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Population, Environment and Development

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Geographers have a longstanding interest in patterns and processes associated with population growth and distributions, impacts of population on the environment, and development. Human population growth has increased exponentially and is currently have a significant impact on native ecosystems through the exploitation on freshwater, arable lands, and oceans. There is great interest in addressing these challenges through sustainable development in all regions of the world.

Population

The world's population was ½ billion in 1650 and one billion in 1850. By 1932, the population had doubled to 2 billion, and reached 3 billion by 1960. There are currently 6.8 billion people on the planet earth and we are projected to reach 9 billion people by the year 2050. This rapid increase in human population can be primarily contributed to a dramatic decrease in the death rate, technological advances, and migration. The average life expectancy of people in developed countries has increased from 47 to 77 years in the last century while the average life expectancy in developing countries has increased from 30 to 55 years. Advancements in technology, especially in agriculture due to the Green Revolution (1960's), have resulted in greater food availability. The advent of hybrid seeds with a range of environmental tolerance and the use of fertilizers has increased the production of crops, while food distribution methods improved both locally and globally to satisfy demand. Improved sanitation (i.e. drinking water, waste management) and vaccinations for diseases (i.e. measles and small pox) have significantly increased the size of the world's population and life expectancies. The migration of people to new regions of the world and increases in urban populations has resulted in cities with extremely

high population densities over the last 200 years. Indeed, currently over 50% of the world's population lives in cities.

The world's population and growth rates are not evenly distributed around the globe. Until 1900, most of the world population resided in temperate regions, however, there has been a dramatic increase in the world's population in tropical regions and a significant increase in urban populations in the last 100 years. Geographically, Asia comprises 60% of the world's population, Africa 14%, Europe 11%, North America 8% and South America 6%.

FIGURE 1 HERE

Figure 1: Global population density.

Source: National Geographic Society

The most populated five countries are China with 1.3 billion people, India with 1.1 billion people, the United States with 303 million people, Indonesia with 235 million people, and Brazil 190 million people.

Models by the World Bank, United Nations Population Division, and Population Reference Bureau all project population growth to reach a minimum of 9 billion people on the planet by 2100 if couples continue to have children at their current rate. The reason that the world's population is projected to exceed 9 to 10 billion people is due to the momentums built into very young age profiles. For example, half of the population in sub-Saharan Africa or Mexico is below 18 years of age. Couples would have to have one child for the next 30 years to stabilize at the current levels. This pattern even holds true for countries like China that has a one-child policy beginning in 1970's and has resulted in couples having with less than replacement size families. China adds 514, 000 new people every month because of the momentum built into the age profile and will eventually add another 100 million people by 2050.

There can be no question that the world's population would be higher if it were not for the efforts of national and international public health and family planning organizations. Family planning programs currently focus on local control sensitive to cultural beliefs; focus on access based contraception distribution, and primarily target women. Couples in Thailand, Korea, Taiwan, and China are having one or two children in order to provide more prosperity for themselves and their children. Most efforts to lower birth rates, such as improving the status of women, better education, more social security, and providing better and more productive jobs result in a higher standard of living.

Environment

The environment is all living and non-living things that occur naturally on the earth. The human use of the environment and associated nonrenewable resources has increased significantly over the last 150 years. The impact of population growth on the environment is a function of the numbers of people being added, the science and technology to sustain populations especially in urban areas, and the capacity of the environment to provide renewable and nonrenewable resources. However, the exponential growth rate in human population is stressing the world's environmental resources. Human population growth is related to the availability of natural resources such as freshwater, arable land, and fisheries.

The increase in human population has resulted in freshwater being significantly impacted by water pollution and depletion. Water quality in almost all major river ways on earth is undrinkable due to increases in sediment, human and animal waste, and pollutants. Freshwater lakes have been impacted in many regions of the world due to increased levels of salt, depletion for agricultural irrigation, and water pollution from sewage. Many freshwater lakes are also

undergoing eutrophication due to increased nutrients, which significantly changes the chemical and biological composition of lakes. Aquifers and freshwater lakes in many regions of the world have also been significantly deduced due to demand of fresh water for agriculture and drinking water.

It is currently estimated that 37% of the earth's land surface is covered by agriculture. Three agricultural crops, rice, wheat, and corn, feed a majority of the world's population. Indeed, rice alone feeds 2/3 of humanity and provides over 50% of calories needed to survive for 1.6 billion people. These subsistence crops are generally planted as monoculture in areas with rich soils and low topographic relief. Other environmental impacts of agriculture are the increased use of fertilizers and pesticides associated with certain crops. Fertilizers used to increase the yield of annual crops like sugarcane can be transported to freshwater systems and pesticides used on crops such as tomatoes and cotton can poison both people and soils. There has been a significant expansion of export crops such as coffee, bananas, and palm oil that are generally planted as monoculture and have resulted in the conversion of native ecosystems such as tropical forests. The harvesting of timber has also resulted the conversions of native forests into monoculture plantations of select timber species.

Oceans have been heavily exploited over the last 100 years and global consumption of fish has doubled since 1973. Fishing techniques such as trawling, drift nets, and long lining have resulted in the dramatic reduction of densities for most marine mammals, reptiles, and fish. Currently 32% of the world's fisheries stocks have collapsed and 39% are over-exploited. Other near shore habitats such as extremely diverse coral reef ecosystems have also been significantly impacted. Over 1/3 of coral reef, which combined cover an area the size of British Colombia, have been degraded by increased sediment runoff, water pollution, and over fishing.

The human use of ecosystems has also not been exploited evenly. Over the last 150 years, native ecosystems in Mediterranean climates, temperate grasslands, deciduous forests, and tropical dry forests have been extremely altered for agriculture, timber production, and urbanization. While other native ecosystems such as tundra, deserts, and tropical rainforests near the equator have remained largely intact. However, in all regions of the world there has been an exponential increase in the rates of species extinction and endangerment. Freshwater fish, amphibians, large mammals, and species endemic to islands have been the most adversely impacted and all species could be impacted by projected rapid increases in global temperatures.

Development

Development geography is the study of the earth with reference to the standard of living or the quality of life of the world's population. The earth can be divided into regions with high human development (North America, Europe), medium human development (Asia) and low human development (West and Central Africa).

FIGURE 2 HERE

Figure 2: Three levels of development geography of the world. Green is high human development, Yellow is medium human development, Orange is low human development.

Source: United Nations Human Development Report 2007. Reprint with permission from United Nations Human Development Program.

High human development occurs in countries that are industrialized, have low population growth and infant mortality rates, and high per capita income, while low human development occurs in countries that have low levels of industrialization, very high population growth and infant mortality rates, and low per capita income. However, the increase in population and natural

resource use is currently not sustainable in most regions of the world. There is currently great interest in development and sustainability in all regions of the world to maintain a state in which population and natural resource use rates are sustainable at a local, regional, and global spatial scale. Development has resulted in improved lifestyles and livelihoods for a majority of people in the countries with high human development. However, one and two children families in developed countries burn the most fossil fuels and inefficiently dispose of the most waste. Indeed, the United States of America contains only 5% of the world population but accounts for 23% of the world energy consumption while developing countries like India contain 18% of the world population and consume only 4% of the world energy consumption. If everyone in the world had the same level of consumption as the population of the United States it is estimated that it would take the natural resources and land area of five earths. Since it is currently not possible for all countries to achieve high development standards without outstripping natural resources, development general focuses on improving sustainability in countries with high and medium development and increasing the quality of life via food, education, and social justice in low development countries where over 850 million people face hunger and food insecurity.

To achieve these goals of sustainable development, international institutions and governments have tried to improve the balance of population growth and natural resource use that improves the quality of life in ways that reduces the impact of the population on the earth natural resources. International institutions, often under the auspices of the United Nations or World Bank, have mandated treaties and security arrangements to accommodate and protect the well being of all sovereign nations. Conferences on improving the status of women, achieving population stabilization, protecting biodiversity, and accommodating the rapid spread of technology have resulted in global charters, regulations, and accords. International treaties such

as the Montreal Protocol have significantly reduce the release of pollutants that impact the ozone layer and significant advances have be made via the Kyoto Accords to address issues of global warming. There has been great progress on enforcement of population and environmental treaties related to deforestation, protection of biodiversity, and the law of the seas, however, much more is needed. Within countries, environmental legislation, incentives, and enforcement are important tools for working toward sustainability at a regional and local spatial scale. There are also a number of geographical tools such as censuses, geographic information systems, and satellite imagery that can be used for monitoring and assessing the status of population and the environments as it relates to sustainable development. Although stabilizing human population growth and sustainable development of the earth's natural resources are still significant challenges that current and future generations will face, there have been significant advances in ideas and policies over the last 50 years to met these global challenges.

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See also

Further Readings

Berger, L. R., & Hager, M. C. (2007). *Visualizing Environmental Science*. New Jersey: John Wiley & Sons.

De Blij, H. J., & Murphy, A. B. (2003). Human Geography: Culture, Society, and Space. New York: John Wiley & Sons.

Figure 1

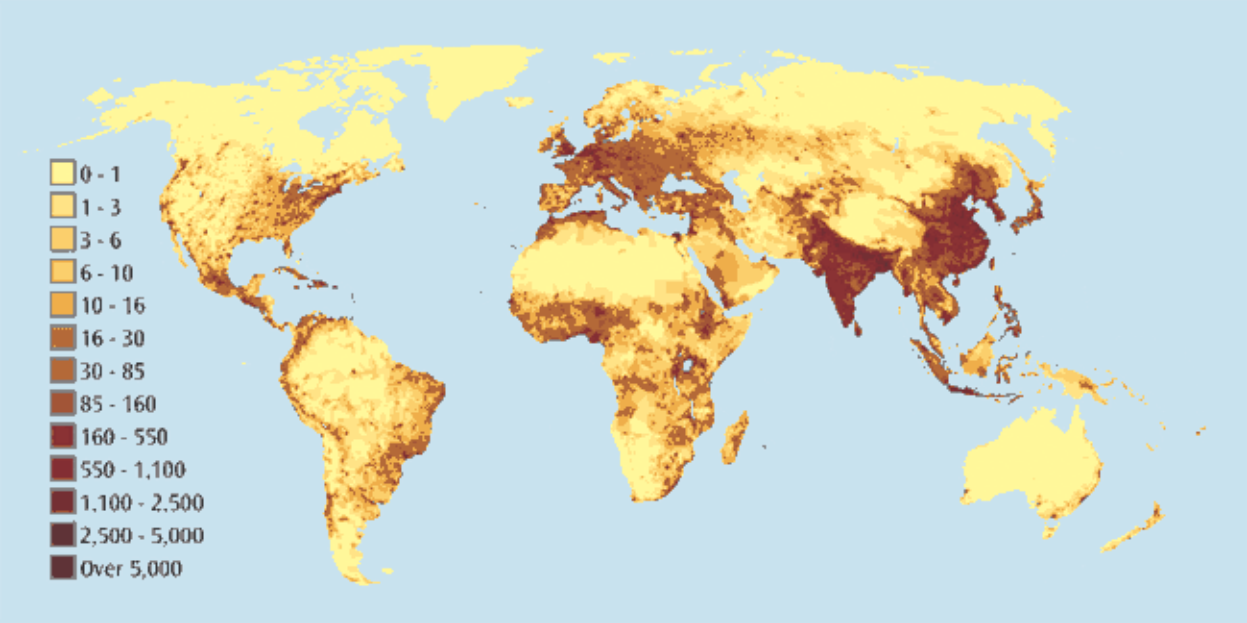
0 - 1
1 - 3
3 - 6
6 - 10
10 - 16
16 - 30
30 - 85
85 - 160
160 - 550
550 - 1,100
1,100 - 2,500
2,500 - 5,000
Over 5,000

Figure 2