Demography India
Vol. 21, No. 2 (1992), pp. 291-300

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Demographic Patterns and Wildlife Resources

Introduction

THE primary objective of this paper is to examine the impact of thepatterns of population growth and its distribution on the utilization of wildlife resources. In addition, a theoretical framework is proposed to study the impact of population-related factors on the conservation of wildlife resources. In its simple form, the growth of population implies additional demand on land resources for cultivation and residence and thus leading to an increasing encroachment into areas previously claimed by the natural habitat of wildlife. However, such simplification is potentially deceptive, for there are several other factors which confound this direct effect of population growth on wildlife. Figure 1 presents a framework for the relationship between population factors and wildlife. The 'outcome' variable is the "wildlife resource leyvel", which is influenced both by the 'independent' variables of population and by the 'intermediate' variables through which the effects of independent variables are mediated.'Population growth, distribution, and its consumption patterns are the main independent variables while public awareness; government policies;

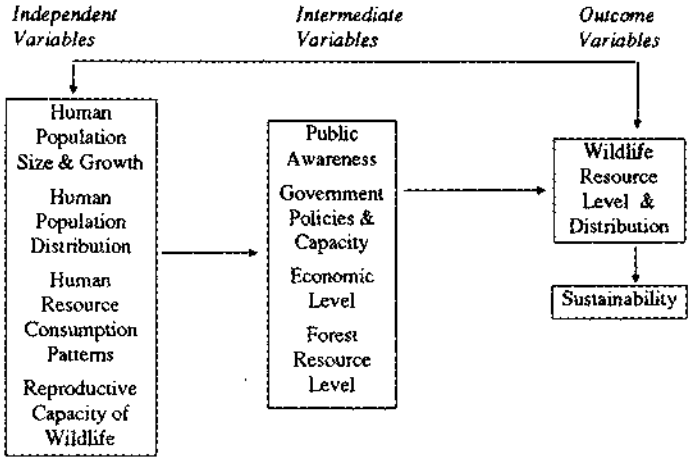

Fig. 1. Framework on the relationship between population and wildlife resources

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economic development level; and habitat resource level are the main intermediate variables.

At a given economic and natural resource level, more people put more demands on such resources as land, food, and housing. To the extent that additional resources to meet these demands are above the levels required for the sustainable development of wildlife, one of the two (i.e., wildlife or human beings) suffers and it is usually the wildlife. Population distribution is closely related with population growth and covers both the rural-urban distribution of population as well as regional distribution. The consumption patterns of population can potentially have more important bearings on the wildlife than the population numbers per *se*. For example, a particular resource-damaging pattern by a small segment of population can cause more losses to wildlife than the resource-neutral pattern by the majority. In many societies, these patterns have been shaped by traditions and culture. In other societies the affluent segments of population can have greater influence on the sustainability of harvests of wildlife (e.g., African elephant; mink; leopard; crocodile; fox; kuala; selas; etc.) because of their peculiar taste for clothing and decoration. Certain cultures exhibit greater preference on certain wildlife species. For example, in the Far-East certain organs of wildlife are used for medicine and in Yemen the horns of rhinoceros are used for dagger handles traditionally carried by men at all occasions.

Public awareness has recently assumed an important role in mediating the population-related effects on the wildlife as manifested by campaigns against hunting rare species as well as species considered in danger of over-exploitation, for example, seals, whales, elephants, rhinoceros , etc. Public awareness can also influence governments to adopt policies which are fully protective or encourage a more sustainable use of wildlife resources. The economic development level of a country is sometimes crucial in the use of wildlife for foreign trade and foreign exchange earnings. Countries with no other means of earning foreign exchange (e.g., mineral resources; industrial or agricultural products; etc.) are frequently less sensitive to the loss of wildlife for earnings.

The forest resource level is also critical, for the forest areas are often the natural habitat for several wildlife resources. Deforestation has been found to be responsible for the loss of wildlife and many scientists have considered this a principal cause for species extinction. The World Resources 1988-89 Report (World Resource Institute and International Institute for Environment and Development, 1988) points out that while tropical closed forests cover only about six per cent of the world's land surface, they contain 50-90 per cent of all the earth's species.

It is obvious that a comprehensive study on the wildlife resource level and its sustainable utilisation involves a careful investigation of these factors. The cultural norms and traditions are important and a topic for the study in itself. Similarly, the economic and political factors require detailed assessments. The loss of natural habitat due to deforestation also merits a careful study as well as the resurgence of interest, especially in some countries, about the sustainable use of resources. This paper, however, focusses on the demographic patterns in selected countries representing different world regions and their implications for the wildlife.

Demographic Background

A global or regional presentation of demographic background masks a wide variety of patterns within the unit of study and, therefore, it is instructive to consider a number of

selected countries as case studies. The criteria for the selection of countries was to cover a wide range of experience from different regions of the world. Nine countries from four regions are selected: Canada from North America; Greenland andFrance from Europe; Chile and Guyana from Latin America and the Caribbean; India and Indonesia from Asia; and Niger and *Zambia* from Africa. The availability and reliability of data range from excellent in Canada to Poor in two African countries. The estimates for 1995 and onward are based on UN projections with 'medium variant' assumptions about population growth (United Nations 1989).

Canada

With a land area of 9,220,970 square kilometres and an estimated population of 26.5 million in 1990, Canada is the largest country in the world in terms of area. However, as is the characteristic of all economically developed countries, its population growth rate has been low (i.e., below 2 per cent per year) and declining. From 1985 to 1990, the population growth rate was 0.9 per cent per year, indicating the population doubling time of 87 years. The population is predominantly urban and no government policies prevail to influence the population growth or distribution. Canada is one of the largest producers and exporters of grains and minerals. Over one-third (35 per cent) of its total land area consists of forest and woodland and fish and other wildlife resources are ample.

It is estimated that 65 per cent of Canada's original wilderness is still preserved (World Resources Institute and International Institute for Environment and Development, 1988). In 1988, there were 79 sites with 23 million hectares of protected areas for wildlife habitat. The animal species threatened in Canada were reported in 1988 to include: mammals: 8; birds: 7; and reptiles: 1. Except for the rapid urbanization and increased industrialization, the population-related factors in Canada do not appear to be imposing greater demands on its wildlife than what can be sustained. Factors such as the construction of highways, train tracks, building of bridges are, however, noted for their negative effects on the wildlife.

France

With a total land area of 545,630 square kilometres and an estimated population of 56 million in 1990, France is the largest among West European nations. Twenty-seven per cent of its total land area is covered by forest and woodland. France is also characterized by a slow growth rate of its population and increasing urbanization. By year 2025, the population of 56 million in 1990 is expected to reach 60 million. The growth rate of its population is estimated at 0.36 per cent per annum, but expected to decline further to below 0.2 per cent per annum from year 2005 onward. The population had already reached the replacement level in the 1970s and is now below the replacement level. France represents the other (lowest) extreme of the population growth spectrum, which is characterized by below replacment level of fertility and extremely low population growth rates. The government is concerned about the low growth rate of its population and encourages high fertility by

incentives for child rearing and caring. There is no significant policy with regard to the geographical distribution of population, but the immigration policy is restrictive.

France has substantial agricultural resources and a highly diversified modern industrial sector. The total forest and woodland area amounted to 123,660 square kilometres in 1965 and increased to 146,200 square kilometers in 1986. The main problem in France is not as much the deforestation as the forest fires. During 1975-84, an average 42,646 hectares were lost annually due to forest fires (World Resources Institute and the International Institute for Environment and Development, 1988).

The information on wildlife in France is scanty. The govenment has declared a total of 4.7 million hectares as protected areas for the wildlife habitat. Just as was the case of Canada, the demographic factors in terms of population growth and distribution do not seem to impose major constraints to wildlife in France. However, its rapid modernization and industrialization can have adverse consequences for the wildlife. Thus the consumption patterns of its population rather than its numbers or growth seem to be of relevance for their implication for the sustainability of wildlife resources.

Greenland

Greenland is one of the largest islands with a total land area of 341,700 square kilometres (ice free) and an estimated population of 55,000 in 1990. It is under the home rule by Denmark as a self-governing overseas administrative divisions. There are no forests, nor agricultural land. Greenland is sparsely populated with much of its population confined to small settlements along the coast. The birth rate and death rate are low and there is a net emigration of 1 per 1,000 in 1989. Nearly all of its working population is engaged in fishing; hunting; or sheep breeding. Over the last 25 years, its economy has changed from one based on subsistence whaling, hunting, and fishing to one dependent on foreign trade. Fishing is, however, still the most important industry, accounting for over 75 per cent of exports.

Population projections by the Denmarks Statistik (1989) indicate that the population of Greenland will increase to 61,294 by the year 2010. Most of its population is rural and the only highway is about 80 kilometres long. Because of its weather conditions and sparsely populated area, Greenland has been estimated to have preserved 99 per cent of its wilderness (World Resource Institute and International Institute for Environment and Development, 1988). Much of its wildlife resources have, therefore, been protected from the population-related factors.

Chile

With a total land area of 748,800 square kilometres, Chile is located at the western coast of South America. Its population was estimated to be 13 million in 1990, with 86 per cent living in urban areas. The population growth rate has been declining from 2.4 per cent per year during 1960-65 to 1.7 per cent per year during 1985-90. With its current population growth rate, the population is expected to double in 41 years and is expected to reach about 20 million by year 2025. By that year, 93 per cent of its population is expected to be living in urban areas. The government of Chile considers the rate of its population growth as too

low, however, it follows a policy of non-intervention. With regard to migration, its official policy emphasizes incentives to encourage Chileans to inhabit underpopulated regions in the south.

Twenty-one per cent of its land areas is covered by forest and woodland and much of its economy is based on fishing, agriculture and manufacturing. Since Chile's entire western frontier is the Pacific Shoreline, its resources of fish products are immense. Its annual fish catch increased from 4.5 million metric tons in 1984 to 5.6 million in 1986. With a length of 4,200 kilometers and an average width of 180 kilometers, Chile has a wider variety of climate and topography than any other country of comparable size. Information on wildlife resources other than fish are not readily available, however, fishery is probably the largest resource of Chile. Some information is, however, available for Guanaco, which were estimated to number 22,950 to 25,650 in 1989 (Cunazza 1990). Historically, over exploitation for pelts, hunting, as well as competition with domestic stock for pasture lands resulted in the reduction of its population. The particular topography of Chile, combined with low population pressures, primarily due to low growth rates, do not suggest excessive depletion of wildlife resources. The number of areas protected for wildlife habitat was 65 with a size of 13 million hectares. The animal species threatened include: mammals: 10; birds: 6; and reptiles: 3.

Guyana

With a total land area of 196,850 square kilometres and an estimated population of 1 million, Guyana is characterized by its tropical forests which comprise 83 per cent of its total land area. The population growth rate is low in comparison to many other developing countries ajid the emigration rate was relatively high with 19 per 1,000 population leaving Guyana in 1989. If the current growth rate prevails its population is expected to double in 40 years. Although 65 per cent of Guyana's population lives in rural areas in 1990, the rate of urbanization, due to migration from rural to urban areas, is increasing. The government perceives the flow of migrants from rural to urban areas as inappropriate for its development policies and for its stated goal of food self-sufficiency. It has instituted programmes for irrigation and housing and social services in rural areas to stem the flow of migrants from these areas. The official policy is to encourage immigration, but through emigration the loss of skilled workers is high.

Despite a large area covered by forest and woodland, the exploitation of the forest has been minimal, primarily due to its difficult accessibility. Fishing has expanded in recent years and aquaculture is now a major proportion of all its exports. The total fish catch was 42,095 tons in 1985. Its dense forest resources provide home to numerous wildlife, but no account is available. The rates of deforestation and industrilization are relatively low, implying less pressures on the wildlife. The trend towards urbanization probably does not have serious implications for the wildlife in Guyana. The topography of Guyana and inaccessibility of forest areas have helped in the preservation of forest areas and, thus, protection of the species living in forests.

India

With an estimated total population of 853 million in 1990, India is the second most populous country after China. The total land area of India is 2,973,190 square kilometres, 23 per cent of which comprise of forest and woodland. During 1985-90, its population was growing at a rate of 2.1 per cent per year, which indicate a doubling time of 33 years. The government views the rate of its population growth and fertility levels as too high in relation to the poverty and unemployment in the country. Its spatial distribution policy aims at slowing metropolitan growth, promoting small towns and intermediate cities, and adjusting the spatial distribution pattern by agricultural and rural development and industrial location policies.

The growing demand for fuelwood, for energy needs is causing a large scale deforestation. The fish catch in 1986 was estimated at 2,921,800 tons. India is also known for its wildlife and some rare species. In 1988,267 areas with 12.9 million hectares were protected for wildlife and habitat. Threatened species in the mid-1980s were figures as follows: mammals: 29; birds: 5; reptiles: 12; and swallowtail butterflies: 2.

The rapid growth of India's population and fragmentation of land holdings have accelerated the search for new land for cultivation. In addition, the growing population has also put increasing demand for the fuelwood. Soil erosion and deforestation are the two most common problems. It has been estimated that 80 per cent of the original wildlife habitat has been lost (Table 1) by 1986 in India. It seems, therefore, urgent to protect wilderness from further reductions and to halt the rapid population growth which exerts pressure on the wildlife resources.

TABLE 1 : THE LOSS OF WILDLIFE HABITAT IN SELECTED COUNTRIES, 1986

Country	*Original Wildlife Habitat (km^2)*	*Amount Remaining (km^2)*	*Habitat Loss (% of Original)*
India	3,017,009	615,095	80
Indonesia	1,446,433	746,861	49
Niger	566,000	127,880	77
Zambia	752,600	534,346	29
Total	5,782,042	2,024,182	65

Source : Mackinnon and Mackinnon (1986), cited in World Resources Institute and the International Institute for Environment and Development (1988).

Indonesia

The land area of Indonesia is 1,826,440 square kilometres, comprising the archipelago of 13,500 islands (6,000 of which arc inhabited). Most (67 per cent) of the land area is covered by forest and woodland. In 1990, its population was estimated at 181 million and growing at the rate of 1.6 per cent per year during 1985-90. Indonesia has one of the more successful family planning programmes in Asia and its birth rates have been declining since

1970s. With the present growth rate the population is expected to be doubled in 43 years. However, these growth rates arc projected to fall in the coming years.

The Family Planning Programme and the Transmigration Programme are the two major initiatives of the government to achieve its objectives with regard to population growth and distribution. In 1983, the Ministry of Population and Environment was created to formulate policies for population and environment management. In an effort to bring about a more equitable population distribution, the government has sponsored a transmigration programme to more people from densely populated areas (Java) to less populated areas. This Programme gained a momentum in 1970, when, under the Third Development Plan (Repelita) 500,000 families were resettled in islands outside Java. Under the Fourth Five-Year Plan, four million people are expected to be resettled. However, people continue to be attracted to Java which offers better employment opportunities as well as education and health facilities, and government-sponsored transmigration out of Java is offset by a counter-stream of migrants into Java.

The official status of an archipclagic state permitted Indonesia to have an undisputed control of the vast marine fisheries resources of the sea. The total fish catch amounted to 2.5 million tons in 1986. Indonesia also has one of the most extensive concentrations of tropical hardwoods, which were exploited at a rapid rate during 1960s. This led the government to institute policies to regulate deforestation. The government has increasingly required logging companies to introduce selective cutting policies, and in 1985, the practice of total tree falling was banned.

The wildlife habitat area was estimated to have been reduced by 49 per cent by 1986. In 1988, 135 sites of wildlife habitat with a total size of 13.6 million hectares were protected. The threatened animal species reported in the mid-1980s were: mammals: 22; birds: 14; reptiles: 11; and swallowtail butterflies: 14.

Although population growth in Indonesia is being increasingly curtailed, the loss of wildlife due to deforestation and resettlement is continuing at an alarming rate. Deforestation combined with hunting and capture has already caused a major loss of Indonesia's primate population. The government's resettlement policies have also indirectly contributed to the loss of wildlife, for most of the people are settled in areas which were previously natural habitat of wildlife. In addition, land is claimed for agricultural activities and, thus, squeezing out the wildlife from their habitat.

Niger

Niger is located in the Western Africa and has a total land area of 1,226,700 square kilometres. Its population is estimated to be growing at the rate of 3 per cent per year during 1985-90 and was 7 million in 1990. By the year 2025, the population is expected to reach 18.9 million. With the prevailing rate of population growth, it would require only 23 years to double its population as compared to 87 years, for example, for Canada. Recurrent drought and desertification servcrcly affect the marginal agricultural activities. The government has recently issued slatcments indicating deep concern over the growing size of the population and has changed its policy towards family planning services, which arc now provided with

the stated objective of improving family health and well-being. The spatial distribution of population is also considedred unsatisfactory. Its policy in this respect is aimed at rural development to check the exodus of migrants from rural areas. Niger had lost 77 per cent of its original wildlife habitat by 1986. The government has set three sites with an area of 372,000 hectares as protected areas.

Niger is one of the least developed countries with a rapidly increasing population. Only 2 per cent of its total land area is covered by forest and woodland. The economy depends heavily on the exploitation of uranium deposits. There is relatively little knowledge about its wildlife resources. However, the rapid growth of its population, together with rural-urban migration and the need for new areas for cultivation would have major implications for its wildlife.

Zambia

The total land area of Zambia is comprised of *740,720* square kilometres. Its population was estimated to be 8.5 million in 1990and growing at the rate of 3.8per cent per year during 1985-90. Among the nine countries considered here, Zambia has the highest rate of population growth, resulting in doubling of its population in 18 years. The government is concerned with the high growth rate of its population and high fertility. In order to improve the spatial distribution of the population, a rural development programme has been launched which aims at utilizing urban unemployed to work on the land. Other plans include regrouping of villages and isolated rural settlements and the promotion of small-scale industries in rural areas.

Twenty-seven per cent of Zambia's total land area is covered by forest and woodland. However, deforestation has been accelerating. The government has established 19 sites with a total land area of 6.4 million hectares as protected areas for wildlife. It is estimated that by 1986 the country had lost 29 per cent of its original wildlife habitat. Soil erosion and desertification have affected the agricultural productivity and the large family size has produced fragmentation of land holdings. Deforestation, droughts, and soil erosion have displaced much of the rural population of Zambia. Because of the economic hardship,, forest resources are used for trade. The effect of population growth on the wildlife is found to be more substantial in Zambia than in any other country considered here. In addition, the prospects for the economic recovery or of curtailing the growth of its population do not seem promising, at least in the immediate future.

Summary and Conclusions

The Report on *World Resources 1988-89* (World Resources Institute and the International Institute for Environment and Development, 1988) concludes that diversity among wildlife continues to erode steadily throughout the world and many species are close to extinction. It is estimated that 68 per cent and 65 per cent of the original habitat for wildlife has been lost in Southeast Asia and Sub-Saharan Africa, respectively. Island habitats and species arc particularly vulnerable to disturbance.

The assessment of the demographic factors and of closely related aspects for nine countries from different regions of the world show a wide variety of patterns. The loss of original habitat ranged from 1 per cent in Greenland to 80 per cent in India. The population growth also varied from low levels in Canada, Greenland, France, and Chile, to moderate in Guyana and Indonesia, to high in India, Niger and *Zambia*. Government policies to curtail population growth and influence spatial distribution of its population are active in India, Indonesia, and Zambia. Policies for the protection of environments and wildlife habitat are in effect in Canada, France, India, Indonesia, and Zambia, Taking all these factors into account and barring major changes in the population trends and government policies, an assessment of the prospects for wildlife, in the short run, is offered in Table 2.

TABLE 2 : ASSESSMENT ON WILDLIFE BY FACTORS AND PROSPECTS FOR WILDLIFE, SELECTED COUNTRIES

Country	*Impact on Wildlife Due to*			*Prospects/or wildlife*
	Pop Growth	*Pop Movements*	*Habitat Loss*	
Canada	Low	Low	Low	Good
Greenland	Low	Low		Good
France	Low	Low	Low	Good
Chile	Low	Low	Low	Good
Guyana	Low	Moderate	Low	Good
India	High	Moderate	High	Fair
Indonesia	Moderate	High	High	Poor
Niger	High	High	High	Poor
Zambia	Very High	High	High	Poor

The need for protected areas of natural habitat and for the preservation of wildlife requires urgent attention. The present trends in deforestation, hunting, and, to some extent, consumption patterns need to be examined. Similarly, population growth especially in areas with low economic development should be slowed. The lower rates of population growth are advantageous for a better quality of life and for the preservation of wildlife.

Notes

The term **wildlife** refers to any wild, non-feral species of animal or plant.

Sustainable wildlife utilization refers to any exploitation of species in a manner that: (a) contributes to the conservation of the species in the wild; (b) produces products that are traded; and (c) enhances the quality of lives of local people. In most cases the utilization scheme will imply financial benefit (i.e., profit) and foreign exchange earnings (or import substitutions).

Forests and woodland is the land, in square kilometers, under natural or planted stands of trees, whether productive or not, including land from which forests have been cleared but that will be reforested in the foreseeable future.

Net deforestation rate is the annual rate of change of forests and woodland area. A positive sign indicates an increase in the forested area.

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