Demography India
Vol. 19, No. 1 (1990), pp. 59-64

B. D. Misra

Population, Eeo-system and the Environment: An Indian Scenario

THE three fundamental demographic factors of births, deaths and migration produce changes in population size, composition and distribution and these changes raise a number of important questions of cause and effect. Answers to these questions go beyond what is learnt in technical or formal demography. One of the ways in which answers to some of the important questions of social relevance can be understood is to examine the demographic system in relation to the ecological and social system of a particular community/society and our concern should go beyond explaining 'how' to examining the' why'. The ecological and the social and cultural system enables us to answer some of these 'whys'. Both the ecological and the socio-cultural factors could be considered either as dependent or independent variables for analytical purposes. The relationship between the demographic and the ecological and socio-cultural factors could also be one of reciprocal influences. Thus one can visualize a demographic system interacting and overlapping the ecological and/or the social system. The principal elements in the former consist of population size, composition and distribution when we look at the processes arising out of fertility, mortality and migration events. The social system, on the other hand, enables us to look at the relationships among the demographic system components which include element traits and processes as well as system traits and processes and components of various social systems. The socially defined components consist of such factors as family, caste, marital status, labour force participation, occupation, education, income, religion etc. and would include such analytically defined elements as attitudes, beliefs, values and tradition. The social system would also include various institutions of the society which may have important demographic consequences. The human ecological system has been indicated as one consisting of interdependent relations among the components of population, environment, resources, social organization and technology. In this interrelated system, demographic variables may be considered as independent variables operating to influence the system; as dependent variables responding to the influences; or as indicators of one or more aspects of the system. The growth of population is a fundamental factor in its relationship to natural resources, environment, and technology. The study of human ecology examines the relationship of man

* Dr. B. D. Misra is Professor in the Department of Humanities & Social Sciences, I.I.T., Bombay.

to the environment and with growing population and urbanization the environment is changing. "Man is not only a part of his eco-system but also the most resourceful asset and the most serious threat in it"[1]. Thus man is not only a part of the eco-system, but also the most influential force in it. In this eco-systein every effect is also a cause: an animal's waste becomes food for soil bacteria; what bacteria excrete nourishes plants; and animals eat the plants. Such ecological cycles are being disturbed in the age of technology, where machine A always yields product B, and product B once used is cast away, having no further meaning for the machine, the product, or the user.

In order to understand the eco-system and the environemtal factors of India, it is necessary to look at the physiographic divisions of the country. There are broadly six major divisions—the northern mountains consisting of the greater Himalayas, the lesser Himalayas, and the outer Himalayas; the northern plains consisting of the western, Gangetic, the north Bengal, and the Brahmaputra plains; the peninsular plateau consisting of the central highlands, the Deccan plateau, the western ghats, and the eastern ghats; the coastal plains consisting of the west coastal and the east coastal plains; the islands of India; and the deserts which again are of two types namely the hot deserts of Rajasthan and Rann of Kutch and the cold desert of Lahul and Spiti. The Deccan plateau and central highlands account for approximately 40 percent of country's area, the plains region including the low lands surrounding the plateau region and comprising the north western desert, the Ganea basin together make up about 45 percent of the land area, and the Himalayas for 15 percent of the country's area. The above mentioned six divisions have their own peculiar demographic features. The northern mountains are sparsely populated with some migration from the hilly regions to the plains although the distance travelled by the migrants is usually not too far, fertility levels are moderate and the morbidity patterns are different e.g. the incidence of malaria is not there. Yet, presently, under a common and uniform policy a Malaria Officer is posted in the hills. The terrain of the hills makes accessibility of health facilities difficult and people have problems in reaching the government health posts. The northern plains constitute the most agriculturally fertile land of the country and in regions where the green revolution has taken place the incidence of migration to the urban areas is less, however, where the agricultural development has not taken place, there is tendency amongst the people to migrate to urban areas in search of gainful employment, particularly in the off seasons. Thus, in Punjab and Haryana there are more people below the poverty line residing in urban areas than in the rural areas[2]. In this context the relationship between food production and population can also be examined from the point of view of 'agricultural' carrying capacity, which measures the number of persons who can be adequately fed by the agricultural output of an area. The nutritional requirement would form the basis of the measurements of carrying capacity and the larger the proportion of energy requirements consumed in the form of meat, the smaller would be the carrying capacity. In this connection, the work of the Food and Agriculture Organization on potential population supporting capacity of lands assumes significance in which it is suggested that by taking into account climate and soils, it was possible to determine the crop-growing potentials and yields of each land unit for the most important crops. Thus the food production potential of lands was obtained, expressed in calories and then, using standard nutrition requirements, converted into estimates of population carrying capacity. In the first step an inventory of the country's land resources is. prepared. The FAO UNESCO soil map of the world indicates 26 major soil units which have

been grouped into nine major soil classes. Subsequently an assessment of country' s climatic patterns provides further information on major climates and lengths of crop growing period zones. A normal growing period is defined as the period in which rainfall exceeds evaporation and a growing period of less than 75 days is considered to be inadequate for crops. After integrating data of land and climate, it is possible to get a quantification of the land resources of a country in terms of soil and climate which can then be matched to the soil and climatic requirements of crops. For India, nearly 85 percent of the land (270.5 million hectare) has a climate suitable for agriculture, where both rainfall and temperature conditions are adequate for crop growth. According to the FAO study the picture of India that emerges is both exhilarating and sobering. India has enormous problems but also has an equally enormous natural resource base to solve them with. Assuming a low level of inputs: local low-yielding varieties, no fertilizer use or chemical pest, disease and weed control, long fallow periods, no long term soil conservation measures, high rates of soil erosion, steadily declining soil productivity, manual labour with hand tools as the only power source, high labour intensity, subsistence production and fragmented landholdings, the study reports that the population supporting capacity of the irrigated and rainfed areas together was 1.56 persons per hectare in 1975 compared to 1.93 that existed in reality. In other words, in 1975, India had 119 million—or 19 percent of the population—more people than its lands could support. Table 1 presents the potential population supporting capacity of India's lands.

TABLE 1 : POTENTIAL POPULATION SUPPORTING CAPACITY, INDIA

	Year	
	1975	2000
Actual population (million)	618,7	1036.6
Low inputs		
Potential supportable population	499.7	1298.1
Contribution of irrigated lands %	56	87
Intermediate inputs		
Potential supportable population	1130.2	1800.1
Contribution of irrigated lands %	25	63
High inputs		
Potential supportable population	2191.0	2619.9
Contribution of irrigated lands %	13	43

SOURCE : FAO/IIASA/UNFPA,Potential Populaion Supporting *Capacities of Lands in the Developing World,* 1983, Rome.

By assuming high and intermediate levels of inputs, the potential population supporting capacity of India's lands goes up to 6.84 and 3.53 persons per hectare. By year 2000 the

picture changes for the better because of country's irrigational development efforts. By the year 2000, according to the U. N. estimates, India's population would be 1036.7 million and the population density of 3.23 per hectare. Thus, even at a low level of inputs, India's lands can support a population density of 3.24. At intermediate and high levels of inputs, the corresponding figures would be 5.62 and 8.18 respectively. The study also suggests that if India can keep to its irrigation targets and manage its lands well, by the year 2000 it can feed a population of up to 2621 million. The important question that to be posed is: Can India's lands support such a large and growing population ? And this is where the concept of carrying capacity comes in. It is the number of people or animals that an area of land can support on a sustainable basis. In the northern plains region, the western plains comprising the states of Punjab and Haryana have developed agriculturally and show a high per capita income, while, on the other hand, in the Ganga plains, states of Uttar Pradesh and Bihar show a relative lack of such fast pace of agricultural development. Both fertility and mortality rates are high and pressure of population on the land is increasing resulting in out-migratory streams more particularly from the backward districts from these states. In the Peninsular plateau region fertility and mortality levels have reached moderate levels and there is greater concentration of industries. The region specializes in growing more cash crops of sugarcane, onions, cotton, grapes etc. The desert region of Rajasthan has also not developed and consequently reflects a syndrome of high fertility and mortality rates.

India's environmental problems can be classified into two broad categories: (a) those arising from conditions of poverty and under-development, and (b) those arising as negative effects of the very process of the development. The first category has to do with the impact on the health and integrity of our natural resources—land, soil, water, forests, wildlife etc. as a result of poverty and inadequate availability to a large section of our population of the means to fulfill basic human needs—food, fuel, shelter, employment etc. The second category generates environmental problems on account of unintended side effects of varying order of efforts to achieve rapid economic development and growth. The concern for environment is essentially a desire to see that the national development proceeds along a rational sustainable line.

India is one of the few countries of the world which enshrined in its constitution a commitment to environment protection and improvement. Article 48A makes a specific reference to environmental protection as an obligation of the State and mentions: The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country. Article 51A further stipulates that it shall be the duty of every citizen of India to protect and improve the natural environment and to have compassion for living creatures. The problems of environment received attention in a planned manner with the beginning of the Fourth Five Year Plan which mentioned the necessity to introduce environmental dimension into the development planning processes. In the Fifth Plan it was stressed that all the major industrial decisions be taken such that environemtal goals are fully taken into consideration and that the pursuit of development goals does not cause a reduction in the quality of life through deterioration in environmental conditions by maintaining a link balance between development planning and environmental management. Consequently a number of programmes for enhancing the quality of life under the minimum needs programme including elementary education, rural health and sanitation, nutrition, drinking

water, provision of house sites, slum improvement and rural education received a fairly high priority. It was expected that through these programmes environmental pollution and degradation would be minimized, particularly in the rural areas arid there would be a reduction in poverty levels.

The Sixth Plan (1980-85) contains a chapter on "Environment and Development" emphasizing sound environmental and ecological principles in land use, agriculture, forestry, wildlife, water, air, marine environment, minerals, fisheries, renewable resources, energy and human settlement. The Seventh Plan (1985-90) calls for incorporating environmental factors and ecological imperatives into the design of all developmental projects at the planning stage itself.

Our urban areas are the greatest generators of air, water, noise and soil pollution. The Environmental (Protection) Act, 1986, the Water (Prevention and Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981 are the three main legislations which provide for environmental protection in India. However, these acts are weakly enforced and suitable machinery has not emerged to enforce the provisions listed in these acts. The National Commission on Urbanization was forced to make the statement that there is lack of political will and that leniency towards the polluters would be an atrocity committed against the average citizen[4]. The environmental pollution can be examined by looking at various kinds of pollution, like water, land, noise, radiation, and odour. There is a direct effect of these on population factors including their effect on morbidity patterns. Unfortunately, studies in India showing the effects of pollution on population are not there to indicate the effects empirically. The major source of contamination of water is through the discharge of community and industrial wastes. The position in regard to potable water is also highly unsatisfactory both in the urban and the rural areas. With growing population in India, there has been an unprecedented deterioration of the environment, particularly as a result of deforestation.

The environmental problems of the developed countries arise on account of affluence whereas the problems of developing countries arise on account of their abject poverty. Inadequacy and lack of development *per se* are responsible for creating environmental problems through such factors as absence of safe drinking water, poor transport, lack of electricity, poor housing, slums and squatter communities etc. and are of great concern for countries like India. Rapid population growth and the nature of urbanization taking place in India are important causes of environmental deterioration and the environmental problems can be seen in a number of ways e. g. efforts to raise food production have resulted in erosion and soil deterioration; rapid increases' in population in metropolitan cities have resulted in urbanization without urban development and the needed infrastructural facilities by way of housing, water supply, waste disposal, transportation etc. have not come. These factors create urban environmental hazards; slums and squatter communities constituting in some cases 40 to 60 percent of city's population create highly infectious human wastes which is beyond the capacity of the soil and natural drains to absorb them; non availability of safe drinking water leads to waterborne diseases causing widespread infections. Under these circumstances, it is unfortunate that millions of people lose their health or even their life because of diseases which medical technology could easily handle, but which aje aggravated

by environmental conditions. The apt remarks of the Director, Population Division, United Nations are relevant when he says that:

> "In the area of health, as in many others, the contrast between the industrial and the developing countries is striking. There are two worlds and two patterns of pathology. In the first world, the pathologies of the rich predominate - cardiovascular, carcinogenic, and degenerative diseases; in the second, it is the pathologies of the poor that flourish, especially malnutrition,,,communicable diseases and those of the environment. In particular, the shortage or pollution of water plays an important role. Unfortunately, water-borne diseases are often poorly identified or understood by traditional societies"[5].

Technology has become in the 20th century an object of interest all around the world both as a potential source of public wealth and as a force bringing with it some threats and risks to the society. Benefits gained due to new technological solutions were usually accompanied by some unwanted side effects and efforts have to be directed to minimize them, if not to completely eliminate them. Likewise availability of resources in a country can be considered a facilitating condition but not a necessary condition for economic development. Until recent times, population size was relatively small in relation to resources and the impact of change and utilization of resources upon the environment was of little consequence. However, presently with accelerated population growth rates in many developing countries the concern has mounted on depletion of resources. The important question is how long the natural resources of a finite world support growing populations at rising levels of living. These are all questions of the. eco-system and the environment and they have to be examined scientifically through research in relation to the present and the future populations.

This paper has briefly attempted to highlight the relationship of population system with the ecological system and we have suggested that efforts need to be made in initiating more scientific research in this important area so that we move on to the next century with confidence and hope rather than a doomsday.

References

1. U.N., World Population Conference, Bucharest, 1974, *Population, Resources and the Environment.* Item 9 of the provisional agenda, p.4.
2. Based on NSS 38th round tabulation. Taken from Table C. 11, *Family Welfare Programme Year Book, 1987-88,* p. 177. The percent population below poverty line (83-84) in Punjab and Haryana in rural and urban areas being 10.9 and 21; and 15.2 and 16.9 respectively. The comparable figures for India being 40.4 and 28.1 percent.
3. FAO/UNFPA/IIASA, 1983, *Potential Population Supporting Capacities of Lands in the Developing World,* FAO, Rome.
4. Government of India, *Report of the National Commission on Urbanization,* Vol n, p. 299
5. Statement by the Director, Population Division, Department of International Economic and Social Affairs. Quoted from *Population, Resources, Environment and Development, International Conference on Population,* 1984, p. 58