

NATIONAL CIRCUMSTANCES OF INDIA

Geographic, Demographic, Socio-Economic and Environmental
Governance Background

Executive Summary

Prepared For
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1.0 Introduction – Importance of Initial Condition

The mandate of this report is to outline national circumstances of the Republic of India in terms of its geographical attributes, its demographic profile, its socio-economic environment and its institutional set up of environmental governance to address the problems of climate change and their influence. India is a party to the United Nations Framework Convention on Climate Change. India signed this multilateral treaty on 10th June 1992, and was the 38th country to ratify the Convention on 1st November 1993. This report provides information about India's national circumstances that provide the context for its Initial National Communication (NATCOM).

In recent years concern for climate change, which could be a serious environmental threat and also a developmental challenge in the world, has grown. Current concern over mounting evidences of global warming requires the world to design appropriate policy measures to combat its effects. We require an understanding of the nature of these impacts on natural systems and their implications for human livelihoods. Climate change may be accompanied by changes in *temperature and precipitation extremes*. The Intergovernmental Panel on Climate Change (IPCC) outlined in its Third Assessment Report the likelihood of the occurrence of high land temperatures and intense precipitation with a 90-99% chance of occurring. These amplified simple extremes could lead to extreme weather events, droughts as well as floods that could lead to vulnerability. Current trends in one-day and multi-day precipitation events already indicate that there is now a tendency to have more days with 24-hour precipitation, even if some areas are experiencing a decrease in total annual rainfall.

India may be particularly vulnerable to climate change, being a poor and tropical sub-tropical country with long coastal lines, high mountains, snow-fed rivers and highly dependent on weather and agricultural output. For India, its freshwater systems, rainfall, rivers and groundwater are critical for its agriculture, food and water security. Disruptions, droughts and floods induced by climate change can cause great hardship and impose large

costs. Similarly, millions who live near the large coastline of India and depend on coastal ecosystems for their livelihood may also be highly vulnerable to climate change. It is important to keep in mind India's vulnerability for it can provide guidance for policy actions both at national and international levels.

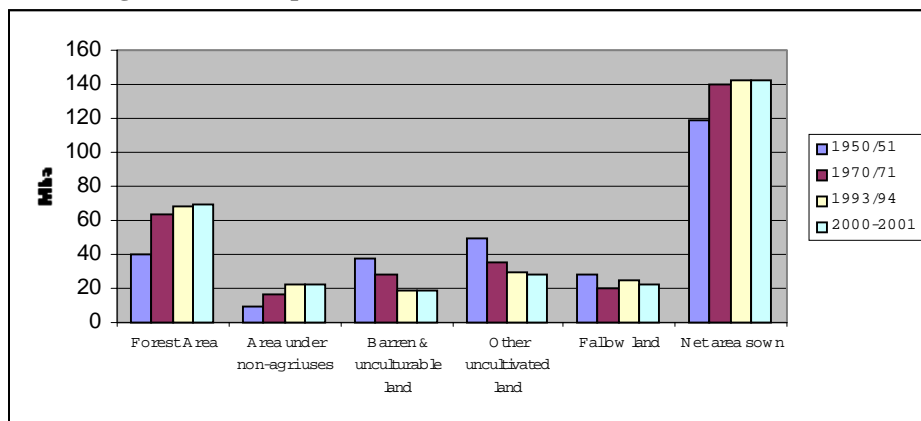
Vulnerability not only depends on the sensitivity of the systems but also depends on the country's capacity to adapt. Adaptation however, is not costless and the ability to adapt depends on one's resources. Thus poor people in developing country like India have the least capacity to adapt and are most vulnerable. India's adaptive capacity is severely constrained by its low level of income, high incidence of poverty and the inescapable need for economic development. At the very low levels of per capita energy consumption in India, the scope to reduce emission is very low. Similarly a land scarce country with high population and density has limited adaptation options to counter to its agricultural system.

As is required by such reports, we give the picture of 1993-94 but also with respect to past and more recent conditions to see what is achieved and what remains to be done. With this background we look at the initial conditions pertaining to the geographical, demographic and socio-economic aspects of India.

1.1 Geographical profile

India is located on the Indian sub-continent in South Asia. The mainland stretches from 8° 4' N to 37° 6' N and 68° 7' E to 97° 25' E. It is bounded by Pakistan to the Northwest, China, Bhutan and Nepal to the North, Myanmar and Bangladesh to the east, the Bay of Bengal to the Southeast and the Arabian Sea to the Southwest. Of India's total geographical area of 328.73 million hectare (mha), 306.04 mha comprise the reporting area and 97.67 mha only is under use for forestry and other uncultivated land excluding fallow. It is only 2.4 % of the world's area but supports about 16.2% of the world's human population. India also has only 0.5% of the world's grazing area but supports 18% of the world's cattle population. India is endowed with a variety of soils, climate, biodiversity and ecological regions.

Table 1. Changes in land use pattern for India 1950/51 to 2000/2001 (Mha)



Source: Ministry of Agricultural Government of India and Indiastat.com

India is endowed with diverse forest types ranging from the Tropical wet evergreen forests in North- Eastern to the Tropical thorn forests in the Central and Western India. The forest of the country can be divided into 16 major groups comprising 221 types. In 1999, the

Food and Agricultural Organization's State of the world's Forest Report had acknowledged that India was the only developing country where the forest cover was actually increasing. Although the exact figures are yet to be disclosed, the trends are clear.

As per the State of Forest Report-1999, India has forest cover in the country (based on satellite data of 1996 to 1998) is 63.73 million ha constituting 19.39 percent of the geographical area of the country. This is composed of 37.74 million ha (11.48%) of dense forest, 25.50 million ha (7.76%) of open forest and 0.49 million ha (0.15%) of mangroves. FSI defines dense forest as lands with tree cover of canopy density of 40 percent and above; open forest as lands with tree cover of canopy density between 10 and 40 percent; and mangroves are salt tolerant forest ecosystem found in inter-tidal regions in estuaries and coasts. Madhya Pradesh accounts for the largest forest cover of the country i.e. 20.68% followed by Arunachal Pradesh (10.80%), Orissa (7.38%), Maharashtra (7.32%) and Andhra Pradesh (6.94%). The seven Northeastern states together comprise 25.70% of the total forest cover.

A comparison of the forest cover of the country between the present (1999) and the preceding assessments (1997) shows a net increase in the forest cover by 3,896 sq.km . The dense forest has increased by 10,098 sq.km, mainly due to improvement in the open forest. The area of mangroves has increased by 44 sq.km. It is to be noted that period during which the change in the forest cover has occurred is not uniform in all the states but varies between 2-5 years, because satellite data used in the interpretation are of different dates. The average difference at the national level is about 3 years. In Andhra Pradesh, net increase of 939 sq.km. in forest cover has occurred in 5 years (1993-98), whereas in Mizoram, loss of 437 sq.km has occurred in 4 years (1994-98). Other states where gains have been recorded are; Arunachal Pradesh, Gujarat, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra Orissa, Punjab, Rajasthan Tripura, U.P., West Bengal and Delhi. The states where forest cover has declined are Assam, Bihar, Goa, Mizoram, Kerala, Manipur, Meghalaya, Nagaland, Sikkim, Andaman and Nicobar Islands and Dadara & Nagar Haveli.

Improved coverage with tree plantation of over 25 million hectares of degraded forests and non-forest areas were achieved during 1980– 98 (MoEF 1999). Thereafter, about 1.5 million hectares of wasteland are being afforested annually, resulting in marginal increase in forest cover. If all the efforts at afforestation were to succeed, India's net emission of CO₂ could come down significantly. The Eighth and Ninth Five-Year Plans gave priority to the promotion of people's participation in forest conservation efforts through Joint Forest Management (JFM). The JFM approach links forest development with socio-economic incentives and broader patterns of natural resource use.

There is much scope for carbon sequestration through improving the quality of forests and greening wastelands.

India has a great variation of climate, with striking contrasts of meteorological conditions. The contrast between Assam in the east and Rajasthan in the west presents extremes of dampness and dryness. In the Thar desert in Rajasthan the average annual rainfall is less than 13 cm, while in Cherrapunji in Assam it can be as high as 1,100 cm. India's climate is affected greatly by monsoons. On the whole summers (March-June) are hot and dry except in the hills and along the coast where it is humid. Summer temperatures in May/June can

soar as high as 47°C while winter temperature goes on decreasing from south to north. While January mean temperatures in Chennai and Kolkatta are 24-25°C, they are between 10 °C degree Celsius in the Northern Plains. The days are generally warm and the nights are cold. Slight frost is not uncommon in places of high altitudes. During the monsoon (July-September), the sub-continent is awash with rain. Thus further temperature rise could greatly compromise comfort, health (heat stroke and pests) and add to additional expenditure for cooling.

The total catchments area of 12 major rivers is 252.8 million hectare (Mha), which is more than 75 percents of the country's total area. Rivers in India are classified as Himalayan, peninsular, coastal, and inland-drainage basin rivers. Himalayan Rivers are snow fed and maintain a high to medium rate of flow throughout the year. The heavy annual average rainfall levels in the Himalayan catchment's areas further add to their rates of flow. During the monsoon months of June to September, the catchment's areas are prone to flooding. The volume of the rain-fed peninsular rivers also increases during monsoon. Coastal streams, especially in the west, are short and episodic. Rivers of the inland system, centered in western Rajasthan state, are few and frequently disappear in years of scant rainfall. The majority of India's major rivers flows through broad, shallow valleys and drain into the Bay of Bengal.

The coastal areas of India accommodate about one fourth of country's population that is dependent to a large extent on marine resources. Nine of the Indian states namely, Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamilnadu, Andhra Pradesh, Orissa and West Bengal are on the long coastline. In addition, some of the Union Territories such as Pondicherry and Daman and group of Islands including Andaman and Nicobar near the East Coast and Lakshadweep on the West Coast also form the coastal eco-systems of great economic and ecological importance in the country. The coastal areas are important and critical for India as the coastline is over 7500 km long. Three of the four metropolitan cities and numerous cities and towns are located with total population of 417.61 (42%) million living in coastal zones. Increasing human activities in coastal regions, mainly for livelihood, industrial and other development activities are threatening marine resources.

A rise in sea level may also have significant implications on the coastal population and agricultural performance of India. The extent of vulnerability, however, depends not just on the physical exposure to sea-level rise and population affected, but also on the extent of economic activity in the areas.

Coastal districts of India are frequently affected by storms. The cyclones are more severe along the East coast compared to the West coast. In addition to cyclones floods also cause havoc in the coastal areas. Table 2 shows the impact caused by cyclones and floods in India during the period 1964-1998.

Table 2. Impact caused by cyclones and floods in India during the period 1964-1998.

Year	Floods			Cyclones		
	Events	Killed	Affected	Events	Killed	Affected
1991-98	36	14,774	229,732,140	17	6,020	6,457,153
1981-90	38	10,339	113,001,550	39	8,806	25,809,193
1971-80	38	12,106	170,288,023	30	24,535	28,145,947

1964-70	13	8,058	21,521,610	9	2,340	447,092
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Source: EM-DAT - The OFDA/CRED International Disaster Database)

Flood and droughts affect vast areas of the country, transcending state boundaries. A third of the country is drought prone. Floods affect an average area of around 9 million hectares per year. According to the National Commission on Floods, the area susceptible to floods was estimated in 1980 to be around 40 million hectares. Riverine flooding is perhaps the most critical climate-related hazard in India. Flood control has a key element of national policies for water resource management. The occurrence of floods and droughts is closely linked to the summer monsoon activity. Floods occur in almost all rivers basins of the country. Heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/ rivers is the main causes of floods. Ice jams or landslides blocking streams; typhoons and cyclones also cause floods.

Out of 40 million hectare of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectare per year. The National Flood Control Programme was launched in 1954. Since then, sizeable progress has been made in the flood protection measures. Nearly one third of the flood prone area had been afforded reasonable protection during the period of two decades.

1.2 Demographic Profile

In 1951, the population of India was 361 million. It reached 1 billion marks in the beginning of 2000, multiplying by three times. The population density of India is 324 persons per square Km. In India; the demographic transition has been relatively slow but steady. The mortality and fertility rates have declined from high to low. As a result, while the population is rising over the years making economic development more difficult, the country was able to avoid some of the adverse effects of urbanization and too rapid changes in social and economic development (Table 3).

Table 3. Basic National Demographic Indicators

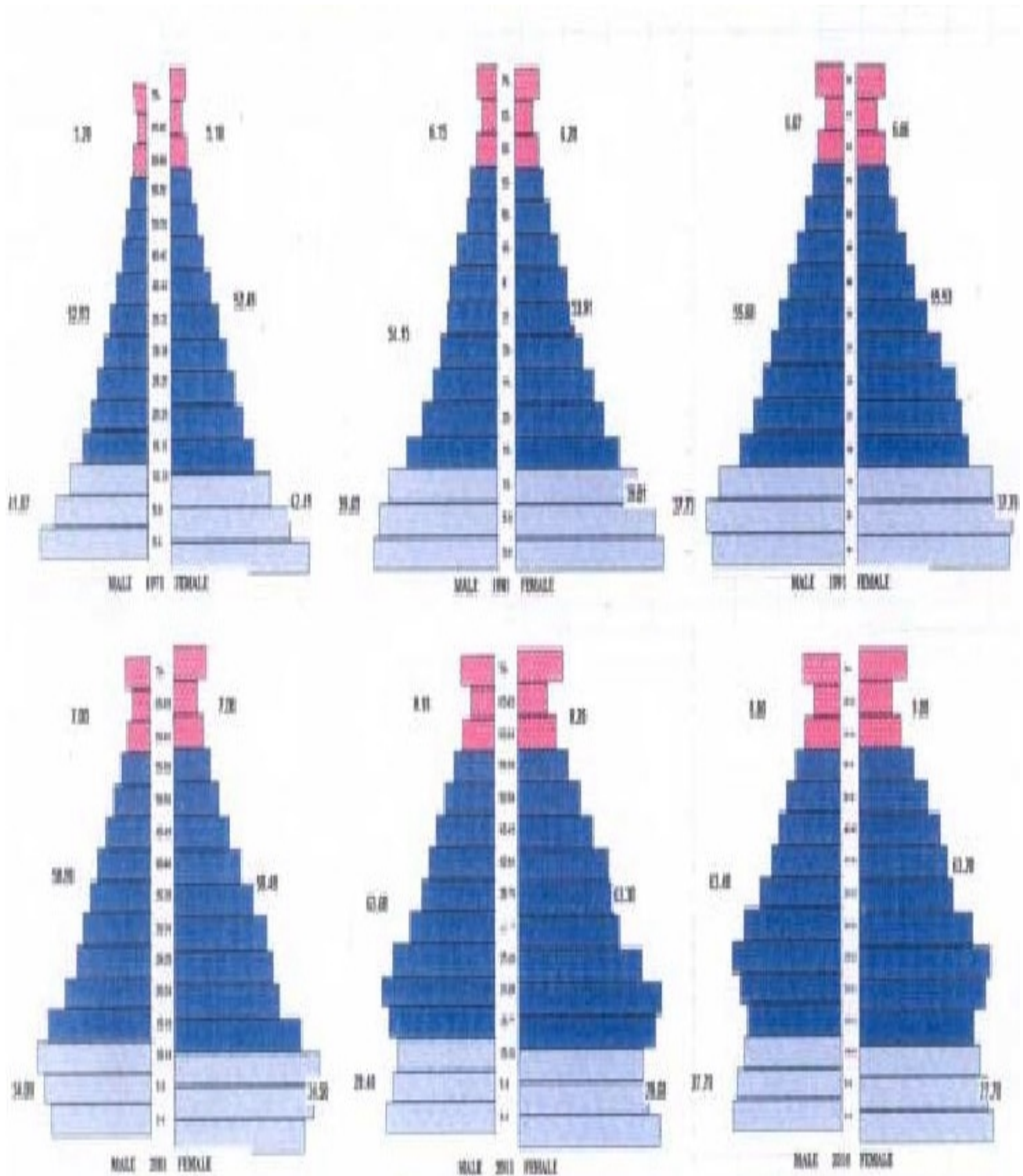
	1951	1994	2001
Population (million)	361	904	1027.01
Average annual growth rate	1.25	2.2	1.95
Per cent urban*	NA	26.1	27.8
Crude birth rate	39.9	28.7	25.8
Crude death rate	27.4	9.3	8.5
Total fertility rate	5.96	3.5	2.9
Infant mortality rate	148	74	68
Sex ratio	946	NA	933

Source: Census 2001

Figure 1 below shows that India is aging gradually with slight expansion at top, a lot more in the middle and stabilizing at the bottom i.e.; younger age groups because the new

additions is not high. India's population pyramid indicates a broad base of an expanding population. This structure has a large number of children born each year. Even if the

Figure 1. Changes in Population Pyramid –1971-2016



Source: Planning Commission

average number of children falls substantially in future, the young age structure will generate continued growth for decades as a large number of them enter child-bearing age. The number of births projected is 25-30 million by 2000 A.D. Even if all Indians plan for two children per family the population will continue to grow for 60 to 70 years. This will continue to build up a young age composition ' bulge'. This 'population bulge' of younger population and older population growing is pronounced in other Asian countries as well.

1.2.1 Urbanization

The progress of urbanization is relatively slow in India compared to other developing countries (Table 4). This rapid increase in urban population has resulted in unplanned urban development, changed consumption patterns and increased demands for transport, energy, and other infrastructure, thereby leading to pollution problems.

Table 4. Trends in the Growth of Metropolitan Cities in India

Year	Population		No. of Cities greater than one million
	Urban (In Millions)	% Urban to total population	
1951	62.4	17.3	5
1981	159.5	23.3	12
1991	217.6	25.7	23
2001	285.3	27.8	35

Source: Census of India, 2001

The increase in the requirements of urban transportation in India over past few decades has outstripped the development of urban infrastructure. This has led to congestion of cities, proliferation of private vehicles, increased energy usage and increased pollution. The situation got worse due to shift of modal split away from railways towards road transport and from public to private transport due to inadequate capacity expansion of public transport leading to rising emission levels of pollutants and increased energy usage due to proliferation of private vehicles.

1.2.2 Literacy

Literacy levels in India vary sharply across various regions, locations and among different sections of population, such as Castes and Tribes. The differences are larger between the two genders. The literacy rate in 1971, in India was 45.96 percent for males, 21.97 percent for females and 34.45 percent for total population. In 2001, the level of literacy had reached 75.85 percent (male), 54.16 percent (female) and 65.38 percent for the total population. Literacy in urban areas have reached high level but in the rural areas, the literacy levels are especially low, for women, which brings down the overall literacy levels in India.

1.3 Socio-Economic Profile

For many decades India followed a mixed economy model where central planning co-existed with private enterprise. Agricultural activities have been almost entirely with

private farmers. Industrial investment was sought to be controlled through industrial licensing till 1991.

In 1991, a major programme of reforms was initiated when industrial licensing was abolished and trade constraints were relaxed, protection was reduced and much greater emphasis was laid on the private sector.

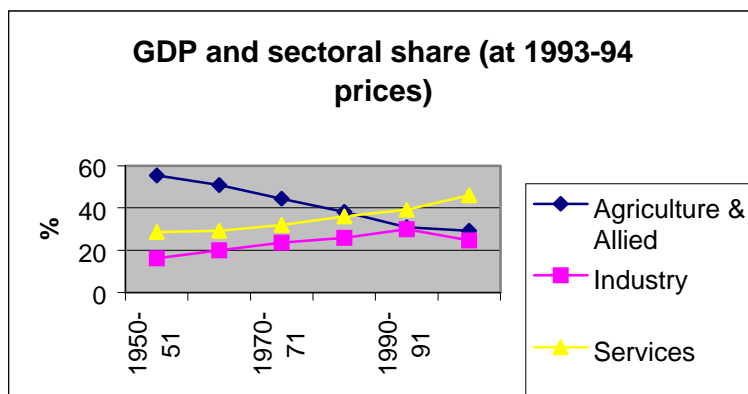
1.3.1 GDP and its Structure

The Indian economy has made rapid strides in the first 50 years of freedom, achieving food self-sufficiency with increased population, creating a strong and diversified industrial base, developing technological capabilities in sophisticated areas and establishing growing linkages with an integrated world economy. GDP growth rates of 5 to 7 per cent in recent years (1981-2002) put it among the few fast countries in the world.

Agriculture sector share in GDP has been declining over the years – from over 50 per cent in the early 1950s to 26 percent in recent years. At the same time the shares of manufacturing, transportation and banking and service sectors have doubled in last 50 years. The growth of the Indian economy is accompanied by a change in its structure (Figure 2).

There have been serious deficiencies as well, especially the slow progress in alleviation of poverty and in generating adequate employment opportunities. It is now well recognized that unless India's growth is sustained at 7 to 8 per cent for several years to come, adequate resources cannot be mobilized to tackle the challenges of social development in which India lags behind.

Figure 2. GDP by Industry of Origin and Sectoral shares (in billion rupees) (At 1993-94 Prices)



Source: Economic Survey, 2003

1.3.2 The Indian Budgetary Situation

The tax revenue has increased by a considerable portion in the period 1991-2002. The value of the total receipts as a percentage of GDP is seen increasing only marginally. The proportion of tax revenue to total revenue has been increasing quite significantly. Even though the direct tax rate is lower, due to the widening of the tax net collections were

higher. Indirect taxes put a burden on the poor and lowering indirect tax rates and rationalization leads to efficiency and equity (Table 5).

Table 5. Revenue receipts (% of GDP)

	1991	2002
Indirect Taxes	6.34	4.79
Direct Taxes	1.21	3.02
Tax revenue	7.56	7.81

Source: Budget Documents of the Government of India and Finance Accounts (various issues).

The expenditure can be divided into two broad categories of 'Plan' and 'Non-Plan', as also as 'Developmental' and 'Non-Developmental' (Table 6). The Plan Expenditure generally considers the plan outlays of the central government and concerns with the growth and investment in the economy, whereas, the Non-Plan expenditure takes care of the recurring expenditures of the government and the economy. Furthermore, these are split into the capital and the revenue expenditures.

The Non-Plan Expenditure has shown an increase during the last few years due to a significant share of the rise in the defense expenditures and also a rise in interest payments, which is roughly about 15%. Also, the Non-Plan expenditure on capital account shows an increase since there has been an increase in the outlay for defense capital. The Plan Expenditure has gone down substantially. The total expenditure as a percentage of GDP has shown a gradual decrease. This has led to and may also be due to, the active participation of stakeholder organizations and the initiatives of non-government organizations.

Table 6. Expenditure (% of GDP)

Expenditure	1991	2002
Developmental	10.31	7.54
Economic services	4.32	4.07
Social services	0.58	0.88
Non –developmental	8.68	11.01
Total expenditure	18.99	18.56

Source: Budget Documents of the Government of India and Finance Accounts (various issues).

Fiscal deficit, the gap between the government's total spending and the sum of its revenue receipts and non-debt capital receipts, represents the total amount of funds borrowed by the government to meet its expenditure. India's rising fiscal deficit is a matter of concern. Though substantial reduction in gross fiscal deficits was observed in the first few years a reversal of the trends was seen in the last few years. Revenue deficit has substantially increased as a percentage of GDP, particularly the combined deficit of central and state governments (Table 7).

Table 7. Combined Deficit OF State and central Governments (% of GDP)

Deficits	1991	1997	2002
Gross Fiscal Deficit	9.42	6.54	9.76
Revenue Deficit	4.20	3.19	6.08

Source: Budget Documents of the Government of India and Finance Accounts (various issues).
: Ministry of Finance, Govt. of India, 2003

1.3.3 Livestock

Along with high population, livestock also exert pressure on land. Moreover, they also emit GHGs. India possesses one of the largest livestock populations in the world (Table 8). The livestock sector is both expanding and adapting in response to economic, technological, and environmental factors. In general, the numbers of different species are increasing; populations of poultry, pigs, goats, and buffalo have grown faster compared to other species. The populations of draught animals have witnessed negative and decelerating trend.

Although the share of agriculture in gross domestic product (GDP) has been declining, the share of livestock in GDP is showing an increasing trend. India has been described as a "slumbering giant of the international dairy trade" (Dairy India, 1997). Even at the low productivity and off-take rates, livestock contribute significantly to economic development. Additionally, livestock act as a storehouse of capital and an insurance against crop failure. With production concentrated among small landholders, livestock help improve income distribution.

Table 8. Livestock Population in India

Animals	Number of Animals (in '000)				
	1977	1982	1987	1992	1997(P)
Cattle	180140	192453	199695	204584	174974
Buffaloes	62019	69783	75967	84206	84027
Sheep	40907	48765	45703	50783	55311
Goats	75620	95255	110207	115279	102255

Source: Live Stock Census (1992 and 1997), Ministry of Agriculture, New Delhi.

1.3.4 Poverty

Despite the growth of population from 350 million to more than a billion today and the low level of economic development at the time of independence in 1947, India has made significant progress in poverty reduction. The percentage of people below poverty line has come down significantly. Yet, large number of persons remains below the poverty line (Table 9).

The poverty line was originally defined in 1961 based on income needed to provide adequate calorie intake, two pairs of clothing and minimal amount of other essentials. This poverty line has been updated over the years to account for changes in prices. The estimates are based on large-scale sample surveys of household consumption carried out periodically by National Sample Survey Organization (NSSO).

Table 9: Percent below Poverty Line (All India)

Year	Rural	Urban	Total
1973-74	56.44	49.01	54.88
1977-78	53.07	45.24	51.32
1983	45.65	40.79	44.48
1987-88	39.09	38.20	38.86
1993-94	37.27	32.36	35.97
1999-2000	27.0	23.62	26.10

Source: Planning Commission, 2000

The high incidence of poverty that still prevails in India underlines the need for rapid economic development to create more remunerative employment opportunities and to invest in social infrastructure of health and education.

Poverty Alleviation and Employment Generation Programmes

Alleviation of poverty remains a major challenge before the nation. While there has been a steady decline in poverty over the last two decades, the total number of poor people has perhaps remained constant because of growth in population. Acceleration of economic growth, which is employment intensive, facilitates the reduction of poverty in the long run. However, this strategy needs to be complemented with a focus on provision of basic services for improving the quality of life of the people through State intervention in the form of targeted anti poverty programmes. The specifically designed anti poverty programmes for generation of both self employment and wage employment have been redesigned and restructured in 1999-2000 in order to make these programmes more effective. For the year 2000-01, an outlay of Rs. 97600 million (BE) was provided as compared to Rs. 93510 million (RE) for 1999-2000.

The major poverty alleviation programmes in operation in rural and urban areas are:

1. Jawahar Gram Samridhi Yojana (JGSY)
2. Swarna Jayanti Gram Swarozgar Yojana (SGSY)
3. National Social Assistance Programme (NSAP)
4. Employment Assurance Scheme (EAS)
5. Pradhan Mantri Gramodaya Yojana (PMGY)
6. Swarna Jayanti Shahari Rozgar Yojana (SJSRY)

1.3.5 Consumption patterns

It is well known that 25% of the global population in developed countries consumes more or less 75% or most of the global resources. At the subsistence level, people usually consume primary goods such as cereals, milk, meat, fuel wood and so on (Table 10 & 11). With a rise in income, secondary goods such as petroleum products, cement, fertilizers, etc. enter the consumption basket. Finally tertiary goods such as transport vehicles, consumer goods and appliances and services are used in large quantities. Not all high-income consumption is material intensive. For example, perfumes, jewelry, restaurant services, etc.

do not require much raw material. Thus, consumption levels depend on change in income and the kind of population that has increased, rich or poor?

Vastly different consumption patterns are found in rural and urban areas, especially in developing countries. Some of the differences may be due to reduced availability of infrastructure and limited availability of merchandise in rural areas. When rural people migrate to urban areas or developing country residents migrate to a developed country, consumption increases and consumption patterns change. Apart from income differences, the change is primarily due to differences in infrastructure such as roads, highways, public transport, airports, power plants, water supply, hospitals and many other services not often available in rural areas. Despite their ability to pay, rich people in rural areas or in developing countries end up sharing poor infrastructure with the rest of the population. This explains why in developing countries, even very rich persons do not consume as much as an average person in a developed country. Infrastructure differences exist due to different investment levels. Thus, investment patterns - public and private – also determine consumption patterns.

Another demographic variable is age structure, e.g., a young population requires schools, books, goods for sports and travel whereas seniors need hospitals and medical care, diagnostic centres, and so on. In developed countries, senior citizens often have good pensions and they support leisure industries. In developing countries, seniors depend on their children to care for them and often their consumption falls with age.

Gender is another variable that affects consumption patterns. Females have different consumption patterns than males but few data are available.

Cultural differences and investment patterns determine consumption patterns. With globalization, cultural differences gradually vanish or get blurred.

Table 10. Per capita net availability per day (Grams)

Year	Fruits	Vegetables	Potato	Onion
1984-85	89	229	47.2	11.6
1991-92	93	190	53.2	11.6
1996-97 (Est.)	138	237	71.0	12.3

Source: Production Year Book: 1997 -- National Horticulture Board and agricultural statistics at a glance, 2002

Table 11. Per capita consumption (Gms/day) of certain important food items

Year	Cereals**	Pulses**	Edible Oils & Vanaspati@	Sugar (Nov-Oct.) +	Tea and Coffee* #	Fish
1955-56	360.4	70.3	9	14	1.18	6.2
1975-76	373.6	50.5	12	17	1.39	8.7
1994-95	457.6	37.8	20	36	1.97	11.0
2000-01	422.1	31.8	26	43	1.95	14.8
2001-02(P)	385.1	29.1	27	45	1.96	14.8

Provisional

@: Includes Groundnut Oil, Sesamum Oil, Rapeseed Oil, Coconut Oil, Nigarseed Oil, Soyabean Oil and Sunflower Oil but excludes oil used for manufacture of vanaspati.

*: Figures upto 1971-72 relate to coffee season and thereafter on calendar year basis. The figures for 1972-73 correspond to 1973 and so on.

+ Relates to actual releases for domestic consumption.

Relates to calendar year.

Sources: 1. Directorate of Vanaspati, Vegetable Oils & fats, Ministry of Food, Consumer Affairs & Public Distribution, Department of Sugar & Edible ard, Coffee Board.

**Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation

Housing Situation

The aggregate picture of the housing situation in India can be judged from the relative quantitative and qualitative improvement in the total residential houses, during 1981-2001. From the data presented in Table 11 it is seen that the growth rates during 1991-2001, of the total residential houses and separately for rural and urban areas, have been lower than the previous decade but must have been higher than the growth rate of households as the shortage figures have come down.. Qualitatively also the dwelling units have exhibited significant improvements. The proportion of pucca houses has gone up significantly both in rural and urban areas from 1991-2001, and the rural growth rate is higher. Katcha houses are showing decline and similarly a gradual decline is also seen in semi-pucca houses from 1981 to 2001.

Despite the quantitative and qualitative improvements in housing stock in India, sizable housing shortage persists. National Building Organization / Working Group on Urban Housing for the 9th plan estimated the housing shortage in 2001 at 19.4 million units (Table 12).

**Table 12. Quantitative and qualitative aspects of houses during 1981-2001
Number of residential houses and household size**

	Total Residential houses (Mn.)			Percentage decadal growth of residential houses		Average household size			Population (Million)		
	1981	1991	2001	1991	2001	1981	1991	2001	1981	1991	2001
Total	118.63	155.43	187.06	31.02	20.35	5.6	5.53	5.35	664	860	1027
Rural	89.59	112.87	135.05	25.99	19.65	5.63	5.56	5.37	504	628	742
Urban	29.04	42.56	52.01	46.55	22.20	5.52	5.45	5.31	160	232	285
Proportion of households with house quality type (Percent)											
	Pucca ¹			Katcha ²			Semi-pucca ³				
	1981	1991	2001	1981	1991	2001	1981	1991	2001		
Total	32.67	41.61	51.8	34.04	27.44	18.1	33.29	30.95	30.0		
Rural	22.53	30.59	41.1	40.55	33.76	23.1	36.93	35.65	35.7		
Urban	64.7	72.75	79.3	13.50	9.56	5.2	21.8	17.69	15.4		
Housing Shortage (Million Units)				Total		Rural	Urban				
1991 housing census				22.9		14.67	8.23				
2001 housing census				19.4		12.76	6.64				

Source: Planning Commission (2001)

¹ Pucca houses: Houses with wall and roof made of permanent materials. Material of wall can be burnt brick or other metal sheets, stone, or cement concrete. Roofs can be made of tiles, slate, shingle, iron, zinc or other metal sheets, bricks, lime and stone, stone and reinforced concrete.

² Kutchha: Houses with wall and roof made of temporary materials. Wall may be made of grass, leaves, bamboo, mud, unburnt bricks or wood. Roofs may be made from grass, leaves, bamboo, thatch, burnt brick or wood.

³ Semi-pucca: Either wall or roof is made of permanent materials and the other is made of temporary materials

Transport

Sustainable Urban Transport System should be economically and socially equitable and efficient. When low-income groups do not have access to affordable transportation system, this imposes hardships on them. Their time and energy is wasted in commuting, making them inefficient and thus sending them in a vicious circle of poverty and inefficiency. Efficient transport system is a critical infrastructure for the cities for economic productivity and quality of life.

Managing transport sector while minimizing externalities such as local pollution, congestion and global pollution is a major challenge. Rapid urbanization is taking place in many developing countries. It is expected that more than 50% of population in India will reside in urban areas by 2025, a substantial increase from 28.9 % in 1999.

Transport is a critical infrastructure for development both intercity and urban. Transport accounts for a major share of consumption of petroleum products in India. It is responsible for an appreciable share of pollution, both local and global. Local pollutants get concentrated in the urban areas. The emission of global pollutants, especially of Carbon dioxide (CO₂), from transport is also a problem of increasing concern in the global environmental scenario. The number of motor vehicles has increased from 0.3 million in 1951 to 48.4 million in 2000 (MoST 2000) (Table 13).

Table 13. Total Number of Registered Motor Vehicles in India (1951 to 2000)
(In thousands)

Year (As on 31st March)	All Vehicles	Two Wheelers	Cars, Jeeps & Taxies	Buses	Goods Vehicles	Others *
1951	306	27	159	34	82	4
1971	1865	576	682	94	343	170
1991	21374	14200	2954	331	1356	2533
1994	27660	18899	3569	392	1691	3109
1999	44875	31328	5556	540@	2554	4897
2000 (Provisional)	48393	33913	6042	559@	2681	5198

Note: * : Others Include Tractors, Trailors, Three Wheelers (Passenger Vehicles) and other miscellaneous vehicles which are not separately classified. @ : Includes Omni Buses.

Source: Motor Transport Statistics of India 1999-2000, Ministry of Road Transport & Highways, Govt. of India & Past Volume.

1.4 Environmental governance profile

Finding solutions for the benefit of human society need natural resources. Doing this without destroying environment is a difficult task. Governance is about the process by which we take decisions, implement them while involving people. It relates to decision-making at all levels —government, ministers, bureaucrats, business people, property owners, farmers, producers and consumers. In short, governance deals with who is responsible, how they wield their power, and how they are held accountable. In this report, we look at the environmental governance profile and the role of various actors: the Indian Parliament, Central Government, State Government, Local Government and the Judiciary.

The issue of governance in general and environmental governance in particular is becoming an increasingly important concern both at the national and international levels.

The Republic of India is a Union of states. The power of the government is separated into three branches: executive, parliament, and a judiciary. The constitution vests national legislative power in a Parliament of two houses: the Lok Sabha (House of the People), the lower house, and the Rajya Sabha (Council of States), the upper house. The head of state of India is the President. A council of ministers, or cabinet, is headed by a Prime Minister and wields executive power at the national level. The President upon the advice of the Prime Minister selects the council, which is responsible to Parliament. Each council member heads an administrative department of the central government. Judicial authority in India is exercised through a system of national courts administering the laws of the republic and the states. The highest court is the Supreme Court. The Judiciary is independent and acts as an effective check on executive and legislature. The Judiciary has been exceptionally effective in the area of environment by achieving greater degree of compliance with the laws and upholding the rights of citizens to acceptable quality of water and air. The state governments are modeled after central government. State Legislative assembly and council constitute the legislative wing. Governor is head of state. Chief Minister with his council of ministers wields the executive power at the state level. High court is the apex court at the state level. At the local/provincial level Panchayat Raj institutions such as Village, block and municipalities are ruled by the elected members.

Environmental concerns are given considerable attention in India. It might be pertinent to recall here that the Indian Prime Minister was the only Head of Government to attend the first *United Nations Conference on Human Environment* (Stockholm, 1972), in addition to the Prime Minister of Sweden (the host country). Even before the Stockholm Conference, the concern for preserving the quality of life and preserving the environment while undertaking the task of development was stressed in India's Fourth Five Year Plan (1969-1974). Prior to the Stockholm conference, the Government of India in February 1972 established a *National Committee on Environmental Planning and Coordination* (NCEPC) in the Department of Science and Technology. This commitment was a major step taken by India and was the first nation in the world to change its constitution to protect its environment. The constitutional provisions are backed by a number of laws – acts, rules and notifications. More than two dozen laws protect India's environment. They cover all aspect of the environment-from pollution to conservation, from deforestation to nuclear waste. Some of these laws existed even before the environmental movement arrived on the world scene.

1.4.1 Role of Indian Constitution

The Indian constitution classifies various legislative subjects into three categories: union list, state list and concurrent list. The legislation in the union list is enacted by the Indian parliament, while the state list legislation can only be enacted by the state legislatures. The concurrent list specifies the subjects that are to be looked after jointly by the central and state governments. For example, while water supplies, irrigation and canal drainage are within state jurisdiction, the regulation and development of interstate rivers and river valleys are subjects for the central government to address. Forests and protection of wild animals and birds are examples of subjects in the concurrent list. When the central government enacted the Water Act of 1974, because the parliament has no power to make

such a law for the states, it had to resort to Article 252 of the Indian Constitution, which allows the Parliament to act at the request of the states. The environmental policy was explicitly incorporated into the Indian Constitution in 1976. There is a multiplicity of agencies involved in resource management in India and overlaps in jurisdiction are common. The allocation of resources to various sectors is directed by the Planning Commission working within the framework of the five-year plans. Environment management is guided at the central level by MOEF and at state levels by the departments of environment at state level. Individual resources (like water, forests, oceans etc.) are managed by separate ministries and departments. Inter ministerial coordination committees and working groups deal with the cooperation and conflict of interest issues. Indeed, in a large country this is perhaps inevitable. The implementation of government policies on resource use is directed by the multitiered administrative set up. The administrative units at the central and state levels coordinate resource allocation and project implementation. However, the implementation of all programmes is done at the field level under the overall supervision of the District Collector. Local bodies such as Panchayats and city councils also have stake in implementing various schemes as per the instructions and directives of the Collector who is a civil servant. Several participatory management schemes dealing with environmental issues are successfully carried out at the local level.

The environmental legislation in India is based on active State intervention to preserve, protect and improve the human environment. Some important acts related to protection of environment are:

Water Act, 1974: An Act to provide for the Prevention and Control of Water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the Prevention and Control of Water pollution, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

WHEREAS it is expedient to provide for the Prevention and Control of Water Pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the Prevention and Control of Water Pollution and for conferring on and assigning to such Boards powers and functions relating thereto.

The Air (Prevention And Control Of Pollution) Act, 1981: An Act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

WHEREAS decisions were taken at the United Nations Conference on the Human Environment held in Stockholm in June, 1972, in which India participated, to take appropriate steps for the preservation of the natural resources of the earth which, among other things, include the preservation of the quality of air and control of air pollution; AND WHEREAS it is considered necessary to implement the decisions aforesaid in so far as they relate to the preservation of the quality of air and control of air pollution...

The Environment (Protection) Rules, 1986:

3. Standards for emission or discharge of environmental pollutants.- (1) For the purposes of protecting and improving the quality of the environment and preventing and abating environmental pollution, the standards for emission or discharge of environmental pollutants from the industries, operations or processes shall be as specified in schedules I to IV

4. Submission of environment statement- Every person carrying on an industry, operation or process requiring consent under section 25 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) or both or authorization under the Hazardous Wastes (Management and Handling) Rules, 1989 issued under the Environment (Protection) Act, 1986 (29 of 1986) shall submit an environmental statement for the financial year ending on the 31 St March in Form V to the concerned State Pollution Control Board on or before the thirtieth day of September every year, beginning 1993.

Some of the other Acts that are made to protect Indian environment are, The Indian Forest Act (1927), the Wildlife Protection Act (1972), The Forest (Conservation) Act (1980), The National Forest Policy (1988), Coastal Regulation Zone (CRZ) (1991) and New Biodiversity Act, 2002.

India is also a signatory to a number of related MEAs (multilateral environmental agreements) and conventions, such as Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), the Ramsar Convention on Wetlands of International Importance, and the Convention on Migratory Species, UN Convention to Combat Desertification, the Montreal Protocol, Cartagena Protocol on Biosafety, the Convention on Biological Diversity (CBD), Intergovernmental Panel on Climate Change (IPCC), and Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC). The MoEF is the focal point in the Government of India for the implementation of these Conventions. Several positive measures were taken to abide by our international obligations. The role of NGOs is also commendable in helping the GOI in environmental governance.

Realizing the importance of Environmental Information, the Government of India, in December 1982, established an Environmental Information System (ENVIS) as a plan programme. The focus of ENVIS since inception has been on providing environmental information to decision makers, policy planners, scientists and engineers, research workers and citizens all over the country.

1.4.2 Five-Year Plans

While strategic plans are carried at the centre, the implementation is done at the state level, where each state also makes its own detailed five-year plan and submits it to the centre. The Ninth Five-Year Plan (1997–2002) explicitly recognizes the synergies among environment, health, and development, and identifies as one of its core objectives the need for ensuring environmental sustainability of the development process through social mobilization and participation of people at all levels.

Tenth Five-Year Plan (2002–07) links economic development and poverty with environmental degradation. As the poor are

dependent on nature for their livelihoods, they are highly vulnerable to natural calamities, environmental degradation, and ecological disasters. Any economic development, which destroys the environment, will aggravate problems of poverty, unemployment, and disease. Among the worst affected are women, who have to travel great distances to collect fuel wood, fodder, and water.

1.5 Concluding Comments

India occupying only 2.4 % of the world's geographical area, supports about 16.2% of the world's human population. India also has only 0.5% of the world's grazing area but supports 18% of the world's cattle population. India is endowed with a variety of soils, climate, biodiversity and ecological regions. About 228 mha (69%) of its geographical area (about 328 mha) fall within the dry land (arid, semi-arid and dry sub-humid) as per Thornthwaite classification. The Thar Desert lies in the hot arid region of Western Rajasthan and is one of the most densely populated deserts of the world. The country has been classified on the basis of agro-climatic, agro-ecological and agro-meteorological zones for the purpose of planning and implementing various programmes and measures. Agriculture is the major sector of growth of the Indian economy. A large percent of the population is still dependent on agriculture for its sustenance. Of the total cultivated area of 142 mha, major part of agriculture in the country is rain fed, extending to over 97 mha and constituting nearly 68% of the net cultivated area. Various land use patterns and land use changes over 50 years.

India's economy is growing rapidly. Yet it has a large number of poor and a modest level of human development. There is thus a large backlog of developmental investment that needs to be made in housing, in roads, in schools, in hospitals, in water supply and sanitation and in other infrastructure. All these will call for increased GHG emissions. India has a well-developed system of participatory, democratic environmental governance and has made much progress in dealing with environmental issues. In fact the reduction in GHG emissions made by India are substantial. India's future emissions have to be seen in the context of its initial conditions, socio-economic needs and political realities.

The seeds of future scenarios of India lie in the initial conditions of the present situation and trends.

Economic liberalization

It can be seen that the current GDP growth rate may continue for some time because major steps have been taken for economic liberalization. Higher economic growth rates may have two major impacts.

- Reduction of poverty
- Accelerated progress in industrialization and service sector

Economic growth will inevitably lead to higher energy consumption but also economic and energy efficiency which will reduce the energy intensity of consumption. Thus, the energy: GDP ratio may decline. Also Co₂: GDP ratio may decline because of increased access to oil and gas and less control of Government where "allocation" of these resources has given

way to market forces and consumer choices and the consumers are no longer compelled to buy coal, which is an abundant natural resource.

The economic reforms launched in 1991 have resulted in higher growth rates for the economy. With that came larger investment requirements, especially for infrastructure development. The reforms of June 1991 constitute a watershed in India's economic history. Imports were made easier through a drastic reduction in tariffs and virtual abolition of import-licensing. Domestic deregulation made Indian industry free to decide what, how much, where and how to produce. The rupee has been made partially convertible, and exchange rate controls are now virtually removed. Foreign investment in core infrastructure industries as well as non-core industries is encouraged. These reforms have helped boost the growth of economy and a 5.5 % to 6 % growth rate is now considered normal.

Demographic factors

In the coming decades one may see India aging with lower birth rates, higher survival rates and increased life expectancy. This along with urban migration and people enjoying higher standards of living may also increase need for energy and increased Co2 emissions with more urban population. Number of cities more than one million population will grow. Per person Co2 emissions in urban areas are higher than in rural areas. The past few decades have seen a gradual shift of people to urban areas. The urban population increased from 19% of the total population in 1965 to 28% in 2000. As countries industrialize one sees cities grow and traffic increase. This may reflect rapid economic development and industrialization but also high levels of energy consumption and emissions.

Consumption patterns

The number of poor may reduce and hence consumption pattern will shift towards better living standards. The diet may thus shift from survival diet (centered around cereals) to well balanced diet with more protein, vitamins and minerals that call for variety in foods. We showed that this trend has already begun. Higher intake of milk, oils, fruits and vegetables can be seen.

Another major change is in housing. A shift from predominantly kachcha (make- shift) housing to semi permanent and permanent housing that call for more energy in terms of GHG intensive materials for foundation, roofs, floors, walls, and accessories such as sanitary wares, porcelain and tiles, is taking place.

Transport vehicles

An efficient urban transport system is essential for sustainable development. When low-income groups do not have access to affordable transportation system, this imposes hardships on them. Their time and energy is wasted in commuting, making them inefficient and thus sending them in a vicious circle of poverty and inefficiency. Managing transport sector while minimizing externalities such as local pollution, congestion and global pollution is a major challenge. Rapid urbanization is taking place in developing countries. The increase in the requirements of urban transportation in India over past few decades has outstripped the development of urban infrastructure. This has led to congestion of cities,

proliferation of private vehicles, increased energy usage and increased pollution. The situation got worse due to shift of modal split away from railways towards road transport and from public to private transport due to inadequate capacity expansion of public transport leading to rising emission levels of pollutants and increased energy usage due to proliferation of private vehicles. The number of motor vehicles has increased from 0.3 million in 1951 to 37.2 million in 1997. The need for transportation will increase and vehicles per thousand persons may rise from a low level of 40 per thousand persons to perhaps 100 to 150 per thousand in the next 20 years.

Environmental Governance

Greening of policies is evident in the way courts are favoring environment over profit-oriented decisions, which are often challenged. NGOs are serving as watchdogs that can no longer be ignored. On the whole, India is on the path of sustainable development where poverty is reducing and economic progress is seen. Evolving from a subsistence level living to a fulfilled life. This may increase per capita Co2 emissions but economic progress will also lead to efficiency and reduce Co2 per GDP values.