POPULATION AND RESOURCES

The relationship between population and resources is best understood by looking at 3 key concepts: UNDERPOPULATION, OPTIMUM POPULATION, OVERPOPULATION

UNDERPOPULATION: Under population exists when a population is too small, therefore unable to fully utilise the available resource endowments. Under population is also characterised by a situation where the available resources are capable of supporting a much larger population with no reduction in living standards. The situation is found in regions of low technical development such as equatorial Congo, Amazon River basin or the rich Prairie region of North America.

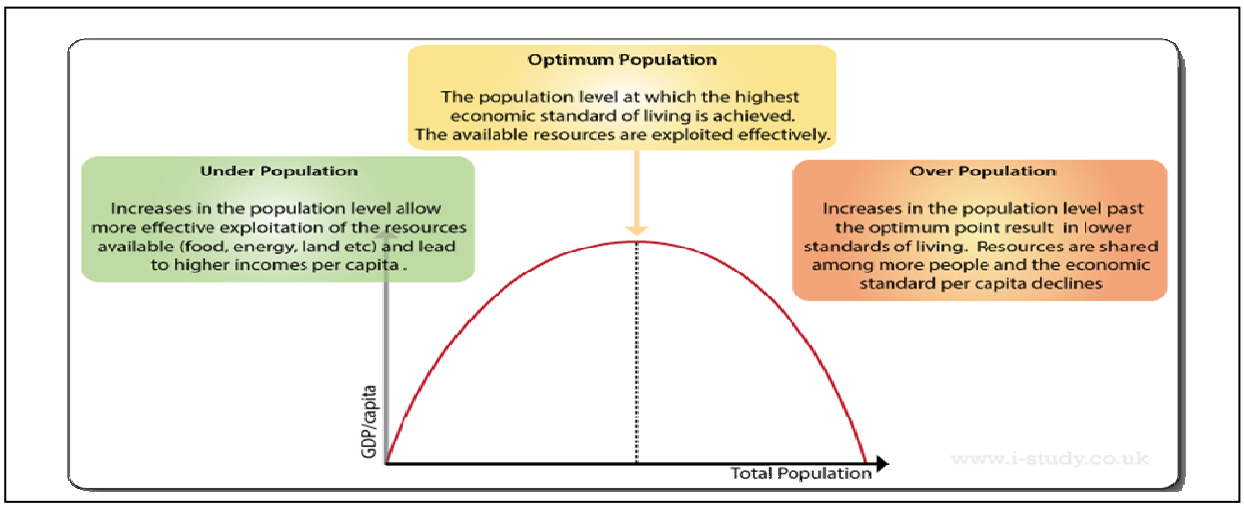
OPTIMUM POPULATION: Optimum population has been defined as that size of population enabling per capita output of the maximum order accompanied by the highest possible standards of living under a given set of economic and technological conditions. Therefore, optimum population lies between two extremes, i.e., overpopulation and under-population. Thus optimum population yields highest quality of life, which means each person has access to adequate food, water, energy and air of highest quality, adequate medical care, recreational facilities and cultural outlets.

Per capita income at a maximum
Population and resources in balance
Highest standard of living
Maximum output per person
Greatest GNP per capita
Biodiversity preserved

OVERPOPULATION: The term 'overpopulation' means too great a population for a given region to support. There may be two causes: (i) population growth exceeds the existing resource base; (ii) existing resources have been depleted. The situation of overpopulation displays the following socio-economic characteristics: high unemployment, low incomes, low standards of living, high population density, malnutrition and famine.

Malthus, for the first time, identified the problems related to overpopulation. Later on, the Neo-Malthusians also viewed overpopulation as a major problem. Marxists argue that overpopulation is the result of poorly distributed resources.

Nowadays, some western geographers view overpopulation as the cause of pollution and the increasing migration from the countryside in the western countries of Europe and North America. Overpopulation strikes the lower strata of the society the hardest particularly in developing countries such as Nepal, Myanmar, and many of the countries in Sub Saharan Africa,



POPULATION THEORIES

CARRYING CAPACITY

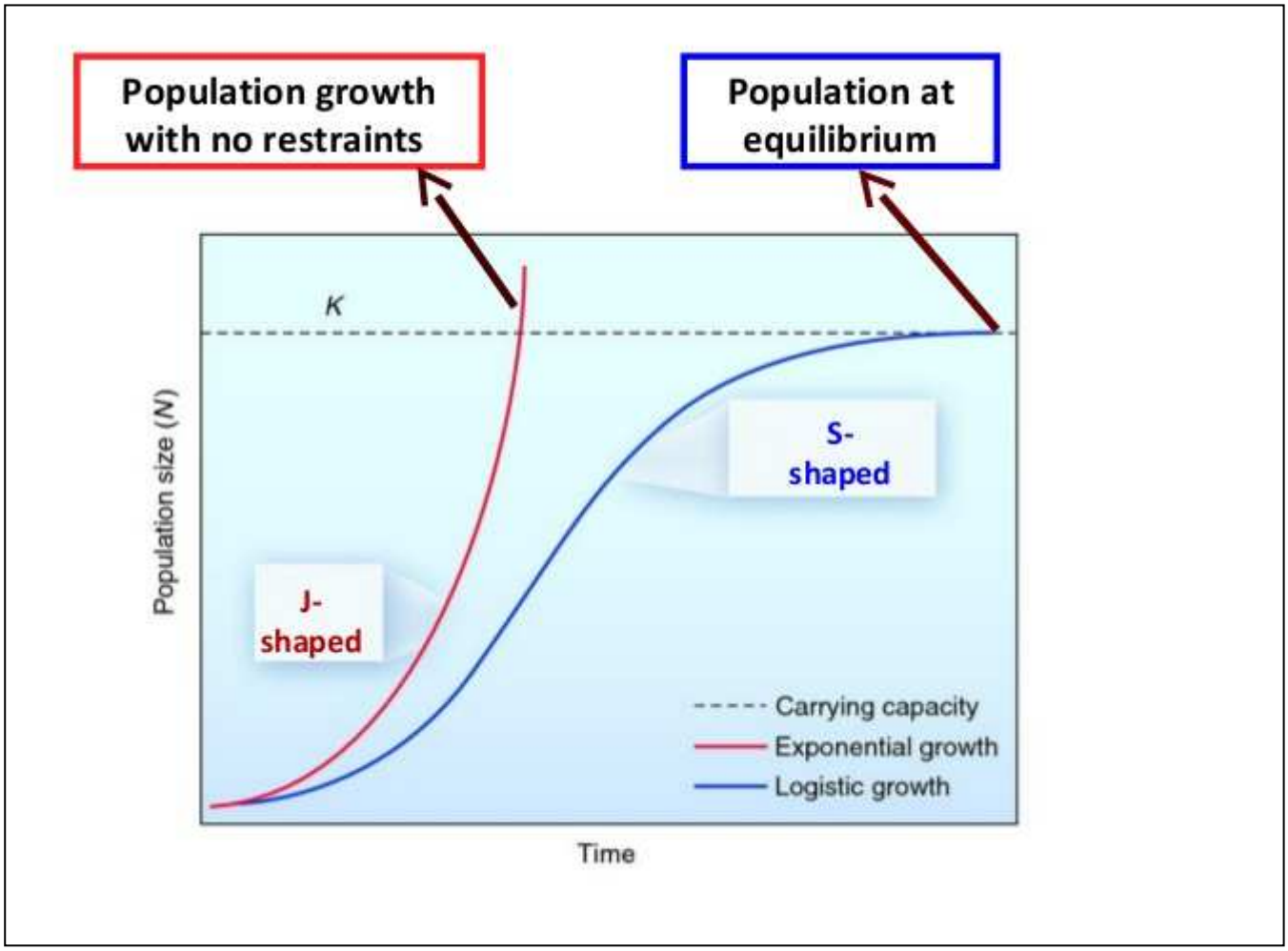
This is a different concept to the optimum population. Whereas Optimum Population requires high standards of living and GDP per capita to be at a maximum, this is not the case with carrying capacity. It is the maximum number of individuals that can be supported by an environment, a country or the world without checks such as famine or disease taking place.

The carrying capacity for the earth has been estimated at anywhere from 4 to 16 billions, so we may take 10 billions as a reasonable figure (present population 7.4 billions). When the population rises above the carrying capacity it is expected that resources will be depleted the environment will be degraded and agricultural output will collapse leading to increased deaths.

The carrying capacity can increase however if more land is farmed or land is farmed more efficiently leading to increased yields or any other technological change allowing more people to be sustained. It is also true, however, that the carrying capacity can reduce if soil degradation occurs or if pollution of the earth and/or atmosphere lowers the numbers that can be sustained.

POPULATION GROWTH

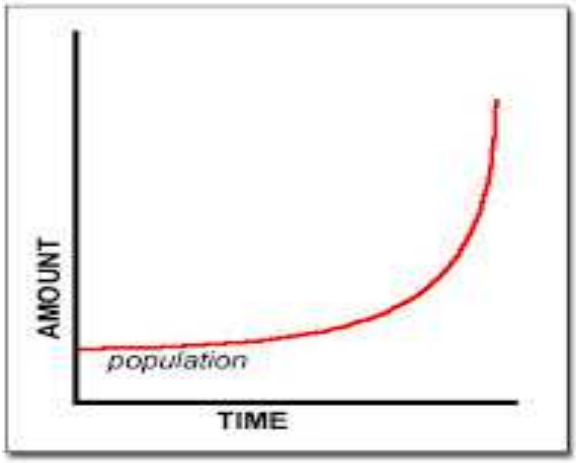
As population rises towards the level allowed by the carrying capacity there are two basic models that predict what might happen. One is pessimistic, showing a population crash and the other is optimistic showing population leveling of gradually at the carrying capacity.

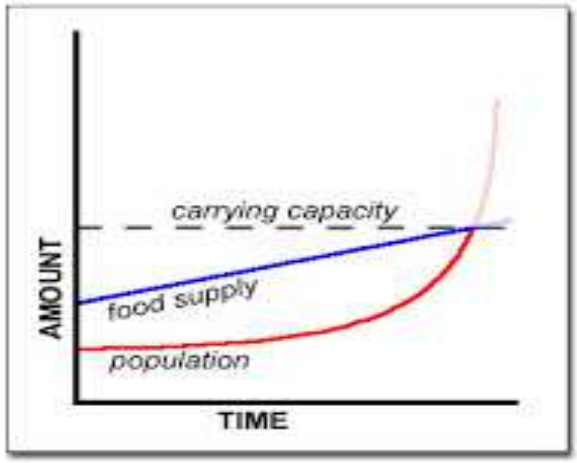


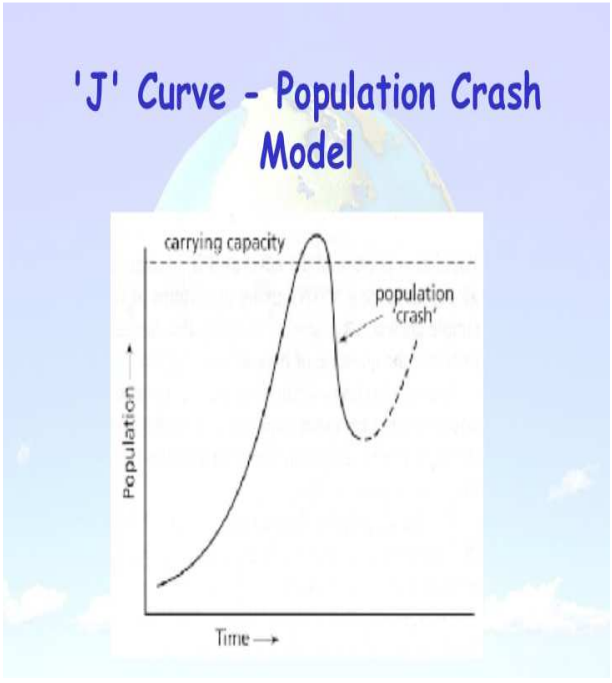
PESSIMISTIC AND OPIMISTIC POPULATION GROWTH THEORIES

MALTHUSIAN / NEO-MALTHUSIAN

Malthus presented his population theory in 1798. He proposed that population grew geometrically (2, 4, 8, 16, 32, 64 .....) to produce the exponential population growth curve shown on the first diagram below. He thought that food supplies and our ability to feed the growing population only grew arithmetically (1, 2, 3, 4, 5.....). He predicted that population would eventually outstrip the ability of the earth to feed the growing population at a point of crisis when the carrying capacity was reached (second graph).
At this point he said positive checks such as famine, war and disease would limit the population and cause a population crash, a J curve; unless negative checks on the birth rate and the fertility rate (birth control and abstinence in his eyes) limited population growth







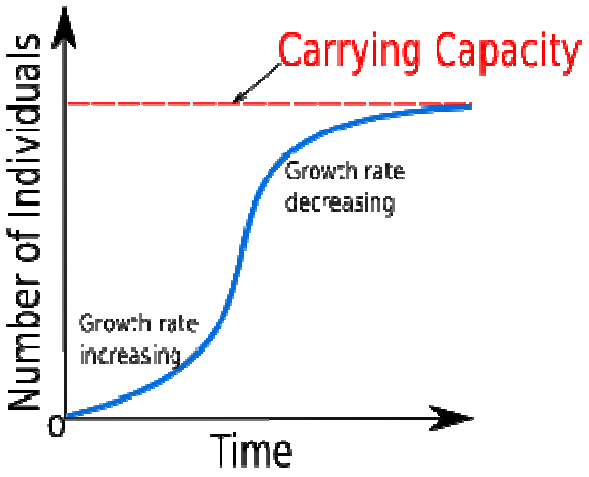
This view has been backed up more recently by Neo-Malthusian population theorists such as Ehrlich, who in the late 1960's predicted catastrophic famines and a certain population crash. He called this the population bomb.

Although this didn't happen there is no doubt that there have been serious famines particularly in parts of Africa and that population pressures have led to the depletion of some resources and put severe pressure on others.

There has also been pressure put on the environment; pollution, acid rain, global warming, soil and environmental degradation, so we must not dismiss these ideas entirely.

BOSERUP AND THE OPTIMISTS

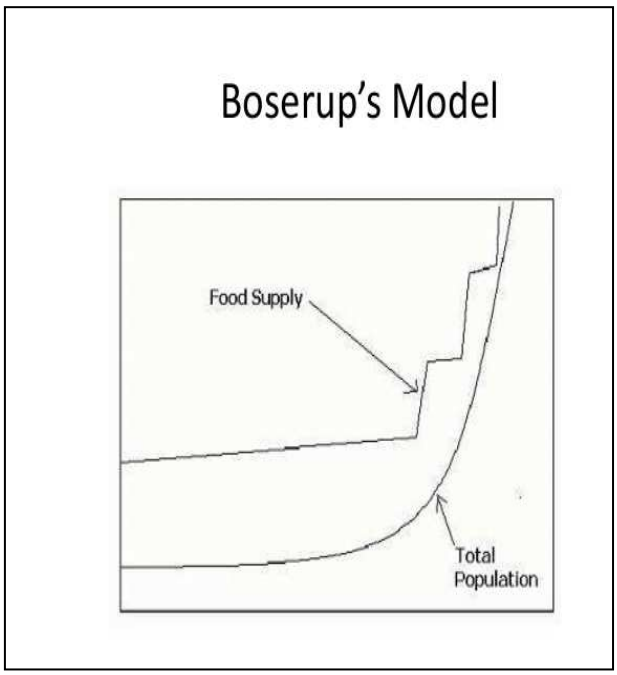
Some researchers propose that human population will follow the pattern shown by other animal species on earth. They predict that population growth will follow the extended S or Logistic curve. Population initially grows exponentially, but then as it nears the level of the carrying capacity the rate of increase slows until it eventually levels off as available resources limit growth.



There is, as yet, no real evidence that global population is following this curve as it still seems to be growing exponentially.

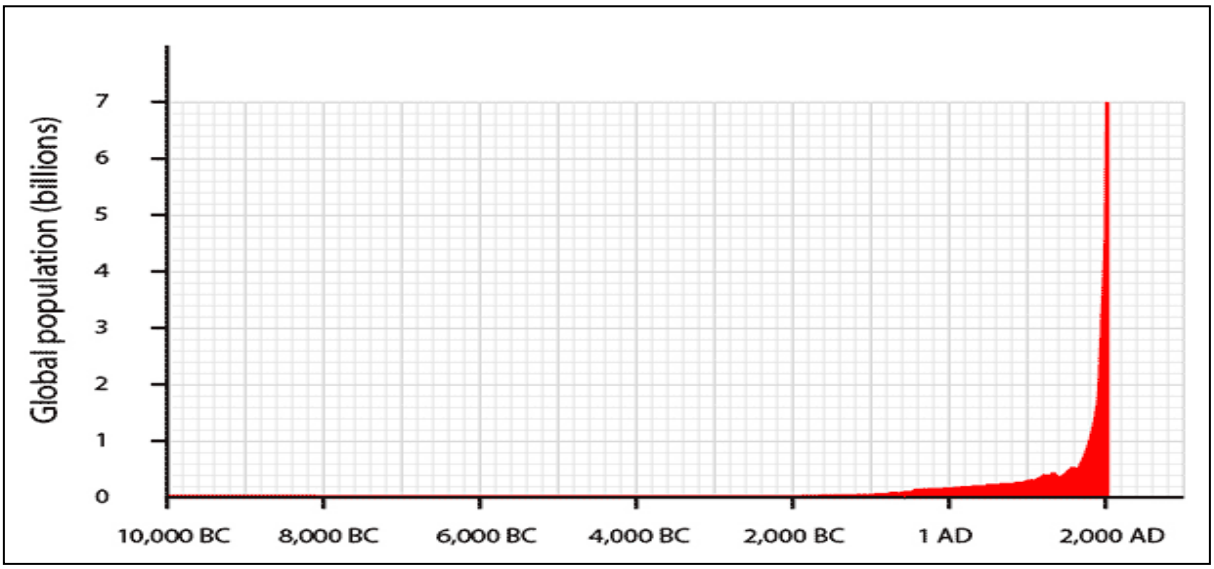
In Developed Nations, however ,that have reached the later stages (4and 5) of the Demographic Transition the growth rate is small or negative and in time it is expected that the countries that presently have the highest growth rates (particularly Sub Saharan Africa, stages 2 and 3) will eventually reach the later stationary stages and global growth rates will decline.

Boserup, working in the 1960's and 70's went further, and suggested that population growth and population pressure may be the drivers of change and technological advancement. She showed that the carrying capacity was not static and that improvements in agriculture and infrastructure would allow population to continue to rise.
Agricultural yields have been increased with the use of fertilisers and pesticides; irrigation and dry farming techniques have allowed the farming of marginal areas, and the Green Revolution was responsible for massive increases in the yields of some crops. GM (Genetically Modified) crops may be the latest technological innovation to allow the carrying capacity of the earth to rise.

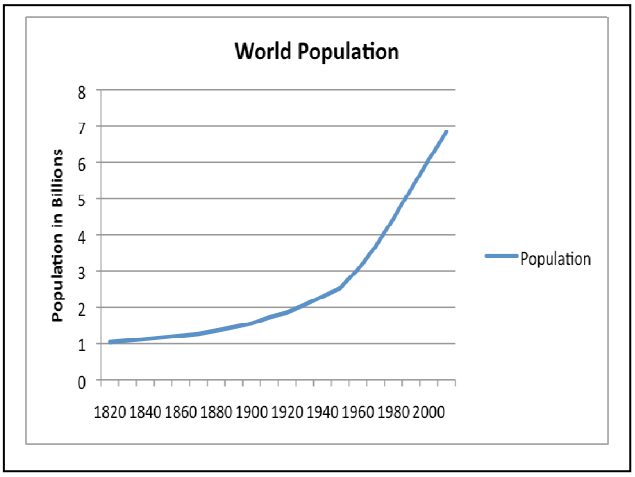


This optimistic view is supported by other social and political writers who suggest that increases in population offer more 'hands' and that ,with organisation, resources can increase in step with population.
It must be admitted, however, that overpopulation is a problem in some parts of the world and that devastating famines have taken place so it is clear that food supply does not always keep pace with population growth. This may be due to the imbalance in resources consumed and the ecological footprint of those in the richer parts of the world compared to those in the poorer parts.
It may also be argued that declining and finite resources such as oil have been the main cause of recent Middle East wars. Is this the War and Misery that Malthus envisioned?

WORLD POPULATION

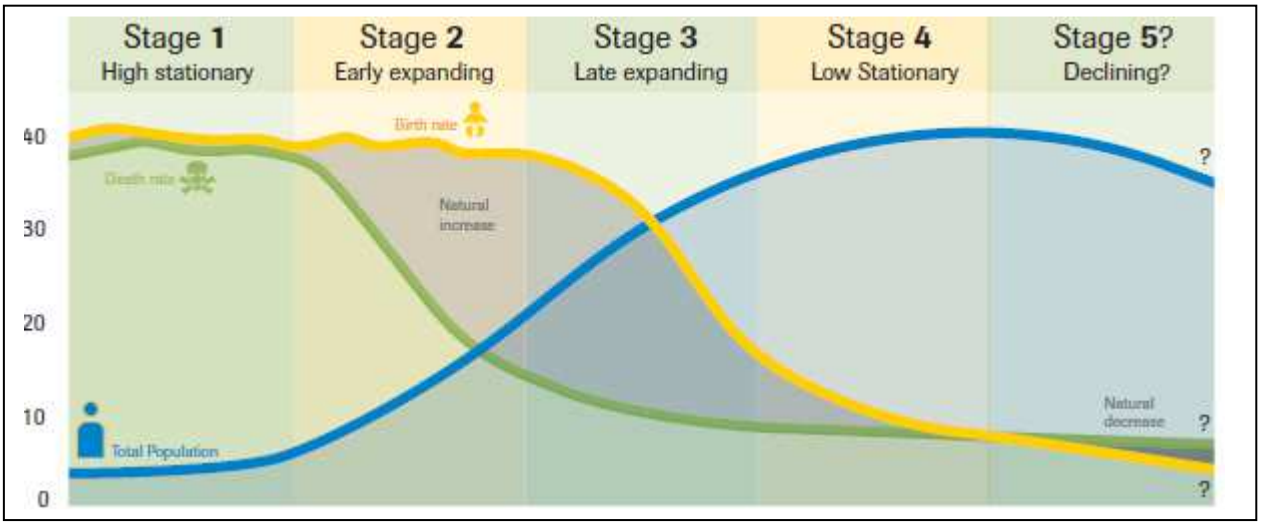


The graph above shows the changes in the total world population over the last 12,000 years. The population remained fairly constant for almost 10,000 years and began to increase rapidly only recently. This recent increase has been extremely rapid, some people have called it a POPULATION EXPLOSION and the present population of the earth is now over 7.4 billions.

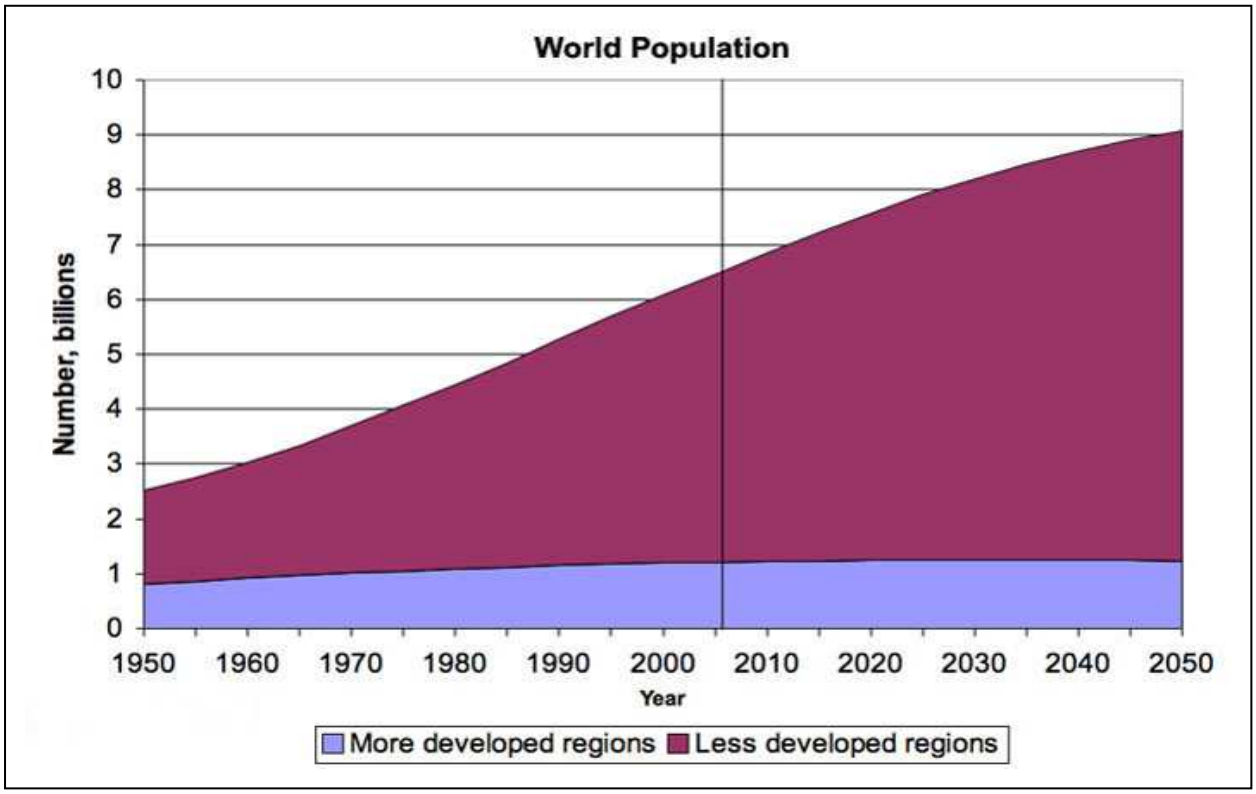


As you can see most of the growth has been concentrated into the last 200 years. Some people think that the rate of population growth is too high and that the population may be growing to a level where it cannot be sustained by the resources available on the earth. This idea was called the POPULATION BOMB and some researchers have predicted that the result will be a population CRASH due to famine, disease and war.

The growing population of the world is modeled in the DEMOGRAPHIC TRANSITION CYCLE that charts the changes of birth, death and growth rates of countries over time. The second and third stages of the cycle, the EARLY EXPANDING and LATE EXPANDING stages are when most growth occurs.

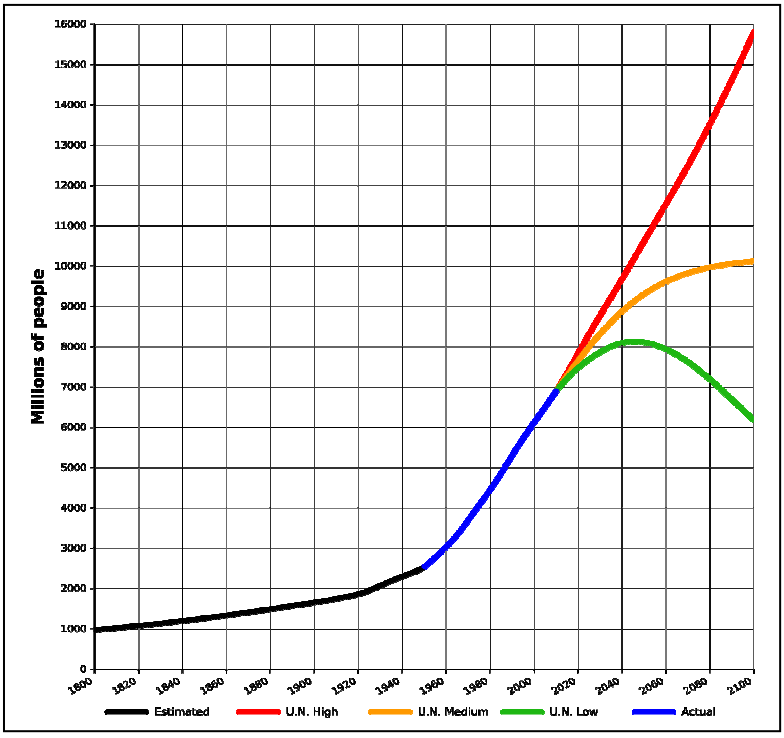


The present growth of world population is not fueled by the Developed nations who have progressed through to stage 4 or even 5 in the Demographic Transition where growth rates slow to almost zero or in fact become negative as the population declines. It is the Developing nations still in stage 2 or 3, the expanding stages that are causing the present growth in world population and this will continue until these nations reach stages 4 and 5. Even when these nations reach later stages in the transition the youthful nature of their populations will mean total population will continue to grow for a time.

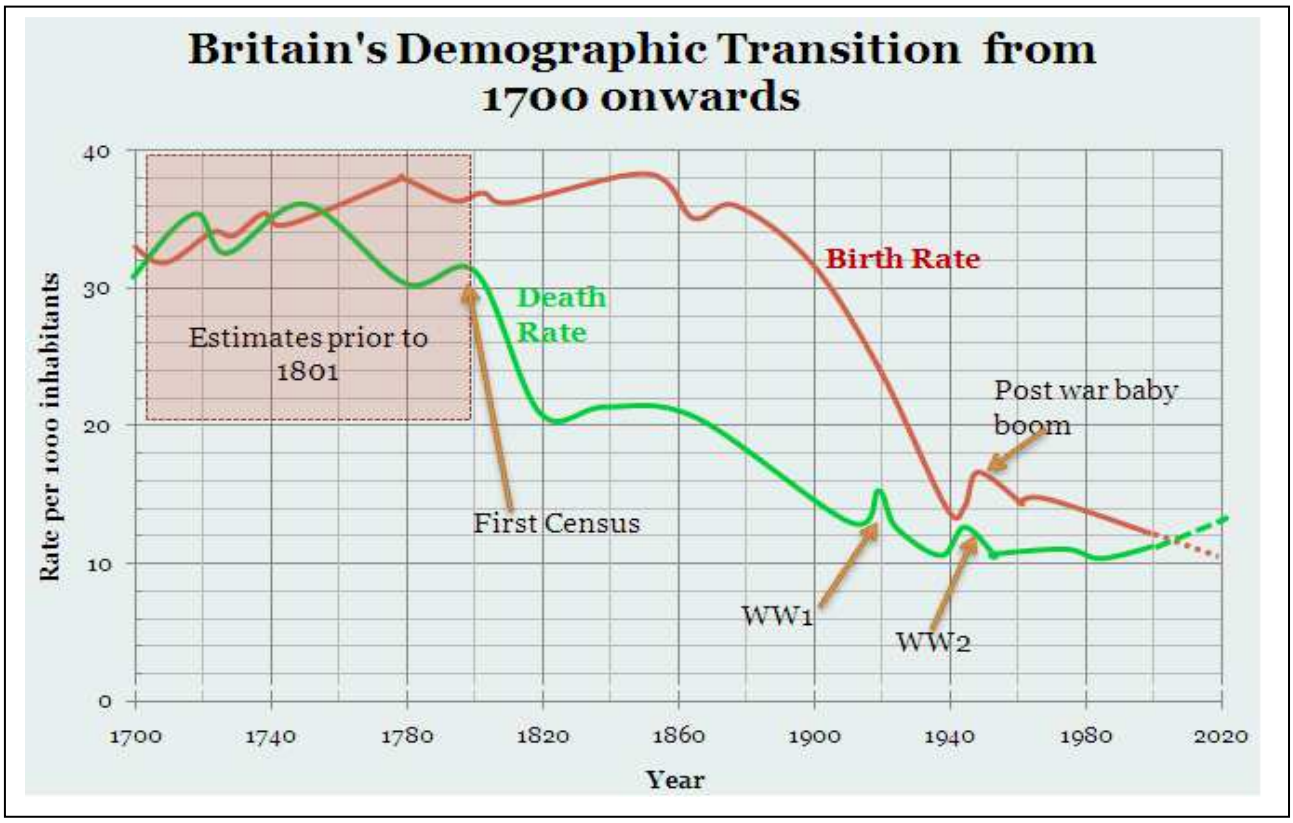


The graph above also shows how the population of the earth is predicted to grow beyond the present 7.4 billions and how this growth will be concentrated in the Less Developed regions of the world.

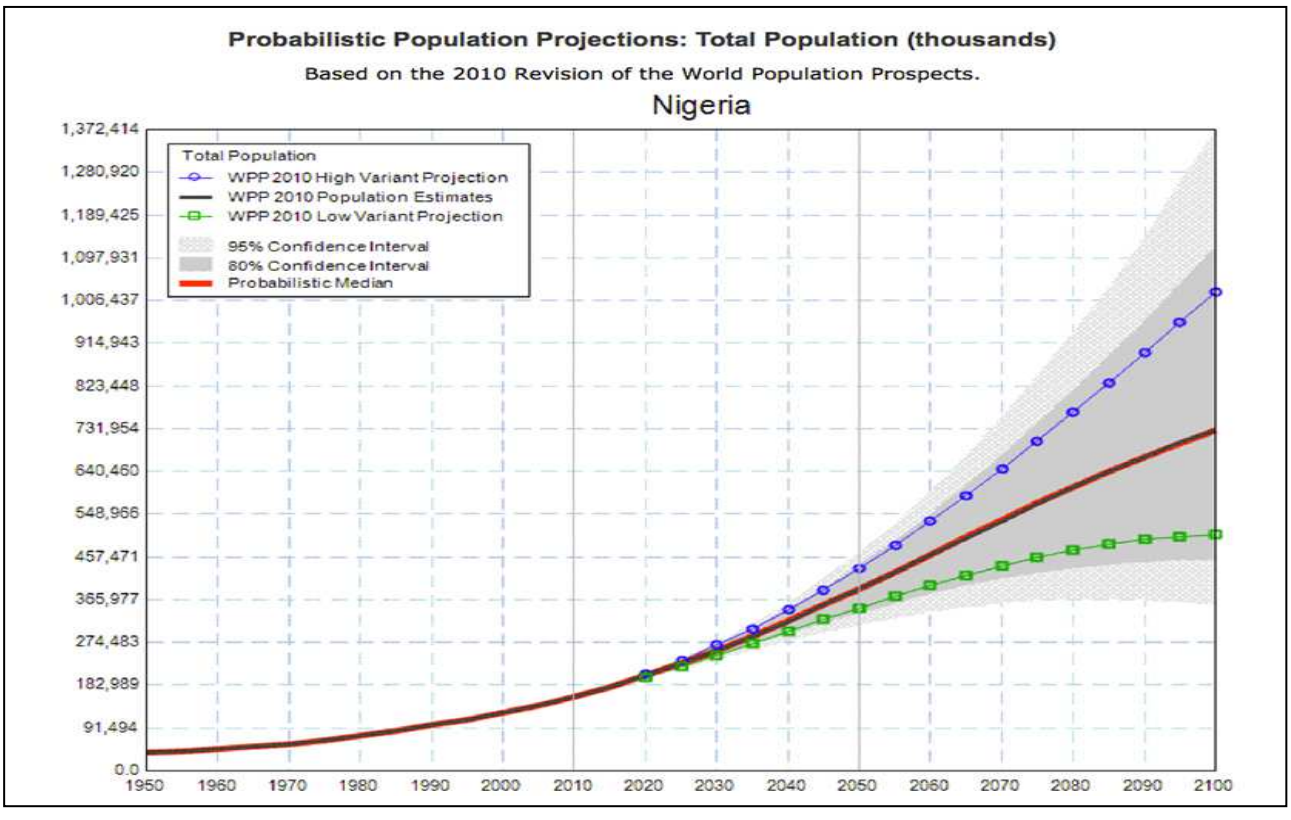
This is really the crux of the problem. How will the total population of the world grow in the future and will there be enough resources on the earth to sustain that population. Some researchers predict not, whereas others predict that the ingenuity of humans will allow us to continue to sustain an ever growing population.
Look at the 3 UN predictions on this graph. Ideally the population would level off at 10-11 billions, the medium estimate. The high estimate would surely bring quality of life problems or worse and the low estimate is only really possible with a population crash.



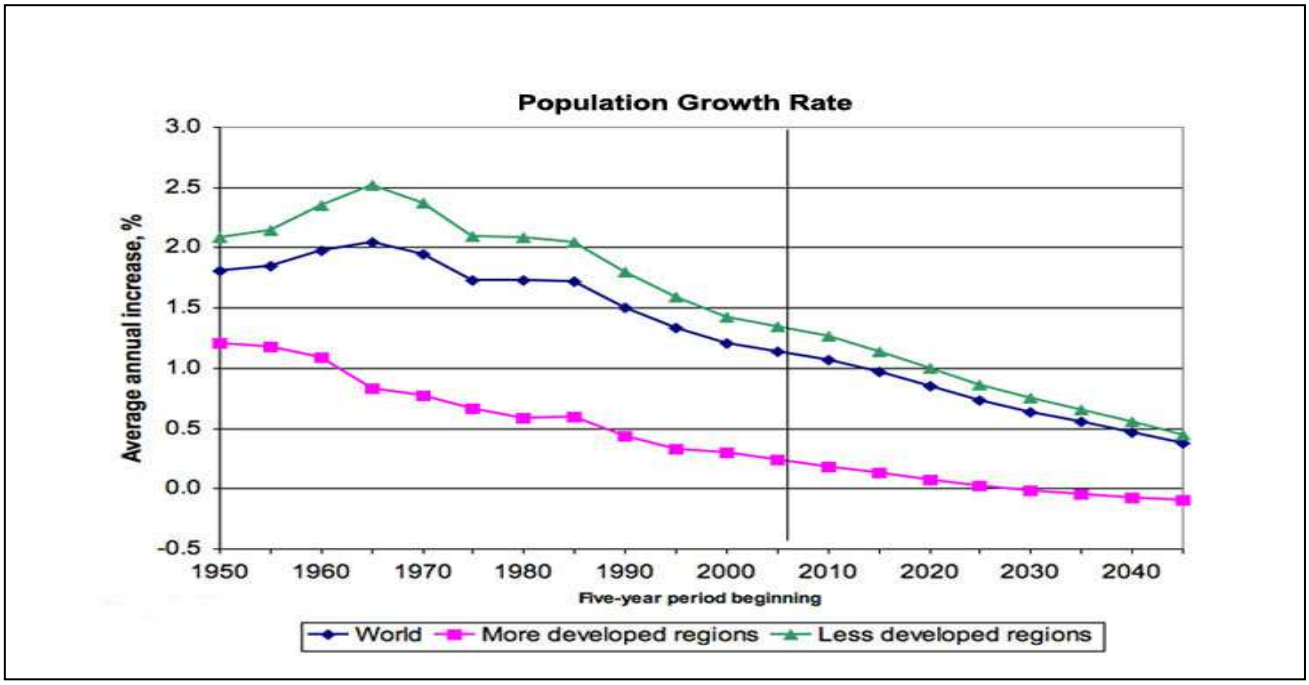
There is a marked difference between Developed and Developing countries. The Demographic Transition for Britain shows that since the late 1800's the Birth Rate has fallen to get closer and closer to the Death Rate, this has gradually reduce the growth rate to near zero with the prospect of it falling to a negative value in the near future.



In less developed countries, in particular Sub Saharan Africa, it is a different picture. In countries such as Nigeria the gap between Birth and Death Rates remains high and populations continue to grow rapidly.



The graph below, however, does show that the growth rates of all countries have generally been falling since the 1970's, and that the gap between the growth rates of More and Less Developed regions has narrowed and will continue to do so in the future. It may be the case that towards the end of this century the global growth rate will fall below 0.5% and perhaps begin to moving towards 0%, and the world population growth may slow or stop.



At the moment, however, the population of the world continues to grow rapidly and it is the high growth rates and high fertility rates of Africa in general and Sub Saharan Africa in particular that are the main causes of this growth. World population will only begin to stabilise when these areas manage to lower Birth and Fertility Rates.