

Research Note

The Population – Environment Nexus: A Review of Emerging Challenges

Debashish Roy*

Introduction

The relationship between population and environment has been discussed during the last few years and international attention to this issue is increasing. The study of population and its relationship to the environment is a challenge because this relationship is often subtle and complex. In other words, the population-environment interaction is a dynamic set of relationships. The objective of this paper is to examine significant factors, such as the personal views of academics, lack of accurate data, lack of perfect models, and oversimplification of a factor which are generally considered to make the population-environment relationship long standing and as well as complex. This paper will also focus on issues that are appropriate at this moment in order to advance the population-environment debate. Finally, some concluding remarks regarding the population-environment research are made.

Factors keeping the relationship complex

First of all, there are disciplinary boundaries between these two subjects, population and environment. From the conceptual point of view, on the one hand, population is narrowly conceived and easily confined. Moreover, it can be easily grasped, observed and measured, and the measures permit projections and interpolations that have a high degree of validity. The environment, on the other

* Deputy Director (Research), Bangladesh Public Administration Training Centre, Savar, Dhaka.

hand, is everything that humans do which has an impact on the planet. It is broad, ambiguous, and apparently boundless. Similarly, organizationally population is served by one academic discipline, tightly cohesive, very powerful and with a very narrow technology, which is located more in sociology than in any other discipline (Ness, 1994:98). There are, of course, economists, geographers, statisticians, and a few political scientists who deal with population, but sociology is the dominant home and within that home, demography is a highly cohesive discipline. The environment, on the other hand, is the field of many specialized disciplines, from anthropology to zoology and almost everything in between. Another significant difficulty of addressing the linkage between population and environment is political sensitivities. It is hard to bring people together from different discipline and walks of life, with very different agendas, to try to talk about this linkage (Ness,1994:98-9; Ness et al.,1993:Introduction 3-4).

Secondly, academics views on the effects of population growth on the environment have put up the population-environment debate as long standing and highly controversial. In other words, the debate has been bedeviled by polar oppositions. Malthus argument was that human population has the power to increase geometrically but food production can only increase arithmetically and as a result population pressure has an impact on the land as well as environment (Harding, 1995: 167). The root of the modern controversy was probably the pessimistic statement of the population problem by Malthusian such as Ehrlich, who says that population growth is the top root of all our problems. In contrast, Simon brings an equal opposite response that 'moderate' (less than 2 per cent a year) population growth is not a source of any problems at all and is a good thing (Harrison, 1994: 18; Harding, 1995: 165-167). He indicates that this moderate population growth has a positive effect on welfare in the 'medium-run', that is, after a 'short-run' period of thirty to eighty years (Simon, 1977 cited in Birdsall, 1992: 375).

Although Boserup acknowledges that the relationship between population and technological change is a complicated one, increasing population size will make life easier because there will be more people to share the burden of collective investments; but it may also make life more difficult because the ratio of natural resources to population decreases (Boserup, 1981: 5). Given this statement, there is a misunderstanding between academics in defining Boserup's position regarding the population-environment debate. Harrison (1994: 20-21) believes that she is accepting that population growth causes environmental problems. Moreover, the 'revisionists' characterized as 'revisionist Malthusian' argue that population can be viewed as only one among several factors that slow development, and not as a threat to natural resources (Birdsall, 1992: 375).

In fact, there is no consensus on the effects of population growth on environment. Any comprehensive debate is welcomed, but the problem is that most researchers are trying to answer one or other of these positions rather than any alternative way of thinking of this issue. It seems that researchers have only three choices: to believe that population growth is the number one threat to the human race like Malthusian arguments; to think population growth is not any kind of threat to the human race according to Simon's ideas; or to decide that it is not one the real problems but merely what some people call 'an exacerbating factor' of resource depletion along with environment problems (Harrison, 1994: 18).

The third reason for the weak observed relationship between environmental and population concern is the lack of current and accurate data. Population data is much more accurately known, especially with regard to its evolution over long periods of time, than much of the data relating to important aspects of physical environment and activities of humankind within it. The problem is that population data are far from being geographically ideal, as they are identified with political and administrative units rather

than environmental areas. Population data are not easily related to environmental regions, and conceptually there have been few attempts to calculate the population of climate zones (Mullerwine, 1987 cited in Zaba and Clarke, 1994: 10). or vegetational zones, or altitude or distance from the sea (Staszewski, 1957, 1959 cited in Zaba and Clarke, 1994: 10-11). The regular population data provide us with powerful consistency checks to apply to estimate population size and growth, but these checks have no counterpart in the measurement of factors such as land use, food production, air quality and water availability. Only a few developed countries have geocoded population data which can both provide a uniform grid for analysis of population concentration, and be linked to remotely-sensed environmental data using recent developments in geographical information system which enable the checking, integration, analysis and display of data (Zaba and Clarke, 1994: 10-11). Therefore, lack of data is generally considered one of major obstacles in analyzing the population-environment interactions.

Fourthly, there is no perfect scientific theory or model of the population-environment relationship; the decomposition devised by Ehrlich and Holdren is only the well-known model. Ehrlich and Holdren's formula is:

$$I=P*A*T$$

Where I= environmental impact, P= population size, A= per capita consumption (determined by income and lifestyle), and T= environmentally harmful technology that supplies A.

A variation of this formula proposed by the Commonwealth Scientific and Industrial Research Organization (CSIRO) is expected to more helpful in the population-environment analysis:

$$I=P*L*O*T$$

Where I= the impact of human activities on the environment, P= population size, L= lifestyle particularly in terms of per capita consumption, O= Organizational style of the society (e.g. use of environmental regulations), and T= use of technologies to meet the needs of population (Cocks, 1996: 113).

In fact, both these formulas are just a helpful way to fix some basic ideas, but the linkages are much more complex than these summary equations can encapsulate. Each of the variables has many dimensions, and the variables are not necessarily independent of each other (Population Issues Committee, 1991:39). Moreover, these theories are not testable theories. Testing them would require some simple means of measuring complex, multidimensional variables and then being able to find data that would allow such measurement in a variety of situations (Cocks, 1996: 113-114). When Ehrlich formulated $I=P*A*T$, he chose three basic factors (variables): population, consumption and technology that act directly on the environment. People always consume resources even at the hunter-gatherer level and hence some kind of technology is always involved. In other words, people, consumption and technology are always correlated.

However, apart from these four factors there might be other factors, which are needed to define the population-environment relationship. For instance, the role of social organization has been discussed widely in considering the population-environment relationship. According to McNicoll (1989: 151), little can usefully be said about human population-environment interactions until details of technology, social organization and culture are brought into the discussion. Similarly, Preston (1994: 88) argues that beyond the biological model (e.g. I–PAT), it is most important to recognize that humans create institutions that can mitigate the environmental impact of population growth. The most important of these institutions are those that govern ownership and access to natural resources, especially land. For instance, Preston states the

role of the social organizations in environmental protection, which is also highlighted by a comparison of forest resources in China and Japan (Mather, 1986 cited in Preston, 1994: 89). Moreover, in rural areas of Bangladesh, many non-government social organizations such as the Grameen Bank, the Bangladesh Rural Advancement Committee (BRAC) and *Proshika* have initiated community programs using poor people in order to manage their natural resources better leading to maintaining a sustainable environment (Farid, 1997: 21). In addition, Commoner (1991; 88) points out that population is only one of several factors that can influence environmental quality and that the degree of its influence cannot be assessed without comparing it with the effects of other relevant factors.

Issues to advance the debate

The study of the population-environment relationship is a multidisciplinary approach; and hence, naturally, there will be a number of problems in defining the population-environment relationship. To solve these problems, more international attention as well as domestic attention is needed. In fact, the population-environment debate has been sidelined in the major discussion forums concerning each of environment and population. Nowadays, it seems that population and environment are at the heart of the development program. But, unfortunately, population did not have a central place in the United Nations World Conference on Environment and Development in 1992 and, similarly, environment has not been a prominent issue in the various world population conferences, including the Cairo conference in 1994 (Harding, 1995: 166). On the other hand, since this relationship requires a multidisciplinary approach, input from many disciplines are needed to address population and environment problems. Therefore, international and domestic organizations should encourage close collaboration between demographers, environmentalists and other specialists.

Another key point is that we should not oversimplify anything; to choose one factor as dominant and dismiss everything else as secondary is misleading and often paints an inaccurate picture of the population-environment interaction. As mentioned before, the population-environment issue requires a multidisciplinary approach. But, there have been more polemics than comprehensive scientific analysis regarding the population-environment interaction (Zaba and Clarke, 1994; 10) and little concentration has been given to analyzing its nature in order to reconstruct it in a form more likely to produce useful outcomes. To construct this interaction in a form, collaboration must be encouraged between demographers, environmentalists and other specialists. As a result, the boundaries of each researcher's effort will be extended by this collaboration. Moreover, these endeavours will enhance the ability to determine the relationship between population and environment.

Moreover, lack of accurate data is being considered one of the major obstacles to identify the population-environment relationship. But the question is; if we have accurate data, even time series data, and a perfect model as well, will it be possible to determine this relationship? Because every impact that population growth has on the environment and every impact that environment has on the population is also mediated by some form of social organization as well as culture. The pressure on natural resources as well as environment is a result of human consumption, and the way we produce and handle consumer goods varies in different socio-cultural and physical conditions. Hence, we need to think about how the role of social organization and culture can be interpreted in this relationship. In addition, we do not know actually what sorts of data are needed to identify this relationship. Therefore, collecting reliable and valid data should be encouraged. However, some fundamental problems have not been discussed in this paper. For instance, scale is a very significant factor in the

population-environment relationship because it is difficult to link explanations at different levels from the individual to the global. Regarding this problem, Lutz (1994: 48) thinks that one possible approach to the solution of this problem is to conduct case studies on the population-environment interactions by combining the model and data. This example implies that researchers are always looking for a way to be able to solve different problems so that a solution to this debate can be found.

Conclusion

Researchers have to emphasize every issue that has arisen regarding the population-environment debate. Data and models, of course, are needed to define the population-environment relationship; there should also be numerous attempts to undertake joint population and environment research, both at organizational and conceptual levels. Similarly, **collaboration** between specialists from different disciplines and thinking beyond polarization is imperative if the debate is to clearly define the relationship between population and environment.

REFERENCES

- Birdsall, N. (1992). "Economic Analysis of Rapid Population Growth" in Deepak Lal (ed), *Development Economics*, Vol. 2, Aldershot: Edward Elgar Publishing Limited, pp. 374-401.
- Boserup, E. (1981). *Population and Technology Change: A Study of Long-Term Trends*, Chicago: University of Chicago Press.
- Cocks, D. (1996). *People Policy: Australian's Population Choices*, Sydney: New South Wales Press.
- Commoner, B. (1991). "Rapid Population Growth and Environmental Stress" in *Consequences of Rapid Population Growth in Developing Countries*, Proceedings of the United Nations, New York: Taylor & Francis, pp. 161-190.
- Farid, S. M. (1997). *Poverty and Environment: Bangladesh Perspectives*, Paper presented at the 12th Conference of the Association of Asian Social Science Research Councils held on 13-17 October 1997, Beijing, China.
- Harding, R. (1995). "The Debate on Population and the Environment: Australia in the Global Context", *Journal of the Australian Population Association*, 12(2): 165:195.
- Harrison, P. (1994). "Sustainable Development in Africa" in C. P. Green (ed), *Sustainable Development: Population and the Environment*, Washington: Academy for Educational Development, pp. 15-28.
- Lutz, W. (1994). "Population and Environment – What do we need more urgently: Better Data. Better Models or Better Questions?" in B. Zaba and J. I. Clarke (eds), *Environment and Population Change*, Liege: Ordina, pp. 47-62.

- McNicoll, G. (1989). "Social Organization and Ecological Stability Under Demographic Stress", *Population and Development Review*, Vol. 15 (Supplement): 147-167.
- Ness, G. D., Drake, W. D. and Brechin, S. R. (1993). *Population-Environment Dynamics*, Ann Arbor: The University of Michigan Press.
- Ness, G. (1994). "Population-Environment Dynamics" in C. P. Green (ed), *Sustainable Development: Population and the Environment*, Washington: Academy for Educational Development, pp. 98-104.
- Population Issues Committee, National Population Council. (1991). *Population Issues and Australia's Future*, Final Report, Canberra: AGPS, pp. 39-63.
- Preston, S. H. (1994). "Population and Environment: The Scientific Evidence" in G. S. Francis (ed), *The Complex Reality: A Report of the Population Summit of the World's Scientific Academics*, London: The Royal Society, pp. 85-92.
- Zaba, B. and Clarke, J. I. (1994). "Introduction: Current Directions in Population-Environment Research" in B. Zaba and J. I. Clarke (eds), *Environment and Population Change*, Liege: Ordina, pp. 9-44.