

The Expanding Human Footprint

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Population explosion & its impact on natural resources

As the world population continues to grow geometrically, great pressure is being placed on arable land, water, energy, and biological resources to provide an adequate supply of food while maintaining the integrity of our ecosystem.

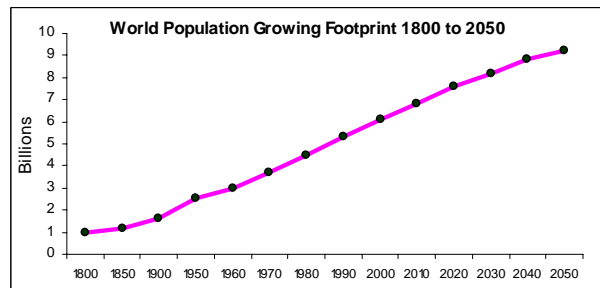
In developing countries, there are a number of socio-economic realities that leads to population growth. Standard of living, limited access to adequate health care facilities, lack of readily available, safe contraceptives, and knowledge of how to use them, religious beliefs etc.,. According to the Worldwatch Institute, less than 30 per cent of people in developing countries use family planning.

Currently world population is growing by about 80 million people per year as opposed to 85 million in the early 90's. According to a recent UN medium variant projection, only after 2015 will we observe a gradual decline of the annual population increase - reaching about 50 million by 2050. However, this is only possible, if fertility - in all developing countries - falls to the "reproductive level" of 2.1 children per woman by 2050. For countries like India, Pakistan or Nigeria this is a long way to go.

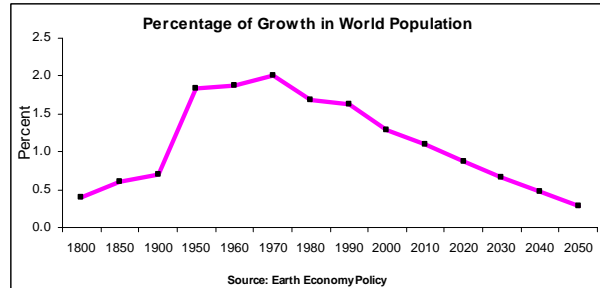
Between now and the middle of the next century world population will most likely increase by some 3.68 billion people - all of these increase will be contributed by the developing countries. Most of this population growth in the developing world will occur during the next 30 years where it is projected to increase by 2.3 billion and between 2025 and 2050 it will "only" grow by 1.39 billion.

Area

Through the ages the world population has grown to a total of one billion people. During the 1800s, human numbers increased at increasingly higher rates, reaching a total of about 1.7 billion people by 1900, and today it stands at over three times its size-some 6.6 billion people.

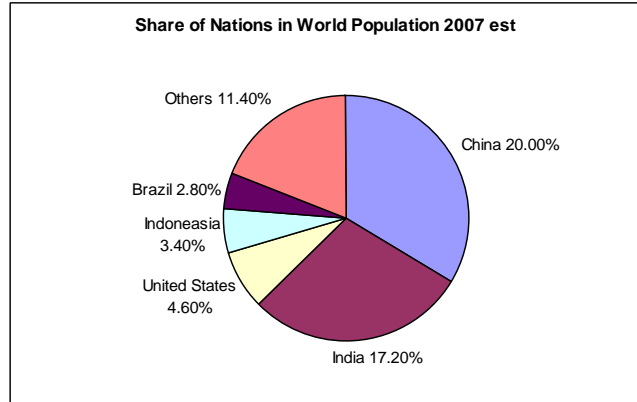


From the mid-1980s through the mid 1990s, world population rose by 85 to 100 million people per year. The population grew more than 80 million people in 1997. Almost 98 % of the increase in population occurs in less developed countries and these countries are on a course to double their populations over the next 30 years. Environmental degradation, stagnant economies, hunger, malnutrition and child-deaths plague poorer countries experiencing runaway growth. China, India, the United States, Indonesia, Brazil and Russia are the six most populous countries in the world.



Source: Earth EconomyPolicy

However, most of the world population increase is concentrated in Asia. From the 3.68 billion people that will be added to the world population between 1995 and 2050, Asia will contribute some 2 billion. This enormous increase is due to the already massive size of the population. This is further projected to increase between 2025 and 2050 to 658 million.



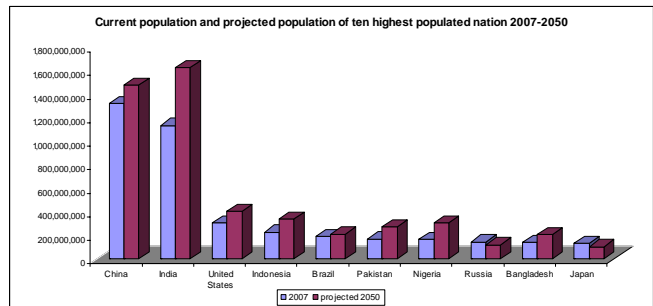
Latin America and the Caribbean, on the other hand, will have only a very moderate population increase of some 334 million between 1995 and 2050 during the next three decades. This is due to both the smaller initial size of the population and the already relatively low level of fertility.

The ten countries which will contribute most to world population growth over the next 30 years are India, China, Pakistan, Nigeria, Ethiopia, Indonesia, United States of America, Bangladesh, Zaire, and Iran

According to the most recent (medium variant) UN population projection India's population will increase by an additional 401 million between 1995 and 2025 - China will grow by "only" 260 million. The next largest contributor to world population growth - surprisingly - is not Indonesia which has the third largest population among developing countries, but Pakistan. This country's population will grow by about 133 million between 1995 and 2025. An almost equal contribution to world population growth will probably come from Nigeria - 127 million. Perhaps unexpected, the next largest contributor to world population growth will be Ethiopia, which will have an additional 80 million people over the next three decades. Indonesia, on the other hand, will grow by "only" 78 million people - which is just sixth place in the "hit list" of contributors to world population growth. The United States of America will probably grow by 65 and Bangladesh by 62 million. Few development experts would have put Zaire on a watch list for population growth. But this Central African country is projected to have an increase in population of almost 61 million between 1995 and 2025. The tenth largest contributor to world population growth will be Iran - with a population increase of almost 60 million during the next three decades.

India will out-grow China.

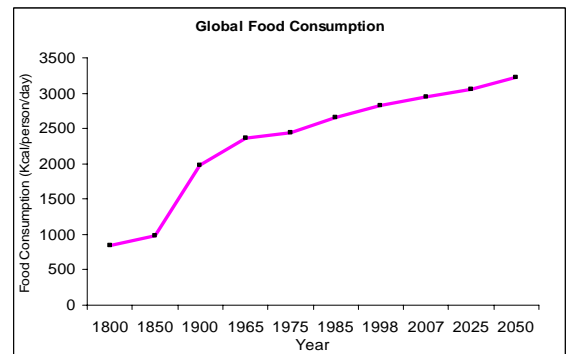
In the early 1950s both China and India had a Total Fertility Rate (TFR) of about 6 children per woman. But while China's TFR sharply fell to about 2.4 in 1990, it declined only slowly in India and was still above 4 children per woman in 1990. This relatively slow decline of fertility has built up a huge population momentum in India. The country's population structure is much "younger" than that of China. These "broad base" of children and young adults - born during the high growth period in the 1960s, 1970s and early 1980s - will enter reproductive age in the near future. Even if fertility continues to decline to reproductive level by 2020 (as being assumed by the UN projections) the Indian population will probably increase to almost 1.6 billion by 2050 - slightly more than that of China (UN medium variant). However, India's population might become even much larger. If the average Total Fertility Rate would only decline to 2.6 (instead of 2.1) children per woman in 2020, the population would increase to about 1.9 billion by 2050.



The Human Footprint

Food

Reports from the Food and Agricultural Organization of the United Nations, numerous other international organizations, and scientific research also confirm the existence of this serious food problem. For example, the per capita availability of world grains, which make up 80 per cent of the world's food, has been declining for the past 15 years. Certainly with a quarter million people being added to the world population each day, the need for grains and all other food will reach unprecedented levels.

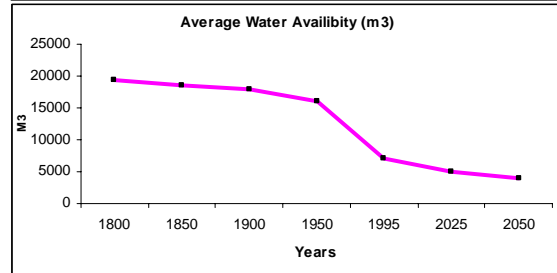
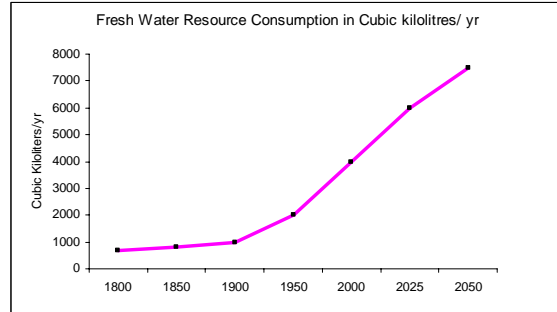


More than 99 per cent of the world's food supply comes from the land, while less than 1 per cent is from oceans and other aquatic habitats. The continued production of an adequate food supply is directly dependent on ample fertile land, fresh water,

energy, plus the maintenance of biodiversity. As the human population grows, the requirements for these resources also grow. On a per capita basis they will decline significantly because they must be divided among more people.

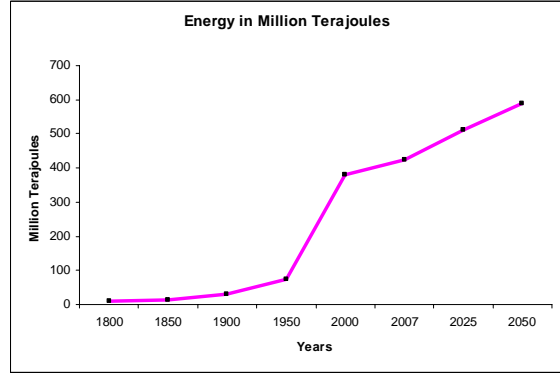
Water

An international study group has warned that the water shortages in India and other parts of the world will be a serious problem in days to come. "Scores of countries are overpumping aquifers as they struggle to satisfy their growing water needs, including each of the big three grain producers —China, India, and the US. "More than half the world's people live in countries where water tables are falling," Lester Brown of the Earth Policy Institute has said. In India, water shortages are particularly serious simply because the margin between actual food consumption and survival is so precarious.



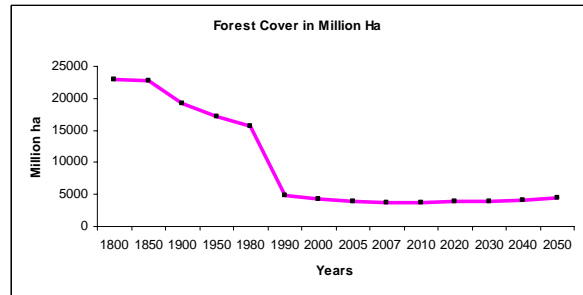
Energy

Fossil energy is another prime resource used for food production. Nearly 80 per cent of the world's fossil energy used each year is used by the developed countries, and part of it is expended in producing high animal protein diets. The intensive farming technologies of developed countries use massive amounts of fossil energy for fertilizers, pesticides, irrigation, and for machines as a substitute for human labor. As supplies of fossil energy dwindle, the cost of fuel increases everywhere. The impact of this is already a serious problem for developing countries where the high price of imported fossil fuel makes it difficult, if not impossible, for poor farmers to power irrigation and provide for their other agricultural needs. Worldwide, per capita supplies of fossil energy show a significant decline.



Environment

Global forest cover is a key indicator of the health of the planet. An intact forest cycles nutrients, regulates climate, stabilizes soil, treats waste, provides habitat, and offers opportunities for recreation. By a conservative tally, these services are worth more than \$4.7 trillion, a total equal to one tenth of the gross world product which is 67 billion dollars as of year 2006. Forests also supply goods, including food, medicines, and a large array of wood-based products.



Source:

State of the World Forest – 2007, FAO

Forests worldwide cover some 3.9 billion hectares—almost a third of the earth's land surface excluding Antarctica and Greenland. Though vast, this wooded area is only half the size of forested land at the dawn of agriculture some 11,000 years ago. Most forests are no longer in their original condition, having changed in composition and quality.

People now use or appropriate an estimated 39-50 per cent or more of the earth's biological production, through agriculture, forestry and other activities. Half of the world's forests have disappeared since the end of the last Ice Age, and only 22 per cent of the original forest cover remains in large, unbroken areas without substantial human influence. Deforestation rates in the last few decades have reached the highest levels in history, as global population growth has also peaked.

In the last 40 years, per capita forest area worldwide has fallen by more than 50 per cent, from a global average of 1.2 hectares to less than 0.6 hectares per person. This is due to both decreasing forest area and increasing population, and it threatens the well-being of both people and the forests they depend on. The proportional loss of forests (the amount lost relative to the amount remaining) has been greatest in Asia, followed by Africa and Latin America. These ongoing losses have been partially offset (by about 10 per cent) by a relatively small increase in forest plantations and re-growth in some developed countries.

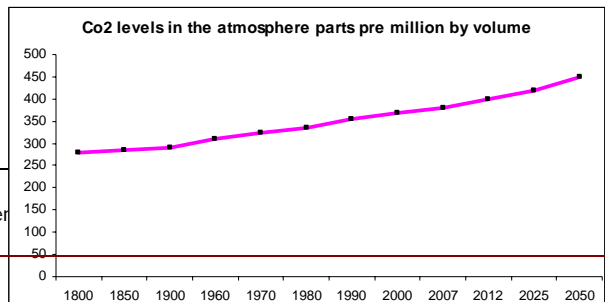
Tropical forests contain an estimated 50 per cent of the world's remaining biodiversity (plant and animal species). At current rapid deforestation rates, and in the absence of any intervention, the last significant primary tropical forest could be harvested within 50 years.⁸⁹ Because habitat destruction is the leading cause of species extinction, the loss of tropical forests is likely to lead to a substantial and irreversible decline in global biodiversity.

Human population growth, density and other demographic variables, and their effect on deforestation, are critically important but under-studied factors in this context. Many of the countries that contain the largest blocks of remaining tropical forest are also those with the highest population growth rates (2-4 per cent per year).⁹⁶ Ongoing human migration, both national and international, is another critical factor that affects forests, habitat and biodiversity.

Biodiversity depletion: Indonesia, India, and China are among the countries with the most threatened species of mammals and birds, according to the World Conservation Union (IUCN). Indonesia has the highest number of threatened mammals (135 species), followed by India (80) and China (72). The Philippines has more critically endangered birds than any other country in the world.

Green House Gases and Climate Change

Carbon dioxide and other "greenhouse gases" trap heat in the atmosphere and raise average global surface

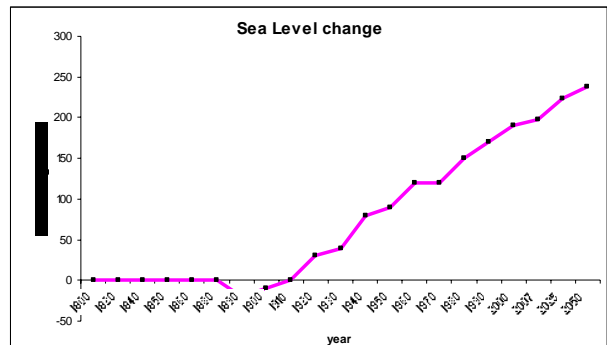


temperatures. Emissions of carbon dioxide grew 12-fold between 1900 and 2000, from 534 million metric tons per year in 1900 to 6.59 billion metric tons in 1997.

In the same period, human population nearly quadrupled, from 1.6 billion to 6.1 billion, progressively consuming greater quantities of fossil fuels—oil, gas and coal. Expanded agriculture, destruction of forests and increased production of certain chemicals also increase greenhouse gases in the atmosphere.

Climate change will have a serious impact. The Intergovernmental Panel on Climate Change (IPCC) estimates that the earth's atmosphere will warm by as much as 5.8 degrees Celsius over the coming century, a rate unmatched over the past 10,000 years.⁶⁰ The IPCC's "best estimate" scenario projects a sea-level rise of about half a metre by 2100 (with a range of 15 to 95 centimetres), substantially greater than the increase over the last century.

The human and ecological impacts of rising oceans include increased flooding, coastal erosion, salinization of aquifers, and loss of coastal cropland, wetlands and living space. The intensity and frequency of hurricanes and other hazardous weather may also increase, endangering the growing human population in coastal areas.



A warming climate also poses a significant public health threat. The redistribution of precipitation would markedly increase the number of people living in regions under extreme water stress—a problem compounded by increasing population. The geographical range of temperature-sensitive tropical diseases, such as malaria and dengue fever, would also expand. Higher average temperatures mean longer and more-intense heat waves, with a corresponding rise in heat-related health problems.

The combined effects of population growth and climate change could produce regional resource shortages, which in turn could result in the exploitation of environmentally sensitive areas such as hillsides, flood plains, coastal areas and wetlands. These conditions may also increase environmental refugees, international economic migration and associated socio-political challenges. Climate and environmental policy should address the geographical distribution and movement of people in the 21st century, as well as their absolute numbers.

Conclusion

With water and land in limited supply, whether we move toward the higher or lower number may have more influence on future environmental and social stability than anything else we do. The most humane way to achieve the low-level projections is to improve health and social conditions to promote population stabilization through reduced birth rates, not to allow death rates to climb as a result of negligence.

Natural Gist:

- **Exponential growth in Population:** The world population continues to grow geometrically and great pressure is being placed on arable land, water, energy, and biological resources. The ten countries which will contribute most to world population growth over the next 30 years are India, China, Pakistan, Nigeria, Ethiopia, Indonesia, United States of America, Bangladesh, Zaire, and Iran.
- **The Human Footprint:** The burgeoning population only leads to dire causative effects along the verticals of food, water, energy and environment.

The Changing World	2007	2050
Population (Billion)	6.6	9.2
Food Consumption (Kcal/person/day)	2940	3220
Water consumption (m3)	4800	7500
Co2 Emission (parts/Mn by Volume)	380	450
Energy consumption (million terajoules)	425	590
World Forest Cover (Million ha)	3,800	4500
Increase in Sea level (mm)	198	238

- **Impact on resources:** food production has gone up, water consumption has almost increased by six times since year 1800 while energy use and production has shot up by 400 times in jus 100 years
- **Distressing signs:** the forest cover is rapidly decreasing, fresh water will become more precious than petroleum in coming years and the air, land and water that supplicate us with their bounty suffer from degradation.

- **To sum up:** Charles Darwin had once famously quoted that no species can become extinct due to over population but we might just prove him wrong.