

POPULATION GROWTH AND ITS EFFECT ON THE ENVIRONMENT IN INDIA

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Abstract: The population growth in the country is having an adverse effect on land, soil, and forests, increasing with every passing year and causing grave and irreparable damage to the earth. The growing population, economic development, urbanization, and transportation in the country are threatening the environment. Though the relationship is complex, population size and growth tend to expand and accelerate these human impacts on natural resources such as land, soil, and forests. The present paper is an attempt to study population growth and its effect on the environment in India. The data has been compiled and analyzed from various secondary sources of data i.e. census of India, sample registration system bulletins, estimates of poverty, Indian agriculture, in brief, economic survey of India, state of forest report, selected socio-economic statistics, and compendium of environment statistics. An analysis of changes and trends has been conducted over the last fifty years. The analysis reveals that the country's population growth and poverty are having an adverse effect on the environment, imposing an increasing burden on the country's limited and continually degrading natural resource base. The natural resources are under increasing strain, even though the majority of people survive at the subsistence level. Population pressure on arable land contributes to land and soil degradation and deforestation in India, thus affecting the productive resource base of the economy. The importance of population and its effect on land, soil, and forests has been discussed. There is a need to protect natural resources and the environment. The paper concludes with some policy reflections, the policy aimed at overall development should certainly include efforts to control population and its adverse effect on land, soil, and forests in India.

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Introduction

The rapid population growth in the country is having an adverse effect on the natural resources and environment through the uncontrolled growth of urbanization and industrialization, expansion and intensification of agriculture, and the destruction of natural habitats. The growing population and the environmental deterioration face the challenge of sustained development without environmental damage. The existence or the absence of favorable natural resources can facilitate or retard the process of economic development. The three fundamental demographic factors of births, deaths, and migration produce changes in population size; composition, distribution and these changes raise a number of important questions of cause and effect. Population Reference Bureau estimated the 7.7 billion world's population in mid-2020, projects an increase to 8.9 billion in mid-2035 and 9.9 billion in mid-2050. The contribution of India alone to this population has been estimated to be 1400 million. It has been estimated that the country's population will increase to 1576 million in 2035 and 1663 million by the year mid-2050. The projected population indicates that India will be the first most populous country in the world and China will be second in 2050 (Population Reference Bureau, 2020). The increase in population has been tending towards the alarming situation. India is having 18 per cent of the world's population on 2.4 per cent of its land area has a great deal of pressure on its all-natural resources. Water shortages, soil exhaustion, deforestation, and land degradation afflicts many areas. If the world population continues to multiply, the impact on the environment could be devastating.

As the 21st century begins, a growing number of people and rising levels of consumption per capita are depleting natural resources and degrading the environment. The poverty-environmental damage nexus in India is important in the context of population growth as well. The pressures on the environment intensify every day as the population grows. The rapid increase of human numbers combines with desperate poverty and rising levels of consumption are depleting natural resources on which the livelihood of present and future generations depends. Poverty is amongst the consequences of population growth and its lifestyle play a major role in depleting the environment either its fuel demands for cooking or for earning livelihood for their survival. The unequal distribution of resources and limited opportunities cause push and pull factors for people living below the poverty line that in turn overburdened the population density in urban areas and the environment get manipulated by manifolds, consequently, urban slums are developed in urban areas.

The growing trends of population and consequent demand for food, energy, and housing have considerably altered land-use practices and severely degraded India's forests vis-à-vis the environment also. The growing population put immense pressure on land intensification at cost of forests and grazing lands because the demand for food could not

increase substantially to the population (Nagdeve, 2007). Thus, the horizontal extension of land has fewer scopes and relies mostly on vertical improvement that is supported by technical development in the field of agriculture i.e. HYV seeds, Fertilizers, Pesticides, Herbicides, and agricultural implements. All these practices causing degradation and depletion of the environment with multiplying ratio.

The relationship between population growth, resource depletion, and environmental degradation has been a matter of debate for decades. The argument has been between those who view population numbers per se as the main culprit in increasing pressure on the environment and those who place more blame on economic development, non-sustainable agricultural and industrial practices, and excessive and wasteful consumption. Both population growth and non-sustainable development are cause for concern in India (Mishra, 2002). Though the relationship is complex, population size and growth tend to expand and accelerate these human impacts on the environment. What is more, concern, the number of population rise will increase to such an extent in future that it will cause overall scarcity for resources. Decades of economic expansion and population growth have degraded its land and forests.

Research Objectives and Methods

The present paper examines the relationship between population growth and its effect on the environment in India. The data from various secondary sources i.e. census of India, sample registration system bulletins, estimates of poverty, Indian agriculture, in brief, economic survey of India, state of forest report, selected socio-economic statistics, and compendium of environment statistics has been utilized for analysis of data. Analyzed changes and trends over the last five decades.

Demographic Characteristics of the Population of India

India is the second-most populous country in the world after China. Recently, the population of India has crossed the one billion mark. According to the Census of India 2011, the population of India was 1210 million. At the time of independence, the country's population was 342 million. The number has multiplied more than two-fold from 1971 to 2011 in around five decades. The population growth of India from 1971 to 2011 has presented in Table 1. The total population size of India had grown from 548 million in 1971 to 1210 million in 2011. The population of India increased by more than two times from 1971 to 2011. The decadal growth rate of the population of India has decreased from 24.80 percent in 1971 to 17.64 percent in 2011. The urban population has grown 3.46 fold from 109.1 million in 1971 to 377.1 million in 2011. The percentage of the urban population has increased from 19.90 percent in 1971 to 31.16 percent in 2011. There are various reasons

for this variation in the trend of population growth rate in various censuses. The increase in population has been due to the improvement in health conditions and the control of diseases. The density of population has gone up from 177 in 1971 to 364 persons in 2011 and it always shows an increasing trend over the census years in persons per square kilometer.

Table 1: Demographic characteristics of the population of India, 1971-2011

<i>Year</i>	<i>Population (in millions)</i>	<i>Decadal Growth Rate (%)</i>	<i>Urban Population (in million)</i>	<i>% of Urban Population to total population</i>	<i>Density (Per Sq. Kms.)</i>	<i>The ratio of Population to 1971 Population</i>
1971	548	24.80	109.1	19.90	177	100
1981	683	24.66	159.4	23.33	210	125
1991	846	23.86	217.6	25.71	267	154
2001	1028	21.54	286.1	27.81	324	188
2011	1210	17.64	377.1	31.16	364	221

Source: Registrar General and Census Commissioner of India, 2013.

Several push and pull factors are presumed to be operative towards distress out-migration from rural to urban areas. This might be due to the declining resource availability per capita and shrinking economic opportunities in rural areas, and better economic opportunities, health, and educational facilities, etc. in urban areas, providing opportunities for a higher level of human capital development could be the underlying factors for rural out-migration.

Vital Rates in India

The growth of the population depends upon fertility, mortality, and migration. The process of accelerated population growth in India till the 1970s was observed to witness a marginal deceleration during the 1980s, as the decadal population growth was 23.9 percent compared to 24.9 percent in the 1970s. Further declines in fertility have been witnessed during the 1990s and 2000s. The estimated birth, death, natural growth, infant mortality, and total fertility rates in India from 1971 to 2011 has presented in Table 2. It has been revealed from the table that the birth rate in India has declined from 41.2 per thousand populations in 1971 to 29 per thousand populations in 1991, and it declined to 25 per thousand populations in 2001 and it further declined to 21.8 per thousand populations in 2011. At the same time, the crude death rate has also declined from 19 per thousand populations in 1971 to 12.5 per thousand populations in 1981, to 9.8 per thousand populations in 1991, it further declined to 8 per thousand populations in 2001 and 7.1 per thousand populations in 2011. Thus, the natural growth rate of India's population has declined from 22.2 per thousand population in 1971 to 21.4 per thousand population in 1981 to 17 per thousand

population in 2001 and 14.7 per thousand population in 2011. The total fertility rate has also declined from 5.52 children per woman in 1971 to 4.5 children per woman in 1981 to 3.1 children per woman in 2001 and 2.4 children per woman in 2011. Infant Mortality Rate (IMR) per thousand live births in India has steadily declined from 129 in 1971 to 110 in 1981 to 72 in 1991. The IMR further declined from 66 in 2001 to 44 in 2011 but the IMR in 2011 is still very high.

Table 2: Estimated Birth, Death, Natural Growth, Infant Mortality and Total Fertility Rates in India, 1971-2011

<i>Year</i>	<i>CBR</i>	<i>CDR</i>	<i>NGR</i>	<i>IMR</i>	<i>TFR</i>
1971	41.2	19	22.2	129	5.52
1981	33.9	12.5	21.4	110	4.5
1986	32.6	11.1	21.5	96	4.2
1991	29.5	9.8	19.7	80	3.6
1992	29.2	10.1	19.1	79	3.6
1993	28.7	9.3	19.4	74	3.5
1994	28.6	9.2	19.4	73	3.5
1995	28.3	9	19.3	74	3.5
1996	27.5	9	18.5	72	3.4
1997	27.2	8.9	18.3	71	3.3
1998	26.5	9.0	17.4	72	3.2
1999	26.1	8.7	17.3	70	3.2
2000	25.8	8.5	17.3	68	3.2
2001	25.4	8.4	17.0	66	3.1
2011	21.8	7.1	14.7	44	2.4

Source: Registrar General and Census Commissioner of India, 2013.

Trends in Poverty and its Environmental Effects in India

Most of India's poor live in rural areas and are engaged in agriculture. India's poverty reduction through the anti-poverty and employment generation programmes along with overall economic growth planning efforts has helped to reduce the poverty ratio in the country. The trends in poverty in India has depicted in Table 3. The poverty ratio of the population below the poverty line declined from 55 percent in 1973 to 22 percent in 2011-2012. The absolute number of poor has, however, declined from 321 million in 1973-74 to 270 million in 2011-2012. During the same period, the fraction of the population below the poverty line dropped from 56.4 percent to 26 percent in rural areas and from 49 percent to 14 percent in urban areas. Over the period 1987-88 to 2011-2012, urban and rural poverty declined but more declines have been experienced by urban areas.

Table 3: Number and percentage of population below the poverty line in India: 1973-2012

<i>Year</i>	<i>Rural</i>		<i>Urban</i>		<i>Combined</i>	
	<i>Number in Million</i>	<i>Poverty Ratio</i>	<i>Number in Million</i>	<i>Poverty Ratio</i>	<i>Number in Million</i>	<i>Poverty Ratio</i>
1973-74	261	56.4	60	49.0	321	54.9
1977-78	264	53.1	65	45.2	329	51.3
1983	252	45.7	71	40.8	323	44.5
1987-88	232	39.1	75	38.2	307	38.9
1993-94	244	37.3	76	32.4	320	36.0
1999-2000	193	27.1	67	23.6	260	26.1
2011-12	217	25.7	53	13.7	270	21.9

Source: Government of India, 2013

Poverty has been said to be both cause and effect of environmental degradation. Poorer people, who cannot meet their subsistence needs through purchase, are forced to use common property resources such as forests for food and fuel, pastures for fodder, and ponds and rivers for water. It also contributes to environmental degradation through the over-exploitation of natural resources like land, air, and water. Population pressure-driven overexploitation of the surface and underground water resources by the poor has resulted in contamination and exhaustion of the water resources. The urban population is also using rivers to dispose of untreated sewage and industrial effluent. The result is that the health of those dependents on untreated water resources is increasing at risk. Moreover, a degraded environment can accelerate the process of impoverishment, again because the poor depend directly on natural assets. Poverty and rapid population growth have been found to coexist and thus seem to reinforce each other. Poverty also affects the demographic characteristics of the population and hinders the transition to slower population growth. Acceleration in poverty alleviation is imperative to break this link between poverty and the environment. The deterioration of natural resources and unsafe living conditions affects the environment and health of poor people.

Environmental Challenges

Population growth and economic development are contributing to many serious environmental problems in India. These include pressure on land, land/soil degradation, forests, habitat destruction and loss of biodiversity, changing consumption patterns, rising demand for energy, air pollution, global warming, and climate change and water scarcity, and water pollution.

Pressure on Land

India faces the most acute pressure on agricultural land. Today every million hectares of land supports 8.54 million people. Forty-three percent of the land is under cultivation, one of the highest in the world. A change in land utilization pattern implies an increase or decrease in the proportion of area under different land uses at a point in two or more times. Table 4 describes the land utilization pattern in India from 1971 to 2011. Over the past fifty years, while the total population of India increased by about 2.2 times, the total area of land under cultivation increased by only 0.91 percent from 140.27 million hectares in 1971 to 141.56 million hectares in 2011. Most of this expansion has taken place at the expense of forest and grazing land. Despite the past expansion of the area under cultivation, less agricultural land is available to feed each person in India. It shows variations in land use and a narrow range of fluctuations in the proportion of net sown area to total land in the country from 1971 to 2011. Out of the total geographical area of 329 million hectares, only 306 million hectares is the reporting area (the rest being unadministered for various reasons). The land for non-agricultural uses (housing, industry, and others) has increased from 16.48 million hectares in 1971 to 26.39 million hectares in 2011. More than 19.4 million hectares are snowbound and remote leaving only 237 million hectares for agriculture, forestry, pasture, and other biomass production. The area under cultivation had increased by about 30 percent until 1981 and thereafter depicts marginal decline. The net sown area increased from 140 million hectares in 1971 to 143 million hectares in 1990-91 mostly through reclamation of old fallow and culturable wastelands and diversion of groves. The net area sown has increased only marginally from 140 million hectares in 1970-71 to 142 million hectares in 2001-2011, indicating that the private efforts have peaked and the intervention of the Government is required for further land reclamation. The extent of agricultural intensification and extensification characterized by an increase in cropping and irrigation intensity and higher use of chemical fertilizers, pesticides, and insecticides. The process of agricultural extensification and intensification is leading to land degradation, overexploitation of underground water resources, increased use of chemical fertilizers leading to eutrophication and water pollution. Agricultural intensification because of increasing cropping intensity, irrigation intensity, and excessive use of chemical fertilizers resulting in water logging, salinization and alkalinization of croplands and eutrophication of water bodies and ill health of oceans and thus reductions in biodiversity.

Land/Soil Degradation

Direct impacts of agricultural development on the environment arise from farming activities, which contribute to soil erosion, land salination, and loss of nutrients. The spread of the green revolution has been accompanied by overexploitation of land and water resources

Table 4: Land use patterns in India, 1970-71 to 2010-2011

<i>Classification</i>	<i>1970-71</i>	<i>1980-81</i>	<i>1990-91</i>	<i>2000-2001</i>	<i>2010-11</i>
I. Geographical Area	328.73	328.73	328.73	328.73	328.73
II. Reporting Area for land utilization statistics (1 to 5)	303.76	304.15	304.86	306.01	305.90
1. Forests	63.91	67.47	67.8	69.02	70.00
2. Not available for cultivation (a+b)	44.64	39.62	40.48	42.41	43.58
(a) Non-Agricultural Uses	16.48	19.66	21.09	22.97	26.39
(b) Barren and unculturable land	28.16	19.96	19.39	19.44	17.18
3. Other Uncultivated Land (excluding fallow land) (a+b+c)	35.06	32.31	30.22	28.49	26.16
(a) Permanent Pasture and other grazing land	13.26	11.97	11.4	11.04	10.30
(b) Land under Miscellaneous tree crops and grooves not included in net area sown	4.3	3.6	3.82	3.62	3.16
(c) Culturable Wasteland	17.5	16.74	15	13.83	12.64
4. Fallow Land (a+b)	19.88	24.75	23.36	24.91	24.60
(a) Fallow land other than current fallows	8.76	9.92	9.66	10.11	10.32
(b) Current Fallows	11.12	14.83	13.7	14.8	14.28
5. Net area sown	140.27	140	143	141.23	141.56
6. Gross cropped area	165.79	172.63	185.74	189.74	197.32
7. Area sown more than once	25.52	32.63	42.74	48.51	55.76
8. Cropping intensity*	118.2	123.3	129.9	134.30	139.4
III Net irrigated area	31.1	38.72	47.78	57.24	63.60
IV Gross irrigated area	38.19	49.78	62.47	76.34	89.36

Source: Government of India, 2013

*: Cropping Intensity is obtained by gross cropped area by net area sown

and the use of fertilizers and pesticides has increased many folds. Shifting cultivation has also been an important cause of land degradation. Leaching from extensive use of pesticides and fertilizers is an important source of contamination of water bodies. Intensive agriculture and irrigation contribute to land degradation particularly salination, alkalization, and waterlogging. It is evident that most of the land in the country is degrading, thus affecting the productive resource base of the economy. Out of the total geographical area of 328.7 million hectares, 175 million hectares are considered to be land-degraded areas (Table 5), acid soil 4.5 million hectares, saline soil including coastal sandy areas 5.5 million hectares adding to the situ degradation. While soil erosion by rain and river in hill areas water and wind erosion are the major contributor of 141.3 million hectares to soil erosion, with other factors like water logging 8.5 million hectares, alkali soil 3.6 million hectares, causes

Table 5: Soil Erosion and Land Degradation, 1999 (Million Hectares)

<i>Items</i>	<i>Area</i>
1. Total Geographical Area	328.7
2. Area Subject to Water and Wind Erosion Area Degraded through Special Problems	141.3
3. Water Logged Area	8.5
4. Alkali Soil	3.6
5. Acid Soil	4.5
6. Saline Soil including Coastal Sandy areas	5.5
7. Ravines and Gullies	4
8. Area subject to Shifting Cultivation.	4.9
9. Riverine and Torrents	2.7
Total 3 to 9	33.7

Source: Government of India, 1999

landslides and floods, deforestation, overgrazing, traditional agricultural practices, mining and incorrect siting of development projects in forest areas have resulted in opening up of these areas to heavy soil erosion. Ravines and gullies reported 4 million hectares; area subject to shifting cultivation reported 4.9 million hectares and riverine and torrents erosion due to floods and eutrophication due to agricultural runoff reported 2.7 million hectares. The increasing intensification and extensification also result in salination, alkalization, and waterlogging in irrigated areas of the country. For achieving and maintaining food security, sustainable forestry, agricultural and rural developments controlling land/soil erosion is very much necessary.

Deforestation

With less than 2 percent of the world's total forest area, the country supports 18 percent of its population. The total area under forests was 692 thousand square kilometers in 2011, which was 21 percent of the total geographical area, as against the National Forest Policy 1988 stipulation of a target of 33 percent. Even within this recorded area, only 404.21 thousand square kilometers, or only 12.30 percent of the country's total land area, comprises dense forest with a crown density of more than 40 percent, thus reflecting a qualitative decline of forests in the country. The comparative situation of forest cover in India has given in Table 6. Overall, the total forest cover had increased by 51.93 thousand square kilometers (sq. km.) from 640.10 thousand Sq. Kms. in 1993 to 692.03 thousand Sq. Kms. in 2011. In the year 2001, as compared to 1993, the total forest cover had increased by 35.44 thousand Sq. Km. However; it has increased in 1997 by 9.45 thousand Sq. Kms, as compared to 1993. The states which shown a significant increase in forest cover are Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal, Karnataka, and Bihar. The

states, which have shown a significant decline in the forest covers, were Andhra Pradesh and Madhya Pradesh.

To regulate unabated diversion of forestland for non-forestry purposes, the Forest (Conservation) Act, 1980 was enacted. It has resulted in a reduction of diversion of forest area for non-forestry purposes considerably and the present rate of diversion is 16,000 hectare annually (Economic Survey of India, 1998-99). Forests are an important natural resource of India. They play an important role in providing raw materials to industries enhancing the quality of the environment by influencing the ecological balance and life support system (checking soil erosion, maintaining soil fertility, conserving water, regulating water cycles and floods, balancing carbon dioxide and oxygen content and generating income and employment. Forests also play an important role in the atmosphere etc. They have moderate influence against floods and thus they protect soil erosion.

Table 6: Comparative Situation of Forest Cover in India, 1993 – 2011

<i>States</i>	<i>Area in thousand square kilometers</i>				<i>Change from 1993 to 2011</i>
	<i>2011</i>	<i>2001</i>	<i>1997</i>	<i>1993</i>	
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Andhra Pradesh	46.39	44.64	43.29	47.26	-0.87
Bihar	29.82	28.36	26.52	26.59	3.23
Gujarat	14.62	15.15	12.58	12.04	2.58
Haryana	1.61	1.75	0.6	0.51	1.10
Himachal Pradesh	14.68	14.36	12.52	12.5	2.18
Karnataka	36.19	36.99	32.4	32.34	3.85
Kerala	17.30	15.56	10.33	10.34	6.96
Madhya Pradesh	133.37	133.77	131.2	135.4	-2.03
Maharashtra	50.64	47.48	46.14	43.86	6.78
Orissa	48.90	48.84	46.94	47.15	1.75
Punjab	1.76	2.43	1.39	1.34	0.42
Rajasthan	16.09	16.37	13.35	13.1	2.99
Tamil Nadu	23.62	21.48	17.06	17.73	5.89
Uttar Pradesh	38.83	37.68	33.99	33.96	4.87
West Bengal	13.00	10.69	8.35	8.19	4.81
All India	692.03	675.54	649.55	640.10	51.93

Source: Government of India, 2013.

Declining Per Capita Forest and Agricultural Land

The population growth has resulted in a downward trend in the per capita availability of forest and agricultural land since the 1950s. The per capita availability of forests in India is

much lower than the world average. The per capita availability of forest and agricultural land has depicted in Table 7. Overall, the per capita availability of forestland had oscillated around 0.113 hectares during the 1950s and then has consistently declined. The per capita availability of forest land declined from 0.124 hectares per capita from 1960-61 to 0.063 hectares in 2005-06 - a level that is extremely low compared to the world standards. The growth of the population has been expected to be faster than hoped-for improvements in forest cover as well as quality. Over the last ten years, despite governmental initiatives of joint forest management, tree grower's co-operative movements, and other efforts tangible results are still to be observed, and forest depletion and degradation are still increasing. Similarly, the per capita availability of agricultural

Table 7: Per capita availability of forest land and agricultural land in rural area of India, 1970-71 to 2005-06 (Area in Hectare)

<i>Year</i>	<i>Forest land</i>	<i>Agricultural land in rural area</i>
1970-71	0.115	0.410
1975-76	0.110	0.388
1980-81	0.099	0.356
1985-86	0.089	0.327
1990-91	0.081	0.315
1991-92	0.079	0.309
1992-93	0.078	0.302
1993-94	0.077	0.296
1994-95	0.076	0.29
1995-96	0.074	0.284
1996-97	0.073	0.279
1997-98	0.072	0.276
1998-99	0.071	0.271
1999-00	0.068	0.302
2000-01	0.068	0.271
2001-02	0.067	0.289
2002-03	0.066	0.29
2003-04	0.065	0.285
2004-05	0.064	0.281
2005-06	0.063	0.277

Source: Government of India, 2011

land in rural areas has declined consistently from 0.638 hectares in 1950-51 to 0.277 hectares in 2005-06 and is expected to decline further as the population continues to grow.

Habitat Destruction and Loss of Biodiversity

Protection of the earth's biological diversity is an important goal in its own right. Biodiversity has direct consumptive value in food, agriculture, medicine, industry, etc. It also has aesthetic and recreational value. The greatest threat to biodiversity is not the destruction of plants and animals per se, but rather the destruction of their habitat. India is one of the 12 mega-biodiversity countries of the world. From about 70 percent of the total geographical area surveyed so far 46,000 plant species and 81,000 animal species representing about 7 percent of the world's flora and 6.5 percent of the world's fauna have been described. Population growth leads to expanding human settlements and increasing demand for food, fuel, and building materials. The modernization of agriculture also threatens potentially valuable local crops. Biodiversity the world over is in peril because the habitats are threatened due to such development programmes as the creation of reservoirs, mining, forest clearing, laying of communication and transport networks, etc. It is estimated that in the worldwide perspective slightly over 1000 animal species and subspecies are threatened with the extinction rate of one per year, while 20,000 flowering plants are thought to be at risk (Compendium of Environment Statistics, 2000).

Summary and Conclusions

Rapid population growth plays an important role in land and soil degradation and deforestation in the country. The outcomes of high population growth rates are an increasing number of people below the poverty line, an increasing population density, and pressure on natural resources. The study reveals that the country's population growth and poverty are imposing an increasing burden on the country's limited and continually degrading natural resource base. The natural resources are under increasing strain, even though the majority of people survive at the subsistence level. It will increasingly difficult to satisfy the basic needs of a growing population even at present levels of consumption, and the situation will deteriorate progressively as the per capita consumption of resources increases. Population pressure contributes to land degradation and soil erosion, thus affecting the productive resource base of the economy. Rapid population growth plays an important role in declining per-capita agricultural land, forest, and water resources. The growth of population is a fundamental factor in its relationship to natural resources, the environment, and technology. To sum up, there is an urgent need to control population and poverty, conserve and protect natural resources such as land, soil, forests, and the environment for healthy human beings.

Policy Implications

From the various effects of human beings on land and soil degradation and deforestation, discussed in this paper, it appears that if human beings want to exist on earth, there is now

high time to give top priority to protect natural resources and the environment. The creation of employment opportunities is essential in agricultural areas with high poverty, unemployment, and landlessness. Poverty also affects the demographic characteristics of the population and hinders the transition to slower population growth. There is a need to control poverty and fertility below the replacement level in the country. Unless significant measures are taken to incorporate environmental concerns into agricultural development, urban planning, technological innovations, industrial growth, and resource management, the situation is likely to worsen in the future. Special efforts should be made for informing and educating the people and local leaders about the adverse effects of a large population through specially designed Information, Education and Communication (IEC) activities. To increase green cover and to preserve the existing forests, afforestation and social forestry programmes should be implemented at the local level. More emphasis should be on compulsory environmental education at the school level to make people aware of environmental protection. Environment protection should not be a responsibility of the government alone but local people and leaders should be encouraged to make dedicated efforts to eradicate the environmental problems.

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