1995, and discuss the trajectories of the change in the forest status.

Our analyses suggest that despite the early setbacks caused by the colonial exploitation, the country has done fairly well in maintaining the forest area from being further depredated. Thus from a nearly monotonic decrease in forest area under the British, after independence there has been a monotonic increase in per cent forest area. Further, the rate of loss of forest per capita in the post-independence period seems to have kept abreast with that in the pre-independence period. Thus, it appears that the status of forests in India is in relatively good stead and that there might not be any cause for worry. In fact, this is reflected in a more accurate assessment made of the changes in the forest for a small window of time (1990 to 1995), which shows that compared to many other countries of the world, India seems to have not lost any forest area.

However, several caveats are in place before these findings could be acceptable. First, as mentioned elsewhere, all studies and estimates are only as good as the robustness of the measures used for estimating the deforestation rates. While we have little control and also insight on the methodology used prior to 1990, there appears to be comfort in estimates drawn for 1990 to 1995, which are based on remotely sensed images. Second, while deforestation rates generally

capture the forests lost due to clear cutting and conversion to other forms of land use, it rarely captures events of forest degradation. Thus, estimates of forest loss could be deceptive of the erosion of the natural vegetation and loss of canopy cover.[9]

Finally, much as our results do not suggest a strong cause for worry over the current status of forests of India, we plead that these results, far from being the cause for complacency, should be taken as cause for renewed perseverance to strengthen further the area under forest in the country.

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