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1. CARRYING CAPACITY, POPULATION AND SUSTAINABLE DEVELOPMENT: LOCAL APPROACH IN A GLOBAL VIEW

1.1. HUMAN CARRYING CAPACITY CONCEPT

Biologists and ecologists frequently apply the concept of "carrying capacity" to the issue of population pressure on the environment.

Carrying capacity is then by definition the largest possible number of any species which a habitat can support for an indefinite period of time. If this maximum sustainable level is exceeded, many times basic resources begin to become scarce and some time later the habitat will experience the decline in its population.

If we apply this concept to earth as a habitat, and to human as a specie, it is obvious that the corresponding carrying capacity should depend, at least, on the followings factors (see also the Figure 1.1.):

The number of people on earth, the natural resources they need in order to survive, the waste they generate and subsequently dispose of by means of the various natural sewage systems (the soil, the sea, the atmosphere, etc.), the technologies (tools and systems) they employ to exploit the habitat, and the species' social organisation and its capacity and methods for facing the emerging intrinsic and extrinsic challenges and threats, etc.

Figure 1.1.

The question which is hidden in the previous paragraphs is "how many people can the earth support?", and finding an answer to it is an extremely difficult and complex task, for there can be no single or definitive answer. This is true, simply because any answer must vary over time.

For example, it is clear that the earth can support varying numbers of people, depending on certain choices we make. These choices will include which resources we decide to use and which needs, or whose needs, we decide to satisfy, and also just how we manipulate these resources technologically.

However, the fact of the matter is that the very concept of resource must itself depend on the available technology, and technology will obviously go on developing. The industrial technological revolution was one element that Malthus underestimated.

Nevertheless, the question is important, and will always be important. Its importance at present is further heightened, especially if we express it more concretely, as follows: How many people can the earth support and for how many generations?

According to reference [B.4.7.], since the middle of this century, there have been three main trends -all of which involved "growth" (some refer to them as the three main contributing factors to ecological decline or the three driving forces)- which have had a direct effect on the excessive pressure which the earth's natural systems have to support at present, and as a result of which we can now clearly see that, probably, there are limits:

a) The world's population has more than doubled from 1950 to the present day.

b) World economic production have increased fivefold, and this has been accompanied by even faster growth in the area of international trade; which, bearing in mind the technologies harnessed and the volume of resources consumed and waste produced in the process, has led to a proportional deterioration in the environment.

c) The increasingly wide gap between rich and poor, that is another cause of ecological decline. The rich, through their huge consumption of energy, raw materials and manufactured products, and the poor because all too often they have to fell trees, work the land or graze herds in such a way that the earth suffers. This global stratification is, of course, a not acceptable ethic situation and, furthermore, a real handicaps in order to solve our problems.

Before continuing any further, it must be said that in the context of the demographic situation we have just referred to, the one conclusion that should not be drawn is that the only solution is the application of demographic control policies in the developing countries.

The problem we are really facing at present is that the world as a whole, (and we say the word "world" consciously, since responsibility is collective -we have always made unquestioning use of raw materials from the developing countries, to mention just one example), is not prepared or equipped to meet even the most basic needs of the population in the developing countries. This is the problem, and not, to cite a frequently heard example, the environmental impact of the growing population in the developing countries, since, at least at present, this environmental impact is insignificant in comparison with the environmental impact which we ourselves give rise to. On the other hand however, this other problem, the problem of the harsh living conditions of the growing population of the developing countries is, in our opinion, the most fundamental problem which humanity is facing in our times.

1.2. MORE ABOUT THE CARRYING CAPACITY CONCEPT: A FIRST GENERAL FOOD/LAND APPROACH

We have seen that human carrying capacity is a concept which can be defined in a simple although potentially misleading way: How many people can the Earth support? According to reference [B.3.5.], there are at least two qualifications which are required if one is trying to find the answer to this question:

a) What kind of life is humankind supposed to lead? What productivity of land is assumed or expected? How much land and of what quality will be available? How long can this level of population be sustained? What would be the impact of sustaining the population over a given time period? The required level of food production, even if sustainable, can have an impact on the environment which is unacceptable on grounds different than providing sufficient food? What kind of impact will there be on the future potential carrying capacity? How biotechnology can affect the answers to the last questions?

b) What are the geographic and political domains for which carrying capacity is considered? Is it the globe, continents, climatic zones, regions, nations, regions within nations?

Another aspect of the carrying capacity notion which one should be aware of is that it is intrinsically based on a realistic view of the future. It is a realistic concept concerned with the maximal potential or the optimal level of food production. Still, it indicates the upper limit on population which cannot or should not be over-stepped. As an example, related with a) item before, of the dependence of carrying capacity on societal choices, technological possibilities and natural constraints, urbanization and industrialization reduce available land, especially during a period of rapid growths of the economy and standard of living. Figure 1.2. [B.3.3] indicates the decline in arable land in Japan, South Korea and Taiwan during a period of rapid economic growth and industrialization. Japan's arable land has been reduced by 100% while at the same time Japan has moved up the economic ladder -from being a devastated country at the end of W.W.II to being an economic superpower-. South Korea and Taiwan are following the same pattern. Even in China, see Figure 1.3. [B.3.4.], which is still in the early stages of industrialization, the impact on arable land is already noticeable.

Figure 1.2.

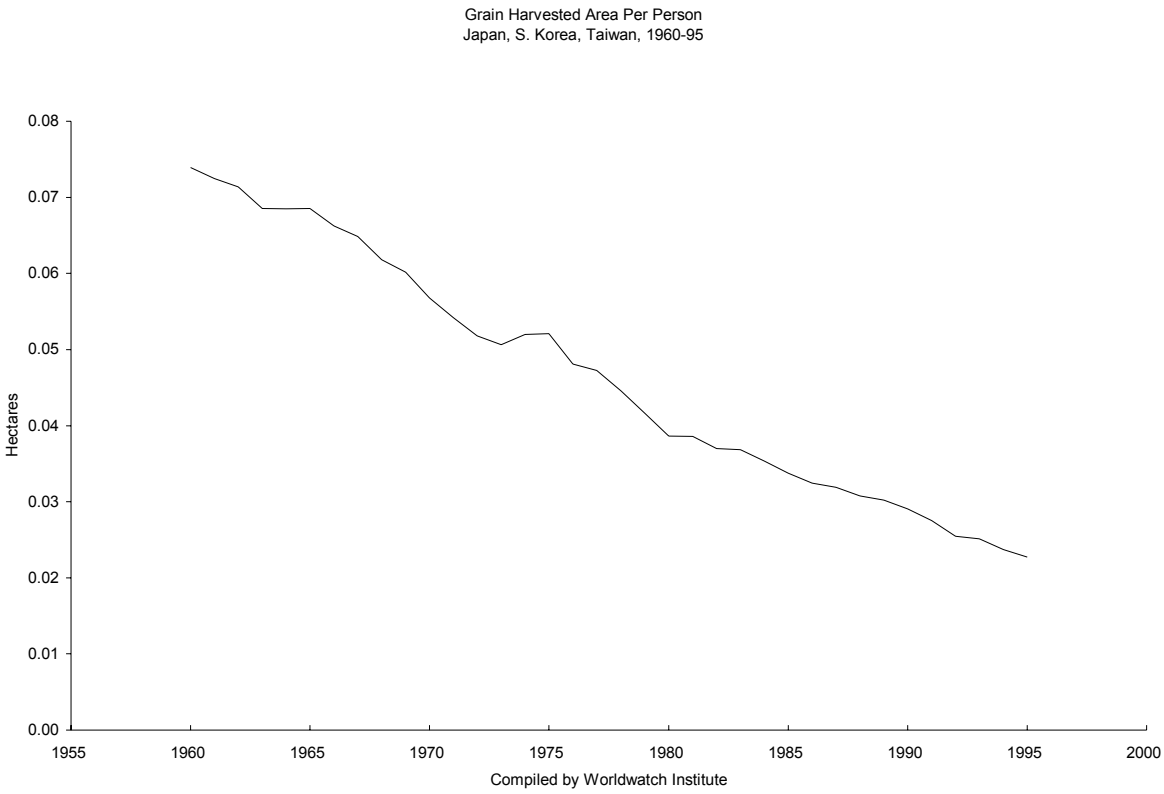
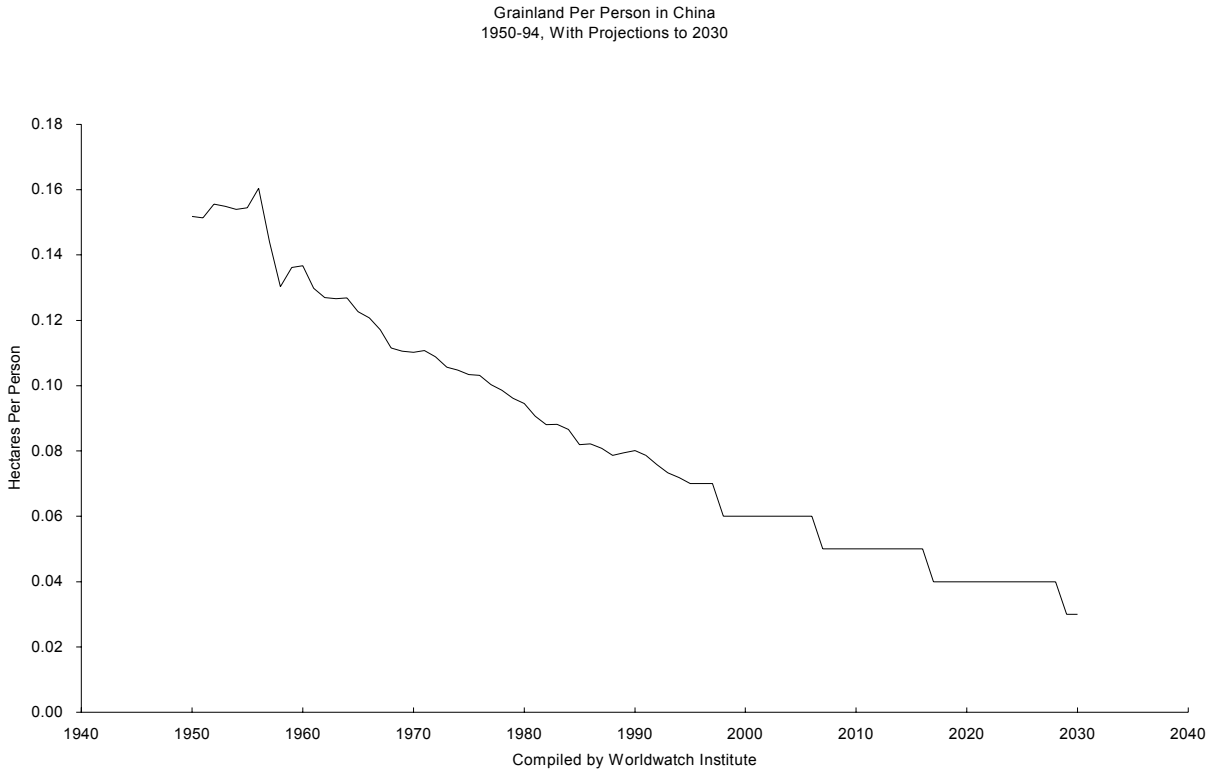


Figure 1.3.



To provide more sense of realism of what is meant by political constraints should also be noticed, for example in reference to item b) before. Carrying capacity is often considered on the global, regional or climate zone levels. Ultimately, though, it is the responsibility of nations to feed their own people. This must be accomplished either by production or food importing. Different nations within a geographic region might have very different carrying capacity levels but, if considered in aggregate, the total region might have more than enough food production potential. However, within the same region (e.g., continent) there could be countries which, for various reasons, e.g., political, cultural, level of development, etc., need not be inclined to view themselves as being part of the region included in carrying capacity determination. A country with a surplus of food might prefer to sell, or even give aid, to a country from another region for economic, cultural, religious or social-political reasons. This can result in a potentially gross over estimation of carrying capacity determined on a regional basis.

Furthermore, if someone argues that in the extreme the food carrying capacity of the globe can be comfortably high enough for the short -or even medium- term future -controversial question-, we need to say that the food production on the plains in North America might not reach in time the food deficient locations in, say, Africa or Asia. This is one of the reasons why the carrying capacity of nations is the proper focus of attention, at least until international arrangements, if it is possible and convenient, for better care of humanity emerges.

Therefore, in this report we will focus our attention on carrying capacity for some selected nations or groups of nations where the concern for population and food production growth appears to be justifiable.

1.3. POPULATION GROWTH AND CARRYING CAPACITY

But we also have to keep in mind that in the not so far future, with the actual tendency of the world population to increase, the food aspect may be one of the most important global problematique.

Justly, in agreement with the most recent book from Lester R. Brown -The Worldwatch Institute-, **Beyond Malthus [**B.3.2.], we can argue that after nearly half century of continuous population growth, the demand in many countries for food, water, and forest products is simply outrunning the capacity of local life support systems. In addition, the ever-growing number of young people who need health care and education is exceeding the availability of these services. If birthrates do not come down soon enough, natural systems will deteriorate and social services will fall short, forcing death rates up.

The following figures, from our simulation and from reference [B.6.1.], show us the trends and the importance of the phenomena.

Figure 1.4.

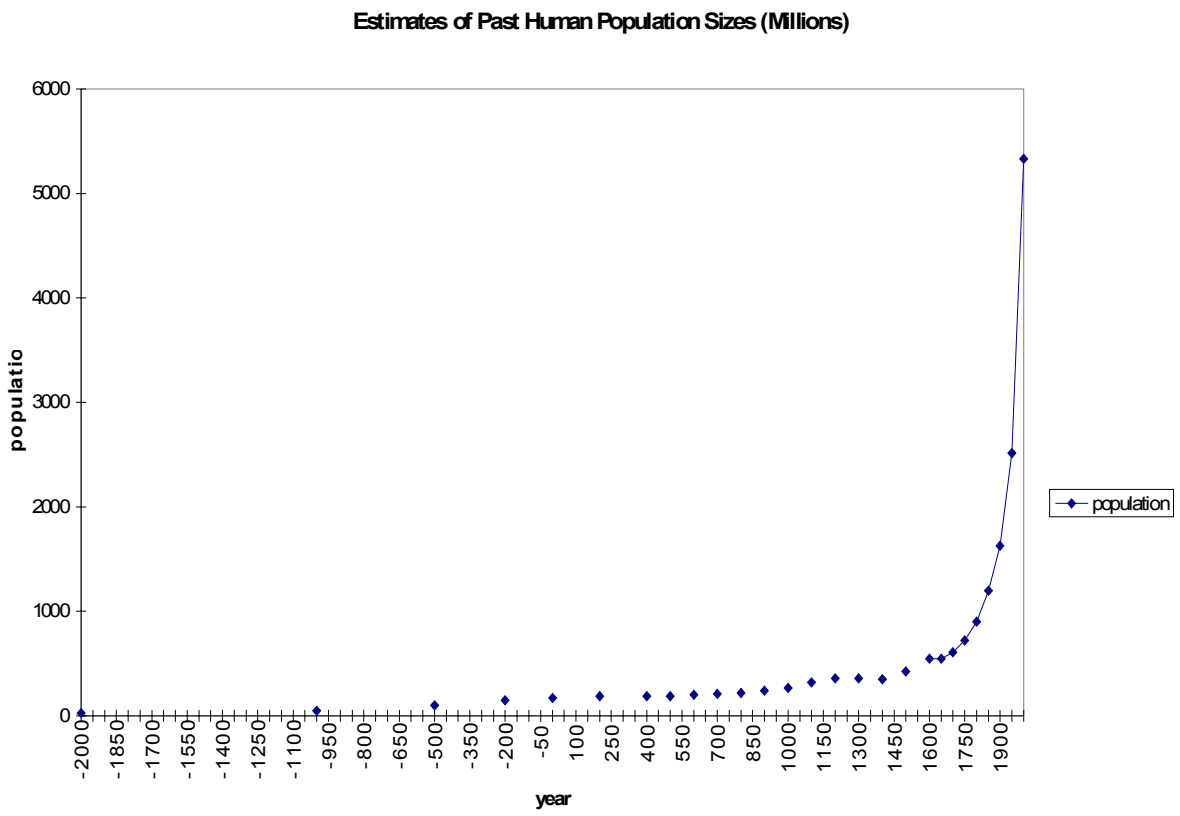
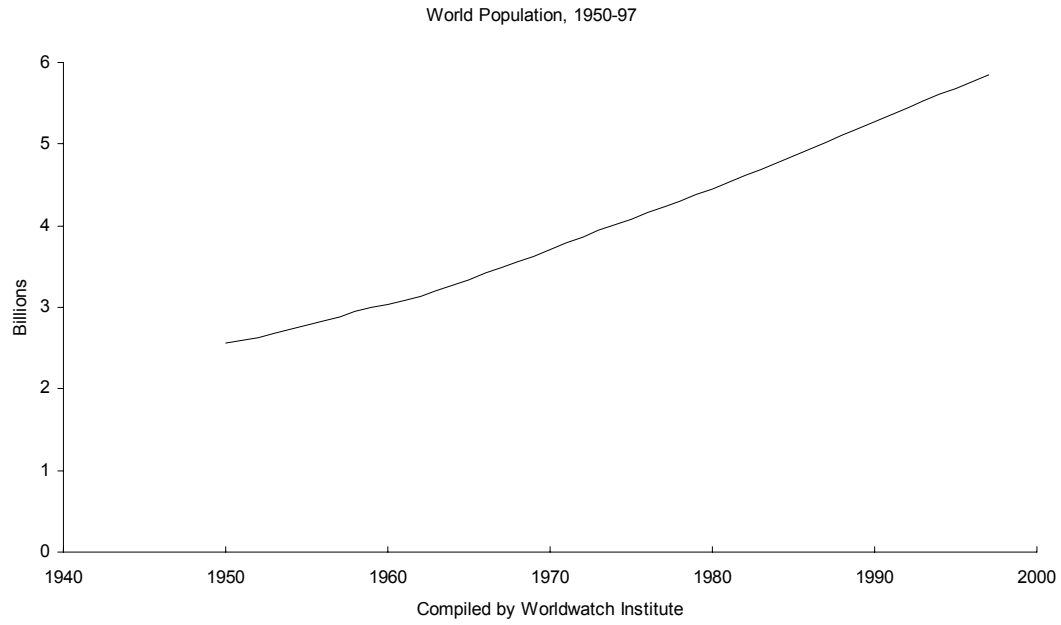
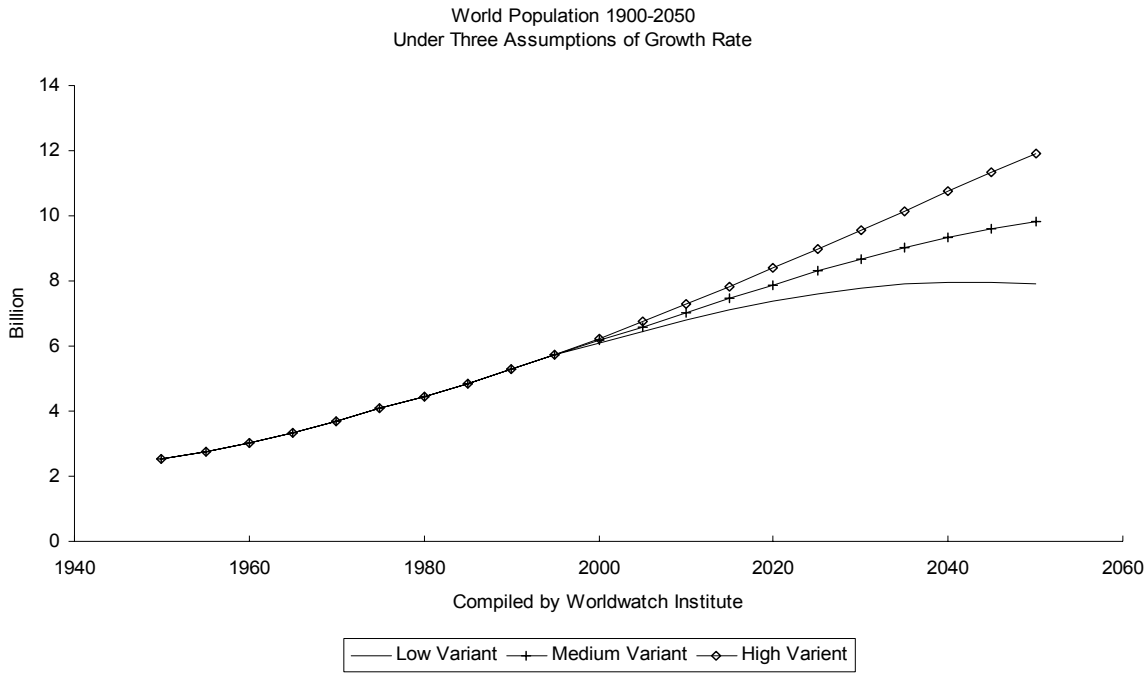


Figure 1.5.



And below is the figure with the three most recent population scenarios for the world according to United Nations; **World Population Prospects: The 1998 revision**; UN, New York 1998

Figure 1.6.



Thus we can conclude that the future prospects in the actual trends in land and irrigated land per capita in the world, could be the following:

Figure 1.7.

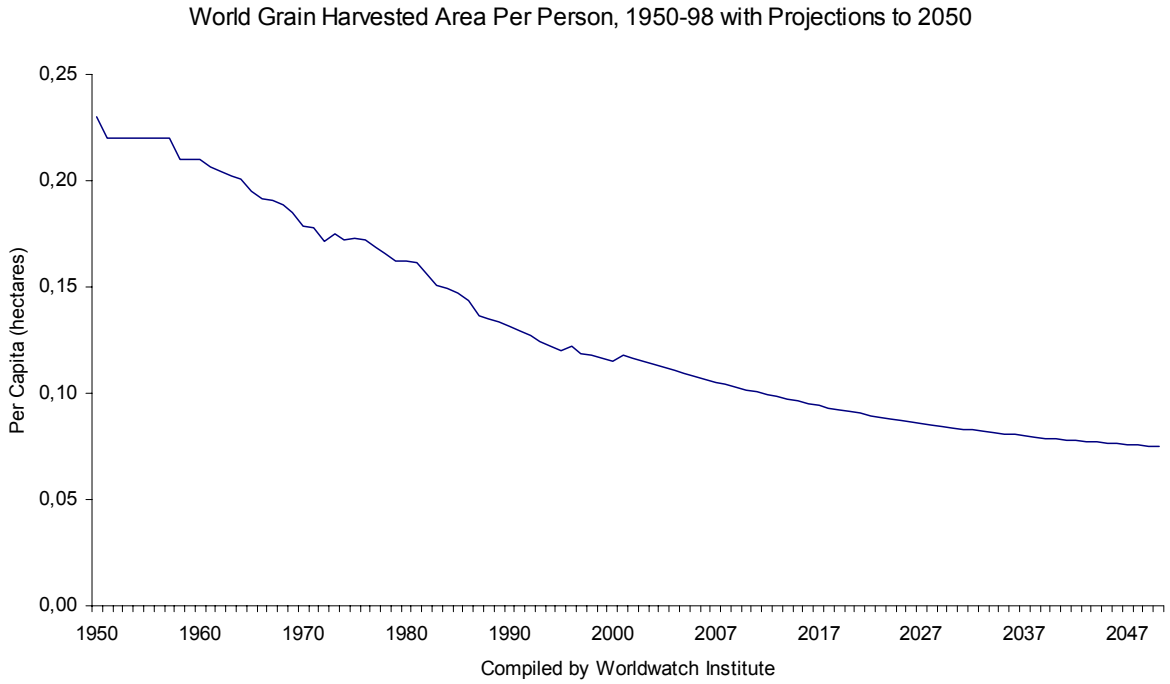
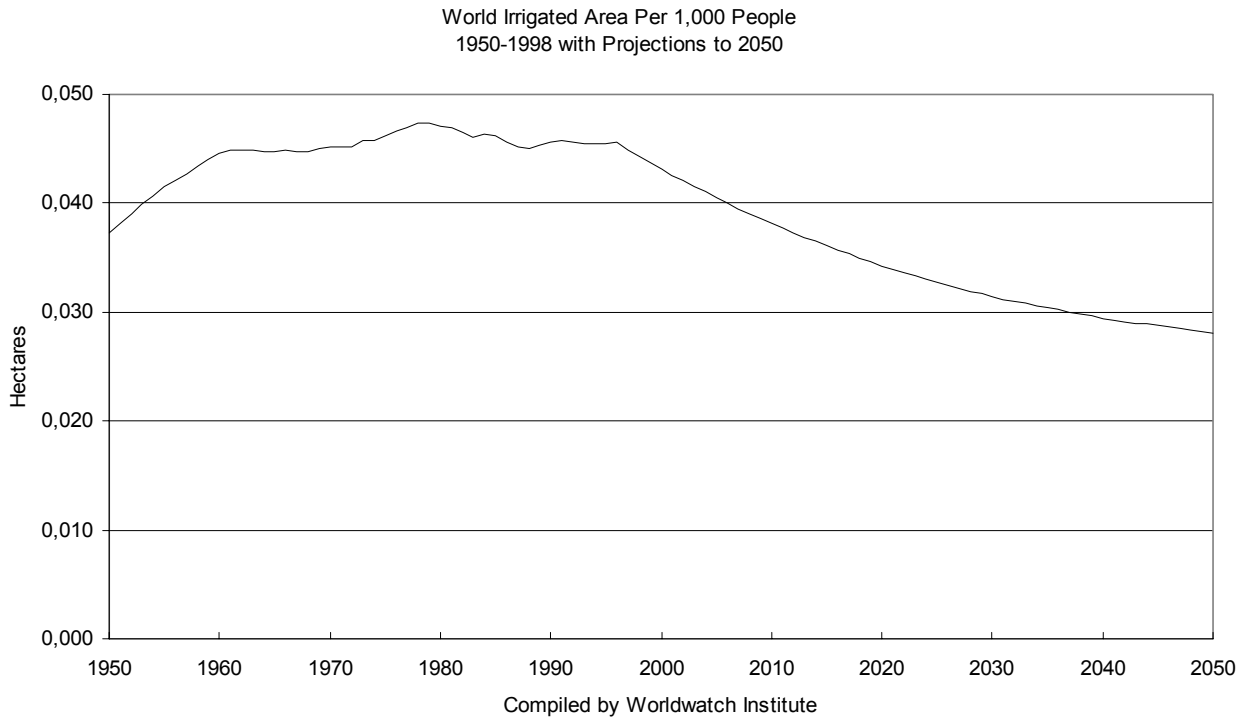


Figure 1.8.



And we want to finish this section by reminding the reader that countries where grainland per person has shrunk to 0,003 hectares, such as Japan, South Korea and Taiwan, each imports some 70 percent of their grain. And that, for example, as Nigeria's population goes from 111 million today to a project 244 million in 2050, its grainland per person will shrink from 0,15 hectares to 0,07 hectares.

1.4. MORE ABOUT THE CARRYING CAPACITY CONCEPT: FROM THE ECOLOGICAL TO THE SOCIAL APPROACH

"How many people can be fed on earth?" This would be the question if we want to be more concrete in our concept. One should ask himself and start to answer by saying: *"Many distinguished writers have studied the question whether food is a limiting factor for population growth. Despite these intense efforts we are still far from consensus. A screening of available literature on estimating the earth's population carrying capacity reveals surprising diversity of results."* (From Gerhard K. Heilig, [B.3.10.]).

In agreement with the same author we can say that the restrictions to hypothetical maximum carrying capacity of the earth are, by order, the following: physical and biochemical, technological, economical, environmental and social & cultural conditions.

The hypothetical maximum carrying capacity, roughly equivalent to what biologists have termed the net primary production, NPP, of the earth. The ultimate limitation of food production is given by the energy conversion ratio of photosynthesis. This is the basic biochemical process by which green plants transform solar radiation into biomass. The NNP is only restricted by physical constants, such as the total solar radiation energy input of earth, and by natural laws that govern the biochemical processes of plant growth. In its most extreme version the measure ignores not only economic, social, cultural and political restrictions of food production, but also technical constraints and ecological feedback mechanisms. It assumes homogeneous implementation of most advanced agricultural technologies throughout the world. But this is impossible in reality. Even with existing agricultural technologies we would need many years before we could use them throughout the world. And furthermore we can imagine the amount of energy necessary to do this.

And in addition to the delays and the viability in technology transfer, we must realize that advanced agricultural methods are primarily available for good-quality soils in temperature climates than for subtropical and tropical irrigation cultures.

In the arid and semiarid zones of Africa, however and for example, we still have traditional pastoral systems which survive quite well provided animal and human

population density remains low. But since the population has doubled or tripled, the social-ecological system is out of balance. We are just beginning to apply scientific methods to the management of arid and tropical soils, and it will probably take years or decades before we have drought-resistant, high-yield crops and livestock.

Current estimates of a global carrying capacity usually ignore the economic dimensions. The earth's carrying capacity in the 21st century will be a matter of economic decisions at least to the same extent as it will be a matter of sufficient natural resources.

Since agricultural and livestock production is embedded into a natural environment, we also have to take into account environmental constraints, such as acidification, soil loss, groundwater pollution, or desertification.

But we must also realize that probably the most serious restrictions for maximal utilization of the earth's population carrying capacity arise from social, political and cultural conditions.

So, now, if we go back to the start of this point, we remember that natural conditions (such as the globe's solar radiation input) and basic biochemical process (such as photosynthesis) ultimately determine the earth's food production potential. But this is just a theoretical exercise.

For all practical purposes we must consider real agricultural-climatic conditions. Four natural resources and conditions directly limit the globe's carrying capacity: land, water, climate and fossil energy.

Another important question is whether technologies will be available that could further increase the earth's carrying capacity? And also, what are the restrictions on and risks for their implementation? But it is not in this direction in which we are interested in this work because we have spoken about the tremendous delays of this kinds of chances in the regions that we want to study. And furthermore these possible new chances must be confronted with the environmental limits.

Probably but, it's obligated to cited here, as only an example of the very important discussion around the biotechnology, Charles C. Mann, **Biotech Goes World**,

Technology Review, July/August 1999, p. 37-44. We can also read [B.2.21.], or [B.1.10.].

We should come back again to the initial discussion of this point that represents the dimensions of carrying capacity. We can conclude that the key for balancing people and food is the speed with which the social, economical, cultural and political constraints are pushed back that hinder people to utilize the full potential of the earth's food resources in a sustainable way.

The carrying capacity of the earth is not a natural constant, it is a dynamical equilibrium, essentially determined by humans actions. The reason for highly diverse estimates of carrying capacity is that human choices determine, to a great extent, how many people can be fed on earth. The estimate number will vary depending on the type of food people will choose to eat and which system of food distribution and trade they will implement. Again this last aspect is far from the objective of our work.

We can quote finally from reference [B.3.6.]: "*determining the long-term carrying capacity of Earth is an exceedingly complex problem. About all we can be sure of now is that, with present and foreseeable technologies, the human population has already exceeded that capacity. It is especially critical to evaluate carrying capacity now because the human population has clearly exceeded local and regional carrying capacities in many parts of the world, as shown by an increasing failure of food production to keep pace with population growth. For the first time ever, moreover, carrying capacity has been exceeded globally. Furthermore, human population pressure is reducing carrying capacity directly through the unsustainable use and consequent destruction of natural habitat and agricultural land*".

1.5. SUSTAINABLE DEVELOPMENT

1.5.1. ABOUT THE CONCEPT

The United Nations Environment Conference which was held in Stockholm in 1972 noted the negative environmental effects of the western development model.

Also in 1972, the Club of Rome report entitled "The Limits to Growth" which was prepared by Professor Meadows pointed out the error of ignoring the limits to development. This concern about the limits which our physical environment imposes on economic development was not new although it was marginal.

Prior to the emergence of the concept of sustainable development, from the early seventies a number of terms were being employed which seemed to anticipate it: ecodevelopment, intensive growth, organic growth (in Professor Mesarovic's second report to the Club of Rome in 1974, reference [B.4.15.]). The term "sustainable development" was introduced by Pearce in 1986. Even before this, "real communism" in the sixties and seventies spoke of the concept of zero growth.

Therefore, although the process is a recent development, in historical terms we can link the birth of the concept to four important challenges of humanity from the seventies: a) the fact that there could be limits; b) the increase in growth and imbalances; c) the increase in environmental impacts; d) the increase in the global and local stratification.

We will now reflect these four aspects at length, both separately and in terms of the great number of interrelationships between them.

The 1987 report known as the "Brundtland Report", which was named after the then President of the World Commission on the Environment and Development, the now well-known Ms. Go Brundtland, made the case for a link between the environment and development as interdependent and equally important, and was the first widely read text to use the term sustainable development.

"The development that meets present needs without damaging the capacity of future generations to meet their own needs"

The term has been criticised as ambiguous and as being open to a wide range of interpretations, many of which are contradictory. The confusion stems from the fact that the terms "sustainable development" and "sustainable growth" have both been used interchangeably, as if their meanings were the same. They are not. "Sustainable growth" is a contradiction: nothing physical can go on growing forever. According to the dictionary, *To grow* means *to increase in size; when something grows it becomes bigger quantitatively*. *To develop* means *to fulfil potential, to achieve a state of greater completeness. When something develops it becomes qualitatively better or, at least, different*. On the other hand, *Sustainable* means *that something can be sustained* and *Sustained* means *maintained*.

Therefore, sustainable development is one development that can be maintained, but this is not necessarily the same as maintaining development.

Perhaps as a result of the possible lexical ambiguity of the term and the fact that the initial Brundtland report opted for economic growth as a means of achieving sustainable development, the term rather than the concept itself was taken on board by a large number of groupings, which were at times quite opposed and contradictory in nature, and indeed now increasingly so. Despite this, we believe that the distinctions we have just drawn and especially the more in-depth analysis we shall carry out later will enable us to see the concept as much more revolutionary and paradigmatic than it seems at the outset.

The concept is basically concerned with needs. We must therefore take a closer look at the question of which needs, or whose needs, if we are to define strategies and approaches to achieve sustainability.

The concept is also concerned with meeting present needs, and therefore it is implicitly involves something which we wish to deal with more explicitly, which is intragenerational solidarity. It is absurd to consider only our own needs, i.e. the needs of just a few people. In this we will clearly coincide with the values and options most closely related with the "left", in the sense of options that favour equity in meeting needs.

The concept is also concerned about the capacity of future generations to meet their own needs, which is clear not to be weakened. Once again, we are in the terrain of needs, but this time, future needs. Therefore the concept also involves, which from our point of view is the crucial point, intergenerational solidarity.

This issue has never received any attention until now. The future of human life on earth was never been so much in danger as it is now, if only for our capacity of self-destruction. The paradigmatic (in the most "Kuhnian" sense) or revolutionary

aspects of the concept lie in the Copernican change which must be brought upon, in our efforts to achieve a higher level of intergenerational solidarity, and the belief that solidarity can be achieved and is worth fighting for in the future.

Recently these ideas were reinforced in reference [B.4.1.].

If the natural limits to the growth of the population and the economy are the limits of the planet's sources of necessary materials and energies, and the capacity of the planetary dumping grounds to absorb contamination and waste, then according to the economist Herman Daly, the "environmental sustainability laws of total insumption (flows of resources and waste)" are:

In the case of renewable sources -earth, air, forests, fish, etc.- the sustainable rate of exploitation cannot exceed the regeneration rate.

In the case of non-renewable sources -fossil fuels, high-purity minerals, etc.- the sustainable rate of exploitation or use cannot exceed the rate at which a renewable source exploited sustainable can replace the non-renewable element (principle of amortisation)

In the case of a pollutant, the sustainable rate of emission cannot exceed the rate at which the polluting element can be recycled, absorbed or sterilised by the environment.

Daly's Laws set out a clear pathway for action which should be incorporated into all areas of our activities, both individual and collective, so as to achieve a form of genuinely sustainable development (based on solidarity). In this case, the emphasis is on resources and waste (the environment) and the perspective is one of solidarity with future generations. But the ideology of this approach is highly applicable to many other situations and perspectives which, we believe, should be incorporated into the body of our definition of sustainability.

1.5.2. HUMAN SUSTAINABLE DEVELOPMENT AND OTHER MORE RECENT CONSIDERATIONS ABOUT THE SUSTAINABILITY CONCEPT

In reality humankind should not be considered outside of the nature but part of the nature itself. Therefore, sustainability has to explicitly include a human dimension. To recognise that interdependence the concept of sustainable human development is introduced as the capability of humans to lead worthwhile lives, which has to be sustained over time, hence the fortune of future generations has to be explicitly taken into account. The second aspect refers to the view that the future generations should not be deprived of the opportunities that the present generation has. But if the present is burdened with misery and deprivation for billions of people one surely cannot consider as desirable to extend the present state of misery and assault on nature to the future. Eliminating poverty and arriving in harmony with nature has to be an essential element of sustainability.

The recent reports of UNDP, references [B.6.3.], are one of the best actual reflections about this concept. They are the answer to Boutros Gali suggestion that the most important and deep intellectual debate in the change of the century should be about the meaning of human sustainable development.

From the other point of view what is increasingly clear is that the global economy "as currently configured", is inflicting serious damage on global life support ecosystems and is probably reducing future potential biophysical carrying capacities by depleting essential natural capital stocks, according to references [B.3.13.], or [B.3.11.]. Goals for global economic development rarely take into account the environmental costs. Economists have "externalized" environmental costs.

In this reference Goodland and Daly define sustainable development as *"development without growth in throughput of matter and energy beyond regenerative or absorptive capacities"*. However they also argue that "*if the world cannot move towards intragenerational sustainability for this generation it will be greatly more difficult to achieve intergenerational sustainability in the future*", meaning that future sustainability will never be possible unless greater attention is given to decrease the income gap between the rich and the poor in all societies of the world.

They define carrying capacity as *"the maximal population size of a given species that an area can support without reducing its ability to support the same species in the future".*

And they separate sustainability into three categories: social, economic and environmental sustainability.

"Economic Sustainability (Maintenance of financial capital; keeping financial capital intact). Economic sustainability means making profit. Industrialization and population explosions are challenges to social and economic sustainability. Economics must change to incorporate all four forms of capital, and work to quantify intangibles and common property resources (air, waters, oceans, etc.). Environmental and social costs must be internalized through new policies and valuation techniques

Social Sustainability (Maintenance of social and human capital; keeping social and human capital intact). The social (and moral) capital is comprised of: Community participation; Intact civil society; Equal Rights; Social Cohesion; Cultural identity; Diversity; Tolerance; Humility; Compassion; Patience; Forbearance; Fellowship; Fraternity; Love; Pluralism; Honesty; Laws; Discipline. Human capital is investments in: health; nutrition; education. Social capital requires maintenance and replenishment of shared values by communities, social and religious groups. Without this "it will depreciate just as human-made capital does".

Environmental Sustainability (Maintenance of natural capital; keeping natural capital intact). The natural capital is comprised of intact ecosystems and ecosystems services (structurally and functionally) comprised of: gas regulation; climate regulation; disturbance regulation; water regulation; water supply; erosion control and sediment retention; soil formation; nutrient cycling; waste treatment; pollination; biological control; refugia; food production; raw materials; genetic resources; and intact land/forest/soils, water/ocean/freshwaters and atmospheric ecosystems. Protecting natural capital will not only ensure sustainable stocks of resources and raw materials for human needs and ensure the maintenance of natural sinks for human wastes, but will also ensure the availability of adequate resources for nature, and that human wastes will not disturb nature. Waste emissions are held within the assimilative capacity of the environment without impairing it. Harvest rates of renewable are kept within regeneration rates".

The authors also made important distinctions between growth and development**.** They argued that development could be sustainable but that growth in throughput cannot.

Following the discussion on human needs, human development, and in general about economical, social and environmental sustainability, then probably we can affirm, with many other authors, that sustainability will demand global and local answers. Globally because it is obvious that the sustainability ought to be achieved in every sense at humanity scale. Locally because the best way to achieve the necessary local contribution to global sustainability is to satisfy the needs as close as possible to the communities and as much as possible with their own local resources. Thus, the best way "to anticipate" the internalisation of externalities is to not externalise. In this sense, it is significant that the economy, for example, should and ought to decrease its exterior dependence and recover its local reinforcement.

1.6. LOCAL APPROACH TO AFRICA (FOR EXAMPLE) IN A GLOBAL VIEW

As we have seen, the food and water availability are the two, and also interrelated, most important things in order to define the practical carrying capacity of a local region.

The demand to estimate human carrying capacity of national and local regions is growing. In paragraph 5.23 of Agenda 21 it is recommended that "*assessment…of national population carrying capacity in the context of satisfaction of human needs and sustainable development, and special attention should be given to critical resources, such as water and land, and environmental factors, such as ecosystem and biodiversity*"

Now for example, the population of Africa is increasing faster than any other region in the world. We will return to this fact later. But the availability of water and the food production in Africa are not increasing. In fact sometimes, or may be often, they are decreasing.

We do not intend to emphasize the necessity to do important actions around this population phenomenon. This is obviously necessary but it is not the goal to insist them here (and we think that wouldn't be the "final" goal of nobody like "itself", except in the global point of view related with the crucial question "How many people can the earth, the whole earth, support?"). The problem is that this region is currently not ready to support more people and if it does, then many problems will arise, perhaps similar to what we have seen in the 90's in Rwanda.

The direction that we are taking here is to try to define policies or line of policies in order to affront this kind of problems in the context of sustainable development background. In spite of the fact that tropical and subtropical areas of the world are not the most productive for agriculture, the opinion [B.2.3.] that everything may be solved by importing food from other more productive countries is not accurate, or indeed false, and impossible for their local economies. Finally this solution is, at least for short and medium term, clearly not sustainable, because it implies, for example, a very high use of energy, at the moment, not renewable, and with many CO_2 emissions related. The problem of the internalization of externalities mentioned before. Or forget the sustainability goal to keep all the natural capitals.
Thus, we insist again that sustainability is a very related view of local and global approaches of the world problematiques. And if the real goal of

sustainable development is to do it possible in the global sense, it is also obvious that it means, in the majority (not in always but) occasions, local and/or sector sustainability like a necessary condition, indeed if this is not enough like a sufficient condition.

Then the question is whether or not Africa and others regions of the world, provide the food themselves. And it is not easy to find the answer in a yes or not sense, but it is very easy if you think in a sustainable way to develop the world. Africa, like every other place in the world, must do, with the real help of developed world, all the efforts that are possible in order to obtain the maximum capacities of his own resources, in a, obviously, sustainable own way.

With this work we also want to show that despite of the very big challenges of the region it also has many potentials to overcome these challenges.

We would like to finish this section before to start with the precise definition of our case study region, saying that we are very close to the report of Michael Renner, Transforming Security, in **The State of the World 1997** from the Worldwatch Institut [B.4.4.]: " *Rather than being a simple case of tribal bloodletting, the Rwandan apocalypse was rooted in a complex web of explosive population growth, several land shortages, land degradation and rapidly falling food production, lack of nonagricultural employment, dwindling export earnings, and the pain of structural economic adjustment. ... Because of population growth and unequal land distribution, large numbers of small peasants are cultivating highly fragile areas, such as steep hillsides and patches cleared out of rain forests, that are easily susceptible to erosion and the soils of which are quickly exhausted. In Rwanda half of all farming took place on hillsides by the mid-eighties, when overcultivation and soil erosion led to falling yields and steep decline in total grain production. ... Average farm size declined from 2 ha per family to 0.7 over the past three decades. ... People whose hopes have worn thin, whose discontent is rising, and whose feelings of security have been stripped away are more likely to support extreme "solutions", and it is clear that some politicians stand ready to exploit the politics of fear. In Rwanda the Hutu leaders in 1994 relied strongly on heavily armed militias. Members of these militias were the people who had insufficient land to establish and support a family. ..."*

But we must also be conscious that this might be only the tip of an iceberg, especially for East Sub-Saharan Africa.