A DEMOGRAPHIC APPROACH OF A SUSTAINABLE DEVELOPMENT

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Table of contents

0. Preface

1. A demographic overview and the limits to growth

1.1. Increase of the world population in history

1.2. The demographic transition

1.2.1. Definition

1.2.2. The components of population growth: fertility, mortality, migration and age structure

1.2.2.1. Fertility
1.2.2.2. Mortality
1.2.2.3. Migration
1.2.2.4. Population age structure

1.3. Population Growth in the South (developing countries) and the North (developed countries)

1.4. Projections of the world population number

2. The population - environment - development issue

2.1. Towards a recognition of population and environment in the development context

2.1.1. Stockholm Conference on the Environment
2.1.2. United Nations World Population Conference at Bucharest 1974


2.2. Environmental degradation and population growth

2.2.1. Theory

2.2.2. What's the problem about

2.2.3. Poverty and environment

2.3. Population growth and economy

2.3.1. Essay on population

2.3.1.1. The declining marginal returns on the land.

2.3.1.2. Mechanisms to check the discrepancy between the rate of population growth and soil productivity.

2.3.1.3. Expectations falsified: Production and population.

2.3.1.3.1. Production

2.3.1.3.2. Population

2.3.1.4. Conclusion

2.3.2. The economic consequences of population growth.

2.3.2.1. The effects of rapid population growth on labor supply in developing countries.

2.3.2.2. Investment in human capital.

2.3.2.3. Rapid population growth, income distribution and poverty.

2.3.2.3.1. Size distribution of wage income.

2.3.2.3.2. Poverty

2.3.2.4. Savings and population growth.

2.3.2.5. Conclusion

2.4. Environmental damage and consumption

2.4.1. Theory

2.4.2. Energy consumption and the North-South dimension.

2.4.3. Global warming

2.4.3.1. Determinants of CO2 emission

2.4.3.2. Consequences of CO2 emission

2.4.3.3. Projected emissions of CO2


3.1.1. Introduction

3.1.2. *The achievement of the UNCED, a legal evaluation!* 
3.1.2.1. Declarations and Agendas... but no Promises.
3.1.2.2. The Biological Diversity Convention
3.1.2.3. The Convention on Climate Change
3.1.2.4. Funding mechanisms and environmental institutions

3.1.3. Conclusion
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.</td>
<td>Population planning and policy</td>
<td>90</td>
</tr>
<tr>
<td>3.2.1.</td>
<td>National Policy</td>
<td>90</td>
</tr>
<tr>
<td>3.2.1.1</td>
<td>How can governments interfere?</td>
<td>90</td>
</tr>
<tr>
<td>3.2.1.2</td>
<td>Resistance to government interference.</td>
<td>91</td>
</tr>
<tr>
<td>3.2.2.</td>
<td>The International Conference on People and Development, (ICPD), Cairo, 1994.</td>
<td>92</td>
</tr>
<tr>
<td>3.2.2.1</td>
<td>The content of the ICPD “Programme of action of the Conference”</td>
<td>93</td>
</tr>
<tr>
<td>3.2.2.1.1</td>
<td>The Preamble</td>
<td>93</td>
</tr>
<tr>
<td>3.2.2.1.2</td>
<td>The mutual relationships between population, economic growth and sustainable development.</td>
<td>94</td>
</tr>
<tr>
<td>3.2.2.1.3</td>
<td>Gender equality, equivalence and the empowerment of women.</td>
<td>95</td>
</tr>
<tr>
<td>3.2.2.1.4</td>
<td>Population growth and structure.</td>
<td>95</td>
</tr>
<tr>
<td>3.2.2.1.5</td>
<td>Reproductive health</td>
<td>96</td>
</tr>
<tr>
<td>3.2.2.1.6</td>
<td>Health, mortality and illness.</td>
<td>97</td>
</tr>
<tr>
<td>3.2.2.1.7</td>
<td>International Migration</td>
<td>98</td>
</tr>
<tr>
<td>3.2.2.2</td>
<td>On the ICPD political background</td>
<td>98</td>
</tr>
<tr>
<td>3.2.2.3</td>
<td>Conclusions and implications</td>
<td>100</td>
</tr>
<tr>
<td>3.2.2.3.1</td>
<td>The significance of the ICPD</td>
<td>100</td>
</tr>
<tr>
<td>3.2.2.3.2</td>
<td>Expected results of the ICPD</td>
<td>101</td>
</tr>
<tr>
<td>3.3.</td>
<td>Conclusion</td>
<td>103</td>
</tr>
</tbody>
</table>

Appendices

1. Bevolkingsprojecties
2. Birth Planning in Sichuan Province, China
4. Barber Conable on the World Bank’s View on Poverty and Population
5. ”Science Summit” on World Population: A joint statement by 58 of the world’s scientific academies
6. The Dakar Declaration on Population
7. Recommendations of the European Population Conference
8. Recommendations of the Arab Population Conference

Bibliography
Our global future depends on sustainable development. “Sustainable development”, a term introduced by the World Commission on Environment and Development (1987), plays, since then, an actual and important role in the development thinking. For instance, the United Nations Conference on Environment and Development of 1992 and the International Conference on Population and Development often refer to the desire of a sustainable future. With a sustainable future in their mind, on both conferences recommendations, and even conventions have been concluded. This is treated in chapter 3.

The actual population growth, poverty, inequality, overuse of energy and industrial production, abuse of the environment endanger or will destroy the Earth’s natural lifesupporting systems, and thus is unsustainable.

To have a better idea of the severity of the recent population growth, chapter I sketches the unusual recent rapidity of population growth, which is tremendous large in history, which started in the developed world and now goes on at the much larger speed in the developing world, and which causes a lot of (environmental) problems.

In chapter II, the problems that population growth causes are treated. First, the recognition of population and environment in the development thinking is outlined through different international conferences that took place. Than, the effects of rapid population growth on the environment and on economy are discussed. Because the realisation of a sustainable development also is a progress of change in which resource use, technological development, these problems and the way they contribute to an unsustainable development are also discussed. Much of our own opinion are interwoven in the text and our interests are uttered through the themes we treated.

The long way to what ultimately became this paper, would not have had a good end without the two computers which were placed at our disposal, some weeks ago. Unfortunately, we have had some problems. Because we made the paper together, transposing the text of one floppy to the other floppy didn’t work out. We had to trouble the teachers of the computer room, who could, after quite a few hours, help us work the problem “garbage” out. Though, the text was changed: no structure anymore, some pieces were missing and the footnotes were at the end of the text. Only the footnotes of chapter three are at the end of each page, were we would have liked the others footnotes to be as well.
1. A demographic overview and the limits to growth.

In the time a reader reads this paper, four hundred women died as a consequence of pregnancy, as much women as a consequence of abortion, and the world population counts 3.600 units more. The world population counts at this moment about 5.7 billion people. The world is in the midst of a "demographic explosion" and, as demographers say, is heading towards catastrophe. "Why isn't everyone as scared as we are?"1, are they asking. Overall, even though the growth rate of the world's population (at the moment ca. 1.7 % and in absolute numbers 95 million people are added annually)2 has been slowly declining since the 1970s, its size is increasing in absolute numbers, faster than ever before. In one year the world population increases with 93 millions of persons.3 The focus of this population growth (90 %) is on the developing countries.

1.1. Increase of the world population in history.

The world population grows exponentially (i.e. a growth that increases with a certain percentage per time-unit), although for millions of years, the growth was very low. In the Paleolithicum, the world population is estimated at 5 millions habitants. The average, annual growth rate was very low (ca. 0.001%).4

In the beginning of our age, man began to use arms and instruments by which the hunter period began, as a consequence of this, the population began to grow faster and there was a population explosion (2 million years ago).

The disappearance of lots of mammals (as a consequence of very good hunting-technics), forced human populations to look for other nourishment sources. With the development of the agrarian culture stage a second population explosion was attended 10.000 years ago. This food-crisis was resolved by the development of energy rich vegetables.

After the valleys of Mesopotamie, the Nile, the Indus, new techniques were seeping slowly through Asia and Europe. One estimates world population at 250 millions people.5

Around 1650 AC, this number was doubled, namely 500 million, although in Europe, the population was behaving very irregular. For instance, in the period 550 till 950, there was a demographic regression due to the first fits of the plague, to the assaults of the Muzelmen, the Huns and the Normen. There was a population growth between 1000 and 1348. 1348 was the year of the big catastrophe: the plague reduced the European population with 40%.6
Since the beginning of the Industrial Revolutions, about 200 years ago, there was a strong acceleration in growth of the world population: a third (and probably the last in history) population explosion. The deforestation in combination with the increasing population pressure (due to improved agriculture-technics), contributed to the increasing use of more fossil fuels. This new kind of energy is a basic factor which leaded to the population-explosion of the industrial stage. Around 1800 the world existed of 1 billion of people, one century later, this number was doubled (1928). It took only 46 years to reach the next 2 billion people (1974), and the number of 6 billion will be reached in another 22 years (1996).

The causes of a population explosion always focus on the demographic transition. Although other factors (Ecological, individual, social, cultural) also play a role. Children, for instance, have, in history, particularly been produced because of the positive effect on well-being they had. Older people depended on their children for 'economic security'. This individual survival function the children had, dropped because of a substitution of a traditional familiar production mode into a capitalistic or socialistic production mode. Children are also valued for their labor and for the possibility that one or more of them may be exceptionally talented ("the lucky dip").

Large families were often strengthened by ideology or society, and still are. Nowadays, some religions oppose the kind of population policy governments are leading. Governments preach birth control, family planning,... while we see now that the muslim and catholic religion form a joint front against any kind of anticonception, birthcontrol,... (see infra).

Figure 1: Increase of the world population in the course of the human evolution.

Source: CLIQUET, L., ibid., 14.
The evolution of the proportional annual growth is striking in historical perspective. Figure 1 shows the increase of the world population in history. Before the Modernisation, the growth was below 0.1% a year, which resulted in a very slow absolute increase of the world population. It took 4 million of years before humanity counted 2 billion of people, but only 46 years to reach the next 2 billion. With the Modernisation, the annual proportional growth rate increased very strongly, and reached its maximum of 2.1% in the second half of the sixties. This means that the world population needed only one generation to double the number of people. In the seventies, the proportional annual growth decreases to 1.7%.
1.2. The demographic transition

1.2.1. Definition

Demographers use the notion of "demographic transition" (see figure 2) to explain world population trends. The demographic transition exists of 3 stages.

Figure 2: The demographic transition

In the natural stage, mortality and fertility are relatively high. For a very long period and for the greatest part of the world, annual fertility and annual mortality amounted about 40 ‰. Despite some fluctuations of the number of population on different places, the average growth of human population (of millions of years ago up till now) is very close to a zero growth, 0.02%. At this tempo, population doubles every 3500 years. Societies are considered to be a "primitive social organization".

When the mortality is declining while fertility remains high, this results in a rapid population growth and this is the first stage of the demographic transition.

In the second stage, fertility is reacting on the mortality number and is also declining. In stages one and two, society is considered as being in transition, "transitional social organization". The longer a society remains in stage I and II, the larger its population will be.

In the third stage, mortality and fertility are stabilized at a very low mean level. Stage III is the "modern stage", and is characterizing societies of the First World, where mortality has stabilized at a relatively low mean value, fertility is approaching the level of mortality, and a stationary population size is possible in the near future.

source: POURSIN, J.-M., ibid., 82.
The demographic transition began in England (ca. 1740), and was followed by the rest of Europe. The 17th century is the century in which exploitation models were getting perfectionistic, and in which inventions took place in all kind of disciplines. The agricultural revolution took place, which was a condition for an industrial revolution.

Societies can always be considered as being in one of the three demographic stages. Countries in stage three, the end of the demographic transition, include those of North America, Europe, the Soviet Union, Japan and Australia. Stage three supposes a growth which is equal to the 'average, every time- growth' (which is 0.02%). This is incorrect, the growth in those countries still amounts 0.3 %, which is 15 times 0.02. Almost all of the developing countries are in stage 1 or 2.

Most of the Third World countries are stucked in stage I and II. Conditions for reaching stage III would not be present in these countries. Mortality has declined with help from outside agencies such as World Health Organization (WHO). Fertility however remains high. Indigenous institutional causes of the mortality decline in the Third World are absent, the agrarian economic structure, extended family systems, and traditional values and beliefs remain intact, which continues to yield high birth rates. A lot of sociologists seem to argue that societies, if they want to reach stage III, must have the same sociological conditions comparable to those in England. These conditions include changes in the economic structure of society caused by industrialization and increasingly efficient agricultural production, a complex division of labor with more specialization of occupations, less need for large families as farming gives way to urban economic opportunities and expanding employment opportunities for women outside the home.

Though, by some theorists, especially radicals, the demographic transition theory has been rejected. Frank for instance argues that "transition theorists suggest that Western industrial values and social organization will somehow diffuse into societies during Stage I, thus changing people’s roles and instilling values for small families. However, the theory fails in the fact that the problems of dependency and the absence of indigenous institutional development that is necessary for Third World residents to gain control of economic and political structures in their own are overlooked; The theory of the demographic transition also fails to specify how long societies will remain in Stage I and II or precisely what kinds of social changes are necessary and sufficient for triggering the transition to Stage III."

Radical analysts argue that the economic development and demographic transition of the center occurred at a time in which there were neither dominant competitors in a world capitalistic market nor extreme population pressures. The periphery today enjoys no advantage.

1.2.2. The components of population growth: fertility, mortality, migration and age-structure.

The evolution of the population is determined by the fertility, mortality, migration and age-structure. We will go deeper in these components, and compare each component with its evolution in the developed and developing countries.
1.2.2.1. Fertility

Children can only be born by women in the reproductive age span (usually assumed to be 15-49). Within this age span the intensity of fertility, that is, the magnitude of age-specific fertility rates, fertility usually shows a pattern of a relatively fast increase up to the modal age of childbearing followed by a slower decrease. The fertility rate of the world is declining since the seventies.

In the developed countries, fertility is slightly under replacement-level. Some European countries such as the Federal Republic of Germany show no sign of an increase in fertility towards an net reproduction rate of one.18

In the developing world, between the early 1960s and late 1980s -in only 25 years- the total fertility rate fell from 6.1 to 3.9 children per woman. Differences in fertility rates among countries and regions are much larger than the differences in mortality rates. While in East-Asia fertility dropped by almost 60 % to close to replacement level during the last 25 years, in sub-Saharan Africa fertility has remained at about the same level. Latin America has seen a fertility reduction of 40 %, and in South Asia, the Middle East and North Africa, fertility has fallen about 26 %.19

In countries with a high fertility and where the population is extremely young, the number of births might even further increase in a situation where fertility or the mean number of children per woman had already decreased. This is because increasingly large age groups continue to enter the reproductive age and this might easily override the effect of a reduced fertility per woman. Demographers call this phenomenon the "momentum of population growth".20 For example, even if Kenya would reduce its fertility level from currently above eight children per woman to the replacement level of slightly over two children in the next few years, the population would continue to grow far into the 21st century.

The difference in fertility rate between the developed and developing countries has decreasing since 1950, nevertheless woman from developing countries still bear two children more than women from developed countries.

1.2.2.2. Mortality

The means by which mortality declines, vary according to the structure of economic institutions in society and the consequences of the economic structure for population distribution. Three principal reasons are given for the mortality- decline :

1) a change in germ virulence or potency. (but there is little evidence for this)

2) the development of preventive and curative medical treatments. Although medical research suggests that in some countries of Europe, the death rate declined before the causes of and medical cures for specific contagious diseases were known. Thus, for the West, medical improvements are not really determinant in mortality-decline. On the other hand, in Third world countries, mortality declines have occurred since World War II as a result of assistance from outside agencies,
of a mass mortality control from the developed countries (which exists in medical help),...

3) institutional changes. And again these changes occur(ed) differently in developed and developing countries. Industrialization in de developed countries and changes in the economic institutions of these countries, resulted in urbanization, and created improvements in urban sewage disposal systems, street cleaning, garbage collection and the centralization of public water supplies. These efforts improved the health of European populations and contributed to the demographic transition in developed countries, However, the Third World didn't know an indigenous institutional change which would be able to create a mortality decline. For agrarian economic structure, extended family systems, and traditional values and beliefs remained intact. Thus, developing countries and developed countries had, up till now, a different demographic evolution.

Mortality has declined from 19.7 to 9.2 per 1000 people between 1950-1955 and 1990-1995. Mortality of the developed nations declined till 1965-1970, and from than on mortality was stable (9.5/1000). For the beginning of next century, one estimates a slight increase to 10.0 people per 1000.

The developing countries are having since the fifties a strong decline of mortality (from 24.4 to 9.1/1000). Infant mortality was decreasing since 1950. Though the gap in infant mortality between developed and developing countries has increased during the second half of the 20th century. For example, in 1950 infant mortality in developed countries was 60/1000 in developing countries 180/1000 (=X3). Now infant mortality in developed countries amount 15/1000, in developing countries 75/1000 (=X5).

In the developing countries, mother mortality is one of the most important causes of female mortality in their fertile period. The World Health Organisaton estimates mother mortality at about 500.000 a year, and 90 % happens in the developing countries. Africa has the highest mother mortality, (600/100.000), Asia has 400/100.000 and Latin-America 200/100.000. In the developed countries, the number is around 10/100.000.

The rapid dispersion of AIDS is alarming. The disease is most spread in Africa, particularly in subSaharan Africa ( Uganda and Zambia are most infected). On the other hand, the effect of AIDS on the African population is merely small. For the African nations where the seropositive population is estimated on more than one percent, the doubling time will only be delayed with one year (22,3 years in stead of 21,3 years).

1.2.2.3. Migration

Migration is important for the dispersion of the population, but not for the size of the worldpopulation. There are two types of migration, internal (urban-to rural, rural-to-urban, rural-to-rural and urban-to-urban) and international immigration.

Over the past five years, the gap between the rich North and the poor South has widened considerably. This, coupled with the profound, uncertain and sometimes turbulent political and economic changes taking place in the developing countries, have made the North, more than ever before, extremely attractive to
migrants from the South. Accordingly, the number of migrants from the South to the North has increased dramatically. International migration is a common problem of the developing countries and developed countries. The North faces immigration problems such as the economic and cultural integration of the immigrants. On the other hand, the South is confronted with a "brain drain". For the countries of origin, the remittance (send back by migrants to their own countire) are economically important as a component of the national income. In 1989 the total of these remittances exceeded the revenues from development aid.

On the other hand, South-South migration has also increased, especially to the newly-industrialised countries of South-East Asia (the oil-rich states of the Gulf remain attractive, although much less so than before).

If 1975-1985 was the decade of the Vietnamese boat people, the 1990s is proving to be that of the war refugee. Conflicts in Liberia, Somalia, Angola, Bosnia, parts of the former Soviet Union,... continue to send waves of refugees across borders into neighbouring countries.

Internal migration results in an increase of the urbanisation in the world. In 1990 43% (in 2025 this number is estimated at 56 %) of the world population lived in urbanized areas; in developed countries is this 73 % and in developing countries 34 %.

Rural population is also increasing, due to the evolution in the developing countries. Although, the growth in the developing countries is in a constant slackening. The growth numbers of the rural areas in the developed countries are for four decennia negative. In 2015 rural population growth will end and the growth number in whole the world will be negative.

1.2.2.4. Population age structure

The population age structure depends mainly on the stage of the demographic transition the population is in. The demographic transition changes the age structure of population from a young to an old distribution. Fertility decline reduces the proportion of children while mortality decline raises the likelihood of survival up to old age.

The changing age composition of a population in turn has important policy implications. In several Western European countries, political parties are started. In the Netherlands and in the Flemish speaking part of Belgium elderly people have organized themself in a political party and had a lot of succes in the recent national and local elections. The figure below show the changes that took place during 1950-1990 and as forecast for the period 1990-2025 in the age composition of the world population and the more and less developed regions.

In the nations where the demographic transition has finished, there is a growing number of older people, and a decreasing number of younger people. Countries in the beginning of the transition have a very young population, this is the case in Africa and particularly the subSaharan countries. Due to declining mortality levels and the persistence of high fertility levels, al large number of developing
countries continue to have substantial proportions of children and young people in their populations.

Over the next 35 years, the global youth population will experience the fastest growth in history. The vast majority of this growth is expected to take place in Southern Asia and Africa, in countries considered among the least developed in the world. Nations which knew in the past decennia a substantial fertility decline, are now in the intermediate stage and have a decreasing young population and an increasing older population. Next century, population will grow older. For the projected speed of relative increase of the world’s elderly population, is substantially faster than that of the world’s child population.

Figure 3

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<td>202</td>
<td>275</td>
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<tr>
<td>World</td>
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<td>318</td>
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<td>318</td>
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Source: NIZAMUDDIN, M., ibid., 56.
Effects of wars and disease on population age structure tend to be less than usually expected. For the world as a whole (see figure 4) the effect of World War II is hardly visible and even for Central Europe the effect is only significant in a few age groups of young men at the time of the war. The major fluctuations visible in Europe were induced by fertility changes. The notch in the world’s age structure that originated around 1950 and runs diagonally along the cohort line has little to do with the War; it is the effect of the post-war acceleration of growth rates due to the steep decline of infectious diseases and some increase in fertility.  

Figure 4: Observed and projected age structural changes of the world population.

![Figure 4](image-url)

World Total, 1950–2025

**Figure 14.2** Observed and projected age structural changes of women, 1950–2025.

*Source: UN Population Division.*

1.3. **Population growth in the South** (developing countries) and the **North** (developed countries).

We have already shown that the demographic transition and the population growth didn’t pass equally in the developing and developed countries. Even the components of the world population growth (fertility, migration, mortality, age structure) passed differently. Now we will focus on this topic.

First of all, we would like to pay attention on the words 'developing' (south) and 'developed' (north) countries. The North is supposed to be developed, the South is supposed in 'developing' stage. These terms are some decennia old, and don't fit with reality anymore. In the North, there are differences between western industrial countries en the former Eastblock (Eastern Europe). Some countries of the South have already walked past the Eastern Europe countries. (By comparing the economic growth, income per capita, mode of industrial production).

Between the countries of the South, there are also differences in grade of development, income, consumption. One can make following distinction:

- **The New Industrialized Countries** (NICs) knew an accelerated industrialization and economic development. They consist of Argentinia, Brasil, Mexico, South-Korea, Taiwan, Hong Kong and Singapore. Their largest trump is the cheap labour forces.

- The countries in an intermediate stage are in an economic uncertain situation. Their export of raw materials depends on the price-fluctuation of the worldmarket. This group exists of the Maghreb countries, Peru, Chili, the Antills, Syria and China.

- A third group are the Oil Producing Export Countries (OPEC). They belong to the richest countries of the world, but because of the social inequalities in these countries, they are considered as belonging to the developing countries. This countries are Saoudi-Arabia, Bahrain, Oman, Libia, United Arabian Emirates.

- The last group are the less developed countries. One can find them to the south of the Sahara and in Asia.

So if we speek, further in this paper about developing and developed, we have to keep in mind the regional differences between both themselves.

If we compare the demographic transition of Europe with Asia and with Africa, one can see the difference. Europe’s demographic transition was a long-drawn-out affair which took more than one or two centuries. So the decline in the birth and death rates was very slow, giving time for the adjustments which resulted from it. In the period 1970-1975 till 1990-1995, the percentual annual growth in the developed countries decreases from 0.86 % till 0.54 %.

Asia's demographic transition was faster and earlier than Africa's. In Africa, the spectacular decline in the death rate over the last 40 or 50 years was neither accompanied nor followed (far from it) by a similar decline in the rate of birth and fertility, such that, African nations had to cope with increases of more than 3 % per annum for a long period, with only one or two managing to get the figures down. The percentual annual growth in Latin-America and Asia have declined, they amount respectively 2% and 1,9%. Africa is the only continent where the percentual annual
growth increases (3 %). Nevertheless, the population in most of the developing countries will keep on growing, despite the further decline of the procentual annual growth. In absolute numbers, population in Africa will grow with one billion in the year 2025, in Asia with 1.8 billion (400 million in China, 550 million in India), in Latin-America with 260 million. Around 90 % of the annual additions to world populations is taking place in the developing world. The proportion of the world's population living in the developing world increases from 75 % in 1985 to an estimated 86 % in 2100.

In the developed countries, population is estimated to grow with 200 million people. (see figure 5)

Figure 5: World population growth in the different regio's.

Figure 2.2: World population growth.

1.4. Projections of the world population number (see Appendix 1)

If stability will cross human's future path, not all different goups of people will arrive at a certain population level at the same time, because the starting point of growth was not similar and growth conditions which lead to the equilibrium are floating. At the moment we all live in the mid of the take-off and wonder when the balance will be attained. (cfr. supra)

If the fecundity would come to replacement-level in 2100, the world population would be stable around 2200.31 Till the midst of next century, the world population would increase with 89 %, and will count 10 billion people. The next 50 years, (2050-2100), world population would still increase with 12 % and amount 11,2 billion people, and then again (2100-2150) world population will grow with 3 % and amount 11,5 billion of people (scenario B see table below).

figure 6: The optimistic, moderate and pessimistic variant of the future of the population growth.

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Replacement Population</th>
<th>Stable Population</th>
<th>Projected Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-2005 (A)</td>
<td>5.9 milliards $^1$</td>
<td>8.4 milliards $^1$</td>
<td>11.1 milliards $^1$</td>
</tr>
<tr>
<td>2020-2025 (B)</td>
<td>8.4 milliards $^2$</td>
<td>11.2 milliards $^2$</td>
<td></td>
</tr>
<tr>
<td>2040-2045 (C)</td>
<td>12.0 milliards $^3$</td>
<td>15.1 milliards $^3$</td>
<td></td>
</tr>
</tbody>
</table>


A highly influential modern formulation of the pessimist position (scenario c) asserts unreliability of linear extrapolation from past experience to the future by noting the apparent suddenness with which exponential growth approaches a fixed limit. In this context, there is often referred to a (beautiful) French riddle:\textsuperscript{32} Suppose you own a pond on which a water lily is growing. The lily plant doubles in size each day. If the lily were allowed to grow unchecked, it would completely cover the pond in 30 days, choking off the other forms of life in the water. For a long time, the lily plant seems small, and so you decide not to worry about cutting it back until it covers half the pond. On what day will that be? On the twenty-ninth day of course. You have one day to save your pond. But how is it to be ascertained that we are on the twenty-ninth day and face the last chance to "save the pond"? Diagnosis is a simple matter if what is required is to look at a backyard lily pond, but is clearly less obvious in sizing up the state of the global population.

A noted optimist, Herman Kahn, also impressed by the relative scarcity of poeple, wrote, speculating on limits to population growth during the 'next 200 years': "There is plenty of room in almost all countries for everybody to have a suburban lifestyle. For example, in such places as Holland, Bermuda or Westchester County (all of which are considered almost ideal areas in which to live) we find that population densities range between 1.000 and 2.000 per square mile. This means that in 10 percent of the United States we have enough room for from 300 to 600 million people, and thus we have 90 percent of the land left for recreation, agriculture, industry and various other purposes. This conclusion even applies to the more populated countries in Asia, where the population densities are not unduly high.\textsuperscript{33}

As a final conclusion to this first chapter we want to state that we always have to keep an eye on the fact that most of the quantitative projections are based on assumptions. On the short period projections give adequate informations and can be offered with confidence only for periods of less than two decades.\textsuperscript{34} However, it is difficult to predict population issues of a period over 25 years. Some revealing calculations and meaningful comments can be made about the outlook for the next to two generations but no 50-60-year forecast can get most of its ingredients right. Thus, demographic prognostication is relatively robust for the short and medium-term, yielding usable forecasts for the next 5 to 10 years. Beyond the time span, reliability of population forecasts rapidly decreases and provid virtually no information at all on population 100 years hence.\textsuperscript{35}
FOOTNOTES

6. Ibid., 22.
7. CLIQUET, L., ibid, 34.
9. A population-explosion was (demographically) caused because of the fact that the decline in the mortality was not immediately followed by a decline in fertility. (In others words, fertility stayed high.)
12. HUMPHREY, C., and BUTTEL, F., ibid., 64.
13. POURSIN, J.-M., ibid., 73.
14. Ibid., 74.
16. Ibid., 67.
17. Ibid., 80.
22. CLIQUET, L., ibid., 24.
23. Ibid., 26.
26. NIZAMUDDIN, M., ibid., 56.
27. The party = W.O.W., 'Waardig Ouder Worden', which means 'Growing Older in Dignity'.
30. NIZAMUDDIN, M., ibid., 56.
33. Ibid., 220.
35. TEITELBAUM, F., and WINTER, J., ibid., 238.