

# **The Effects Of Overpopulation**

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## **Introduction: The Notion of Overpopulation and Carrying Capacity:**

Despite unprecedented increases in human numbers over the course of the last century, there is much debate as to whether we are in fact suffering or going to suffer from overpopulation. To quote Jawaharlal Nehru (Indian Prime Minister 1950-), «no country can be over populated if there is work for everyone ». There is an underlying assumption present here. If we are to talk of overpopulation, then we are inferring that some sort of optimum population exists. Academics call this „carrying capacity“ and simply refers to the number of people that the earth can support in perpetuity.

An ecologist by the name of William Reese uses the notion of „carrying capacity“ and estimates based on current levels of consumption to derive a level of optimum population. He also calculates a productive bio-capacity for the earth (total productivity of the earth divided by total number of people on it), measured in global hectares. However, there is of course huge discrepancies with regard to different levels of consumption around the world, leading to some astonishing results. Reese calculates that at current levels of human numbers, a fair share would be 2 global hectares (the earth's capacity to produce food, energy, usable water and of course its ability to assimilate waste) for every man, woman and child. At the extreme ends of the spectrum however, the average Indian consumes on average 0.89 and the average American 9.42 global hectares each. These figures can help calculate how many people the earth could support at these various consumption levels. Considering that the earth's population currently stands at just over 6.9 billion people, the results are terrifying. If we were all to consume resources at the same level as the average Rwandan, then the earth could perpetually support a population of approximately 18 billion people. However at European consumption levels this figure falls to 4.5 billion and for our American counterparts ; 1.5 billion people.

We can have some deal of confidence in these figures. NASA calculate with terrific accuracy the daily needs of astronauts who don't have the benefit of our natural endowments aboard the space station. These daily requirements per person include 820 grammes of oxygen, 4000-5000 calories of food and 3.52 litres of water, in addition to the station's ability to assimilate waste. Cumulatively, all these figures add up to the fact that at current levels of consumption, the human race needs about one and half worlds, to cater for the demands we place on it.

Although it is sometimes controversial, there is nothing new about debating the issue of population. Theodore Panayotou (Centre for International Development at Harvard University) provides us with a brief and helpful, historical literary analysis in his paper «Population and Environment » (2000). He cites how population has been discussed in a variety of contexts throughout history ; from Plato and Aristotle (with respect to the governance of cities), to Malthus (concerned with food production), to Boserup (concerned with agricultural growth). Malthus seems to be of particular historical significance

when addressing the issue of population, being cited in just about every academic source for this essay. Even in contemporary writings, an «Essay on the Principle of Population» is cited frequently. Raj Patel writes in «The Value of Nothing», «Malthus argued that any population would, tragically, always exceed the resource base available to feed it». Malthus (at least in his earlier writings) viewed this as an inevitability due to exponential population growth and finite resources.

We shall momentarily look at the absolute numbers in terms of population growth and try to identify some of the challenges associated with such demographic changes. Panayotou's paper is particularly helpful in documenting some of the direct «effects of overpopulation». We shall also look at the case of India and conclude with some brief comments and recommendations.

### **The Absolute Numbers: A Growing Population and Associated Challenges:**

Historically speaking, the world's population remained pretty stable for thousands of years. Between 10,000BC and 1800AD in particular, very little population growth can be identified. Professor Tim Dyson of the London School of Economics cites that the reason for this is that people were only survived into adulthood by two children. However, around the turn of 1800AD the world's population began to increase rapidly, increasing from about 1 billion to almost 7 billion today. This is attributed to technological improvements allowing for the control of death rates, in particular the development of treatments and immunisations for infectious diseases such as; cholera, small pox, malaria and measles.

A billion people were added to the world's population between 1987 and 1999 alone («Population and Environment») and according to Hania Zlotnik of the UN Population Division, «the human population is still growing and at the very least, it is likely to add 2.3 billion people by the middle of the century». This projected increase for the next 40 years represents in David Attenborough's (BBC Documentarian) words are; «more than the current population of the whole of Europe, the whole of Africa, North and South America combined». According to the Optimum Population Trust, «the world's population is growing 80 million a year, that's 1.5 million every week or 10,000 every hour». During the writing of this paper alone, the world's population is likely to increase by 50,000. The good news is that population growth on a global scale is slowing down, despite that increases in absolute numbers are still unprecedented throughout history. Also encouraging is the fact that population has been shown to stabilise under certain conditions, notably when contributory factors are challenged. There is some agreement amongst academics with regard to quite a few of these factors and we can identify them as 1) Lack of reproductive health and access to modern contraception, 2) Lack of women's rights and 3) Poverty.

These factors can contribute to population growth in different ways. Lack of contraception for those who would be willing to use it may be obvious but the others may be more ambiguous. For example, with regards to women's rights, it can be shown that women bear more children where they are denied the right to education. This is a result of later marriages and increasing the perceived opportunity cost of having more children. Poverty can also serve as a major contributory factor and key in creating a sort of cyclical effect. Again, in «The Value of Nothing», Patel documents this excellently. He states that in many of the world's poorest countries, children may be viewed as «productive assets». This is particularly the case in countries where people farm common lands together. The more hands a family has at its disposal, the larger the share of resources it's able to take home, thus increasing family welfare. Patel suggests that children may become «net contributors» to their families by the age of 12 years old. This is in striking contrast with western

countries, where parents usually have to support children through a minimum of 3 years of college before they reach a state self sufficiency. Short term incentives are essentially out of sync with the long term social and ecological costs associated with having children.

The practical problems of providing an extra 2.3 billion people with food, water, housing, employment and educational opportunities are vast. Even at present more than 1 billion people are lacking access to safe and clean drinking water. Projections estimate that within 20 years, up to half of the worlds population will be living in areas of water stress . Unfortunately, this will especially be the case throughout some of the poorest parts of the world, where the largest population increases are expected. For example, the populations Afghanistan and SubSaharan Africa are expected to double. Nigers population is expected to triple. India is set to become the most populated nation on earth with an estimated 1.65 billion inhabitants by 2050. The UK and US are expected to yield relatively small population increases and decreasing populations are also expected in ; Japan, Russia, Germany and Eastern Europe. None the less, all this means that we will need to effectively double food production. Many commentators also suggest that all this is likely to end in increased inequality and human suffering.

### **Effects of Overpopulation :**

Panayotou (2000) systematically adresses the various literture with regard to population and its associated enviroinmental impacts across a variety of subjects including; Land Useage, Water, Pollution Levels, Deforestation and Climate Change.

**A) Land Usage :** agriculture has demonstrated a tremendous ability to keep pace with population change. Through expansion of the agricultural frontier, shortening fallow periods, increasing labour and new biological and chemical technologies such as fertilizers and pesticides, the agricultural and industrial revolutions managed to triple yields . However, each of these past solutions faces an uncertain future. Panayotou introduces various studies that correlate population number and density to a countrys expanse of agriculture and land degredation via ; insecure land tenures, poor soil quality and vulnerable ecological systems. This consevatively suggests that the earths productice capacity may exhaust at some point.

In the same BBC documentary «How Many people Can Live On Earth?», Dr. Molly Brown of NASA Goddard Space Centre estimates that we now devote approximately 30-40% of the entire surface of the earth to agricultural protection. Expanding the frontier again is simply not viable because theres no more land. Land degredation was heavily correlated with population increases and suggests it may not be able to provide as plentiful as before. Ecological systems are showing signs of frailty. Lake Chad for example has shrunk to one tenth of its former size through drought and over use. There is none the less approximately 30 million people depending on it for survival. Finally, Robert Constanza (1990) argues that it may foolish to presume that new technological innovations will be able to repeat their previous feat of doubling food production in his paper «Balancing humans in the Biosphere : Escaping the Overpopulation Trap ». Until these technology arrives, he argues, we should plan for the worst, for the consequences would be too great if these new technologies sholud never arrive.

**B) Water Use :** Panayotou (2000) documents findings (as already mentioned) that state there are «over 1 billion people lacking access to clean water today ». 90% of projected population increases occur in countries where there is already considerable levels of water stress. In many of these countries, the resources required to improve water provision are scarce. The WTI (1995) estimates that 1 billion people a year suffer with water borne diseases. In some countries of the poorest countries, there is up to half the population lacking proper sewage and sanitation facilities.

Similarly, there is a natural constraint on the amount of water we have at our disposal. 70% of the earth's surface is water. Of this, only 2.5% is fresh water and only 1% of this fraction is available to us, the rest is locked in the ice caps. As with land, there is only so much available.

Raj Patel argues (in the same book) that if all the environmental cost of producing one hamburger were taken into account, it should retail for around \$200. This hamburger will require approximately 8,000 litres of water to bring it to the final consumer. Patel believes that markets undervalue water thereby encouraging inefficient use of it by farmers. Panayotou (2008) documents evidence to support this citing that Bangladeshi and Thai water irrigation revenues represent only 10-20% of their respective cost.

**C) Pollution :** Panayotou (2000) again provides us with some revealing insights. Pollution is generally measured across emissions in air and water and the production of solid waste. He cites Newell and Marcus who study data spanning (1958-1983) and find a 99.8% correlation between increases in population and CO<sub>2</sub> in the atmosphere. Although this is near perfect correlation, it does not imply causation. CO<sub>2</sub> emissions are not spread equally throughout the world according to population density. The US for example has approximately 4% of the world's population but contributes 23% of CO<sub>2</sub> emissions. Other factors need to be taken into account such as ; the level nations development, structure of the economy and the robustness of their environmental regulations (eg. tradable permits and limits). Mink (1993) is also reported, finding that up to 50% of all applied nitrogen ends up in fresh waters or the sea, suggesting room for greater efficiency. He cites Japan, who managed to reduce nitrogen emissions 10% (1960-1980) but at the same time significantly increasing agricultural production. Like Raj Patel, he advocates the benefits of a full cost pricing system.

**D) Deforestation :** «Population and Environment » reports that there are 15 million square kilometers of forest disappearing every year. In addition to being a source of income for timber companies, communities and individuals, forests serve many of functions of nature including; water and soil conservation, providing wildlife habitats, capture vast amounts of rainfall and are key to the planet's biodiversity and carbon cycles. Panayotou cites Southgate (1994) who correlates population growth to deforestation across 24 Latin America countries. Panayotou extends this methodology himself (1990) and finds a 10% population increase correlated to a 3.3% increase in deforestation. The problem can be compounded especially in poor countries where there are open access resources, insecurely held land tenures, lack of access to credit for farmers, low levels of education, scarcity of off farm employment, and a low level of per capita income.

**E) Climate Change :** Papanotou (2000) again reports a series of papers who apply econometric models to test for evidence of climate change. For example, a study cited ; Holden (1991) uses a simple model to estimate the environmental impact of population increase across a variety of variables such as consumption level per capita and pollution level per capita.

David Attenbrough documents the further reaching consequences of climate change stating « we've depleted fish stocks massively, 10% of all the worlds coral reefs are estimated to be degraded beyond repair, 1/3 of all amphibians, 1/5 of all mammals and 70% of of all plants are under threat of extinsion ». I believe there is little scientific doubt remaining with regard to humanities contribution to climate change. Through overpopulation I believe we are likely to excaserbate the burden on the earths productive capacity, accelerate climate change and ultimately limit our ability to cater for an ever growing population.

### **The Case of India:**

India is of partucial importance to any discussion relating to overpopulation as it due to become the most populated nation onthe planet in the coming decades. Mytheli Sreenivas documents in «Population Bomb ? The Debate Over Indian Population », that Indias population was around 350 million in 1947, around 1.16 billion today and projected to be 1.65 billion by the middle of the century. India has also been one of the few countries in the world to have actively sought to reduce birth rates through public policy.

In the 1975 for example, Prime Minister Mrs.Indira Ghandi announced a state of emergency, suspending the Indian constitution. This was in response to a failed monsoon which rendered millions at the very real risk of starvation. Mrs. Ghandi advocated an „integrated approach“; incentivising contraception and sterilisation with a cash payment. The move was deemed « coercive » to members of the lower casts who had nothing. Government employees were given quotas of how many people they were expected to „motivate“ into participation. Furthermore, « Sterilisation Certificates » were rendered necessary for ration cards, land allotments, slum dwellers and even electricity connections. Sterilisation became the punishment for the most trivial of crimes, a hugely unpopular move that brought down the government in subsequent elections (1977) and rendering 8 million sterilized. Since then, Indian politicians have taken a more moderate approach and focused on increased production as a means of catering for a burgeoning population.

Again however, under the right conditions, population has stabilized even in India. In the coastal state of Karala live 32 million people. The average woman in Karala will give birth to only 1.5 children and marry (on average) at the age of 28 (in striking contrast to an average age of 18 for surrounding states). This is solely down comes down to a long tradition of compulsory schooling for boys and girls, with Karala demonstrating some of the highest literacy rates in the world.

### **Conclusion:**

According to a variety of sources examined, improving womens literacy , educational and occupational opportunities in some of the poorest parts of the world is the most cost effective way for governments to slow birth rates, and subsequent increases in resource consumption. This is a conclusion that I fully support. It suggests that instead of focusing on

limiting carbon emissions within domestic nations, our efforts would yield more desirable results if the education of women on an international basis took priority. Panayotou (2000) puts forward some policy suggestions, which implemented simultaneously, would help a great deal; increased education, provision of affordable food and clean water to the world's poorest, increase family planning services to those who would avail of them, remove policy distortions that may undervalue natural resources (eg. water), and reduce credit constraints to those who seek to engage in off-farm activities. I agree with Robert Costanza's assertion that it is foolish to assume new technologies will be sufficient to meet the on-coming challenges before they are developed, for the consequences are far too great if they do not arrive. Therefore, I believe we should start to legislate for these challenges, the practical implications of how to provide for an extra 2.3 billion people now, before we are forced to later, when it may well indeed be too late.

### **Bibliography :**

*Note ; although I only used a handful of sources in preparing this paper, each one was tremendously helpful in its own right.*

1. David Attenborough ; BBC Documentary «How Many People Can Live on Planet Earth?» This is a 6 part documentary available on Youtube with the following links :  
<http://www.youtube.com/watch?v=LF15YAvT9G0>  
<http://www.youtube.com/watch?v=B498dbsireA&feature=related>  
<http://www.youtube.com/watch?v=ndtOAKDOBV&feature=related>  
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2. Robert Costanza ; «Balancing Humans in the Biosphere : Escaping the Overpopulation Trap » (1990)
3. Aldous Huxley ; «Brave new World Revisited » (1958) ; Pages 1-16
4. Theodore Panayotou ; « Population and Environment » ; CID Working Paper No. 54 (July 2000) ; Centre for International Development at Harvard University
5. Raj Patel ; « The Value of Nothing » (2009); Pages 43-46, 94, 163
6. Mytheli Sreenivas ; «Population Bomb ? The Debate over Indian Population » (2008)
7. The Optimum Population Trusts website ;  
<http://populationmatters.org/issues/people/>

