Food Security: Challenges and Outlook

Fondazione Barilla
il tuo cibo, la tua terra
people, environment, science, economy

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il tuo cibo, la tua terra

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Dear Reader,
notwithstanding the extraordinary advances in the field of science and technology, the launch of ambitious international aid programs and the commitments undertaken over the last few decades by the richest countries in the world, the scourge of hunger continues to ravage millions of human beings every single day. People who do not have access to minimum quantities of food or to food with sufficient quality standards, which is necessary to live with dignity. People – men, women and children – who are still beset by hunger and poverty and who wage a hard battle to survive.

There is an incredible paradox: on the one hand, over a billion people suffer from hunger; on the other, almost as many people are overweight or obese. This is a defeat for all of us. The defeat of reason, of the sense of humanity, of the ability to propose credible and effective solutions. And this situation is to be interpreted in the light of a second paradox: there is evidence that today the global food system can produce sufficient calories to provide a healthy daily nutrition to the world population as a whole.

This situation – briefly described in this paper with the help of data, evidence and speculations in order to capture the essence of the challenges facing us – is certainly a result of the enormous complexity of the food access theme and the many imbalances characterizing our time.

However, it is not possible to find an exhaustive explanation for these phenomena without considering the progressive reduction which has taken place in the last fifteen years in the scope of the global and concerted actions designed to promote a more balanced access to food. In fact, once again we have been surprised by the recent severe food crises and by their terrible consequences.

But the true and possibly decisive challenge for the destiny of mankind will occur in the next few decades. The issue of food access has many interconnected variables which are difficult to interpret: population growth, changing lifestyles and food consumption patterns on a global scale, urbanization, the progressive reduction of agricultural productivity rates, climate changes and environmental sustainability concerns, the increase in prices of raw materials and their incredible volatility, the need for better management of scarce resources, starting with water. All rapidly changing and increasingly unpredictable variables. There are no certainties or definitive answers to these problems yet. There are primarily three areas on which to focus our attention: the governance of the whole food production system, the search for new and higher productivity rates in the field of agriculture, and the correct functioning of food commodity markets. However, it is urgent to raise the general level of awareness and attention and to capitalize on the desire to solve and deal with these critical issues. If our new effort is able to attract even slightly more attention to this issue and to raise the awareness of its relevance, then we will achieve our goal.

Enjoy the read!

Guido Barilla

THE VISION OF THE BARILLA CENTER FOR FOOD & NUTRITION

TO OFFER A VARIETY OF HIGHLY SCIENTIFIC CONTRIBUTIONS AND BECOME A VALUABLE SERVICE TO THE INSTITUTIONS, THE SCIENTIFIC COMMUNITY, THE MEDIA AND CIVIL SOCIETY OVER TIME; A MEETING POINT FOR ANYONE WHO CARES ABOUT FOOD, THE ENVIRONMENT, SUSTAINABLE DEVELOPMENT AND ITS IMPLICATIONS UPON PEOPLE'S LIVES.

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THE BARILLA CENTER FOR FOOD & NUTRITION

The Barilla Center for Food & Nutrition (BCFN) is a center of multidisciplinary analysis and proposals which aims to explore the major issues related to food and nutrition on a global scale.

Created in 2009, the BCFN intends to listen to the demands emerging from society today by gathering experience and qualified expertise on a worldwide level and promoting a continuous and open dialogue.

The complexity of the phenomena under investigation has made it necessary to adopt a methodology that goes beyond the boundaries of different disciplines: hence, the breakdown of the topics under study into four broad areas: *Sustainable Growth for Food, Food for Health, Food for All and Food for Culture*.

The areas of analysis involve science, the environment, culture and the economy; within these areas, the BCFN explores topics of interest, suggesting proposals to meet the food challenges of the future.

In line with this approach, the activities of BCFN are guided by the Advisory Board, a body composed of experts from different but complementary sectors, which makes proposals, analyzes and develops the themes and then drafts concrete recommendations regarding them.

One or more advisors were then individuated for each specific area: Barbara Buchner (expert on energy, climate change and the environment) and John Reilly (economist) for the area *Food for Sustainable Growth*; Mario Monti (economist) for the area *Food For All*; Umberto Veronesi (oncologist), Gabriele Riccardi (nutritionist) and Camillo Ricordi (immunologist) for the area *Food for Health*; Claude Fischler (sociologist) for the area *Food for Culture*.

In its first two years of activity, the BCFN created and divulged a number of scientific publications. Driven by institutional deadlines and priorities found on the international economic and political agendas, in these first years of research it has reinforced its role as a collector and connector between science and research on the one hand, and policy decisions and other governmental actions on the other.

The BCFN has also organized events which are open to civil society, including the *International Forum on Food & Nutrition*, an important moment of confrontation with the greatest experts in the field, now in its second edition. The BCFN continues its path of analysis and sharing for the third year, making its content accessible to as many interlocutors as possible and acting as a reference point on issues of food and nutrition.

In particular, in the *Food for All* area, the Barilla Centre for Food & Nutrition has so far investigated three main themes: the access to food, the limited availability of food and

agricultural resources, the emerging needs and the factors related to this problem, the definition of a well-being index in order to provide clear indications to effectively guide individual and collective behaviours towards a higher and more objective well-being standard. This paper focuses on the first aspect: food accessibility challenges and future prospects. In fact, the BCFN wants to start a line of research with the aim to reflect upon the ways in which it is possible to avoid the food crises of the last few years and to promote a better governance of the food and agricultural system on a global scale. The goal is to reach a more equitable distribution of food and to improve social well-being, health and the environment.

STUDY AREAS

Barilla Center FOR FOOD & NUTRITION

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FOOD SECURITY: CHALLENGES AND OUTLOOK

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EXECUTIVE SUMMARY

1. The global food crisis today

IN 2010, THE NUMBER OF MALNOURISHED PEOPLE IN THE WORLD AMOUNTED TO ABOUT 925 MILLION

According to recent FAO estimates, today there are about 925 million people who suffer from hunger in the world. In 2010, this number dropped slightly by 98 million people, with respect to the past, representing a very positive trend. This is the result of a more favorable global economic situation and of the reduction of food prices vs. the 2008 peaks. In evaluating the situation over a longer time scale, it is not possible to disregard the major deterioration of the global scenario which has occurred over the last fifteen years. Out of a population of about 6.9 billion people, those who suffer from hunger account for 13.4%.

THE MOST AFFECTED POPULATIONS ARE IN DEVELOPING COUNTRIES

It is well known that the most affected populations, that is 98% of the total, live in developing countries and that the prospects in terms of food access are not reassuring. In fact, considering that in 2050 there will be an additional 2.2 billion people to feed, the current situation is bound to deteriorate unless significant corrective actions are adopted at the international level.

In light of this data, the issue of access to food is to be analyzed from two different perspectives: on the one hand, there is the need to make food available for a growing population, especially in developing regions; on the other, it is crucial to ensure the quality and safety of the food that is produced and distributed.

In order to understand the complexity of this issue, a multidisciplinary approach is required to deal with the many facets of this phenomenon at the economic, political, environmental and social levels.

2. Price trends on the food commodity market

THE ROOT OF HUNGER IS POVERTY

The root of hunger is poverty; in order to eradicate it, equitable and sustainable development tools have to be developed, in the field of agriculture, in particular. It has been estimated that 75% of people below the poverty line live in rural communities and have small farms. This explains why a 1% growth in GDP generated by the agricultural sector is much more effective in reducing hunger and poverty with respect to the same amount of growth generated by the manufacturing or tertiary sector.

The reduction in the resources allocated by Western countries to aid programs and to developing countries in the last decade and the mixed results obtained by the development policies implemented by international agencies and organizations have almost directly resulted in the overall deterioration of food security in many poor and emerging areas. Then, this already ailing context was hit by the food price crisis which began in 2008 and is still going on.

OVER THE LAST FEW YEARS, FOOD COMMODITY PRICES HAVE INCREASED, AND SO HAS THEIR VOLATILITY

As shown by many statistical sources (including the FAO Food Price Index), food prices have significantly increased in the last few years, but they have also been characterized by growing volatility.

The public measures adopted to counteract this crisis have shown the intrinsic limitations of the current regulated markets, both in terms of efficiency and transparency. For this reason, too, the rapid increase in food prices has made the crisis particularly difficult to manage, with tragic consequences for the weakest segments of the population in the poorest countries.

FOOD PRICING IS BASED ON SEVERAL COMPLEX AND INTERRELATED FACTORS

Food pricing is not only inherent to the functioning of the market; it is important to consider that it is based on several complex and interrelated factors. The reason for its imbalance is to be found in the demand for and supply of agricultural products. In addition, there are global macroeconomic factors such as population growth, the rampant growth of countries such as India and China and the increase in their demand for food, the entrance of once-excluded segments of the population into the consumer market, and oil price trends, as well as progressive changes in the climate.

Other market distortions are cyclical: the financialization of agricultural commodities, the considerable increase in the demand for agricultural products for the production of biofuels – which is bound to become a structural and permanent issue – and on-going protectionist policies implemented by many governments.

In sum, the causes of agricultural price volatility are to be found in the factors which have an impact on the supply and demand of food and which have a common denominator: i.e., the many unresolved issues in the distribution mechanisms of income, food, and natural and energy resources.

3. Global governance and international policies

GOVERNANCE POLICIES SEEM TO HAVE FAILED TO IMPROVE ACCESS TO FOOD

Hunger and malnutrition can be eradicated only by adopting systemic, complementary and consistent policy actions. In fact, non-homogeneous and uncoordinated public interventions set the stage for the persistence of malnutrition and poverty.

The policies adopted in the last decade – after the slow but continuous progress of the mid- 1990s – have clearly failed to improve access to food.

In this connection, the Heads of State have always recognized the relevance of food access.

But in the present international political and economic situation, this theme runs the risk of being downgraded to a minor issue. And so there is a question of priority: it is crucial for the agenda of the most developed nations to acknowledge that the 925 million malnourished people in the world urgently need support and that this can only be provided through effective policies in view of future sustainability.

THE PRIMARY SECTOR, IN PARTICULAR, IS ONCE AGAIN BECOMING THE CENTRAL ISSUE OF THE INTERNATIONAL POLITICAL AGENDA

In order to respond to the weak and insufficient food security governance mechanisms, the last international summits have proposed a response based on three pillars:

- *Investing in food aid and food security nets* to the benefit of the most vulnerable segments of the population;
- Increasing *investments in agriculture and development policies*;
- Adopting *more balanced commercial policies* between developing and developed countries.

Thomas J. Abercrombie/National Geographic Image Collection

The primary sector, in particular, is once again becoming the central issue of the international political agenda and is still considered essential to achieving the Millennium Development Goals.

There are at least *six relevant variables* in the domain of food security which today – and even more so in the future – will have an impact on the international geopolitical balance of forces: emerging countries claiming a greater geostrategic role; the increase in import duties and non-tariff barriers; subsidies to the national agricultural sector; climate changes; oil price patterns and, more in general, the major global energy challenges; the development of the biofuel market and the land grab phenomenon.

The international political system will have to address different and extremely difficult challenges characterized by a common trait: the need to find a trade-off between economic growth, environmental protection and food security and between diverging local, national and international interests

THERE IS A CLEAR NEED TO FIND A TRADE-OFF BETWEEN ECONOMIC GROWTH, ENVIRONMENTAL PROTECTION AND FOOD SECURITY AND BETWEEN DIVERGING LOCAL, NATIONAL AND INTERNATIONAL INTERESTS

4. Natural resources and climate change

Natural resources are essential for food production, rural development and sustainable growth, as well as for the wellbeing of the populations.

The major on-going structural changes require greater attention to the systematic management of natural resources. In fact, there is mounting pressure on natural resources in different parts of the world, and there is growing concern as to how to optimize and protect them and how to contain the negative effects of economic growth. Competition for the exploitation and hoarding of scarce and unequally distributed resources generates conflicts, violence and the impoverishment of this shared natural heritage. This situation may become exacerbated by changing crop requirements due to climate change, to extreme weather conditions and to scarce water supply.

NATURAL RESOURCES ARE ESSENTIAL FOR FOOD PRODUCTION, RURAL DEVELOPMENT AND SUSTAINABLE GROWTH

Climate change, in particular, will have a complex impact on agriculture and on its ability to produce food. There will be direct effects on the biophysical processes and on the agricultural and ecological conditions of farming, and indirect ones on growth, income distribution and on the demand for agricultural produce.

In addition, it is important to consider that, in the first half of this century, the global demand for food, fodder and fibers is estimated to almost double, while agricultural products are estimated to be increasingly used not as food but for the production of biofuels. Farmers will be forced to adapt to climate change and to respect natural habitats and, thus, they will have to compete with urban dwellers for land and water resources. Moreover, arable land is expected to become drier and degraded, and this will represent a major challenge for the agricultural sector, which will be required to produce a higher amount of food on smaller and smaller plots.

CLIMATE CHANGE WILL HAVE A COMPLEX IMPACT ON AGRICULTURE AND ON ITS ABILITY TO PRODUCE FOOD

Agricultural productivity has already dropped in some areas of the Earth because of increasingly difficult environmental conditions, such as drier soils, dwindling water resources, etc. This has led several governments to find alternative and unconventional approaches to produce the necessary quantity of food to meet their requirements, resulting in the so-called land grabbing phenomenon, defined by the FAO Director General, Jacques Diouf, as a “form of neo-colonialism.”

5. Society: access to food in its social dimension

THE RELATIONSHIP BETWEEN ACCESS TO FOOD AND HEALTH IS MAINLY RELEVANT FOR DEVELOPING COUNTRIES

The social aspects of food accessibility can be generally found in three main domains: human health, population trends, and the social and political dimension (social conflicts and migratory flows).

The relationship between access to food and health is mainly relevant for developing countries, in light of the chronic and/or acute conditions of malnutrition and hunger in these social and economic contexts.

In fact, hunger and malnutrition have an impact on the immune system of people and on their predisposition to severe and prolonged diseases. This relationship is strengthened by other factors associated with malnutrition, such as poor hygiene and sanitation, and limited access to drinking water and to basic drugs.

Moreover, there are other economic and social conditions which exacerbate the link between disease and malnutrition, such as the inability to work, social and economic marginalization and inadequate knowledge about nutrition – which impairs the ability of mothers to care for their children. All this will have an impact on future generations.

As already mentioned, the growth in the world's population, especially in developing countries, has been, and still is, a major challenge for the global food and agricultural sector, in that it generates an exponential growth in the demand for food that has to be met. It is also necessary to recall the on-going and significant process of urbanization – which will continue in the future – with a progressive flight from rural areas and a population boom in urban areas, in the developing world, in particular.

SOME MAJOR CONFLICTS/ CRITICAL ISSUES FOR FOOD SECURITY ARE RELATED TO THE AVAILABILITY OF FOOD AND OF NATURAL RESOURCES

As to the social and political dimension of this problem, international experts agree that some major conflicts/critical issues for food security are related (directly or indirectly) to the availability of food and of natural resources:

- social tensions due to the access to and the control of agricultural resources;
- migration flows due to very bad living conditions (malnutrition and lack of water), which in some cases are exacerbated by climate change;
- political and social instability and misgovernment in response to the growing needs of populations;
- pressures on international governance due to increasing imbalances between developed and developing nations.

In this connection, it is important to stress that social conflicts – especially those linked to the control of natural and agricultural resources – often undermine the future growth and the economic and social potential of countries.

In the future, there may be relevant risks related to the deterioration in the availability and security of food and agricultural products – exacerbated by the current climate changes – which may significantly increase social conflicts, especially in developing regions, where scarce food and water resources multiply latent and still unsolved ethnic, religious and economic tensions.

6. Recommendations: areas of intervention

In light of the situation described above – which is going to be analyzed in greater depth in this paper – there are four major recommendations to put forward:

1 *Strengthen the global governance mechanisms*. It is essential to restore the central role that food plays on the international political and economic agenda. The whole food production system will have to be redesigned and regulated in view of greater accessibility, sustainability and nutritional quality, also by creating common venues and forums to discuss and analyze food security issues.

THE WHOLE FOOD PRODUCTION SYSTEM WILL HAVE TO BE REDESIGNED

2 *Promote economic development and increase agricultural productivity*. It is necessary to identify and implement sustainable development approaches, so as to reach food self-sufficiency in developing countries in order to fill the current gap in terms of know-whow, by transferring scientific knowledge and best agricultural practices.

In addition, by adopting adequate incentive/disincentive policies and measures, it will be possible to *maintain and to develop* "*local* production-distribution-consumption systems" of food and agricultural products, thus preserving quality and biosustainable productions.

IT IS NECESSARY TO IDENTIFY AND IMPLEMENT SUSTAINABLE DEVELOPMENT APPROACHES BY PROMOTING SUPPORT MEASURES DESIGNED TO ACHIEVE FOOD SELFSUFFICIENCY

3 *Adjust the food production system to manage price volatility* – which is constantly growing – and provide safety nets. Therefore, it is necessary to evaluate and select the best practices at the international, national and local level in order to create stocks of food and of raw materials, defining the costs, the timing and the role of an overall global "insurance" system. In addition, a new regulatory framework is needed for the food commodity market so as to enhance the not merely economic value of these traded commodities and coordinate trade policies at the international level, promoting access to the markets and the qualitative growth of products coming from developing countries.

IT IS NECESSARY TO ADJUST THE FOOD PRODUCTION SYSTEM SO AS TO MANAGE PRICE VOLATILITY AND TO ENSURE THE EXISTENCE OF SAFETY NETS

4 *Manage dietary habits*. The spread of highly imbalanced dietary habits, with increasing consumption of animal-derived products and the "westernization" of consumption models among growing segments of the population, require actions and guidelines to govern these styles. This is becoming a decisive economic policy and a sustainable development variable for the world population.

A COORDINATED ACTION IS NEEDED TO MANAGE AND GUIDE DIETARY HABITS

1. THE CURRENT GLOBAL FOOD CRISIS

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1.1 THE SCENARIO

IN 2010 THE NUMBER OF UNDERNOURISHED PEOPLE IN THE WORLD AMOUNTED TO ABOUT 925 MILLION

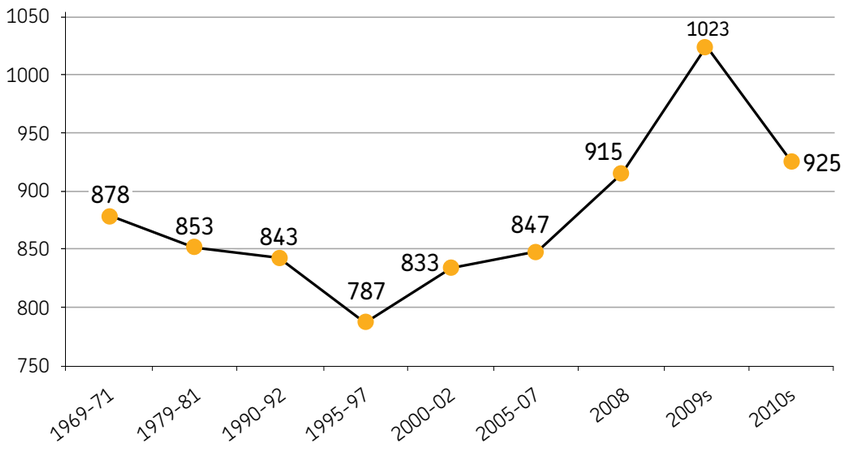
The analysis of the available data clearly shows how severe the food security issue has become in the world in terms of food availability and accessibility for people and populations.

In 2010, the overall number of malnourished people amounted to about 925 million. An extremely positive trend is the reduction in the total number of these people by 98 million, that is 9.6%, with respect to the past. This was made possible by a more favorable economic situation on a global scale and by the reduction in food prices vs. the peaks in 2008.

13.4% OF THE WORLD POPULATION IS MALNOURISHED

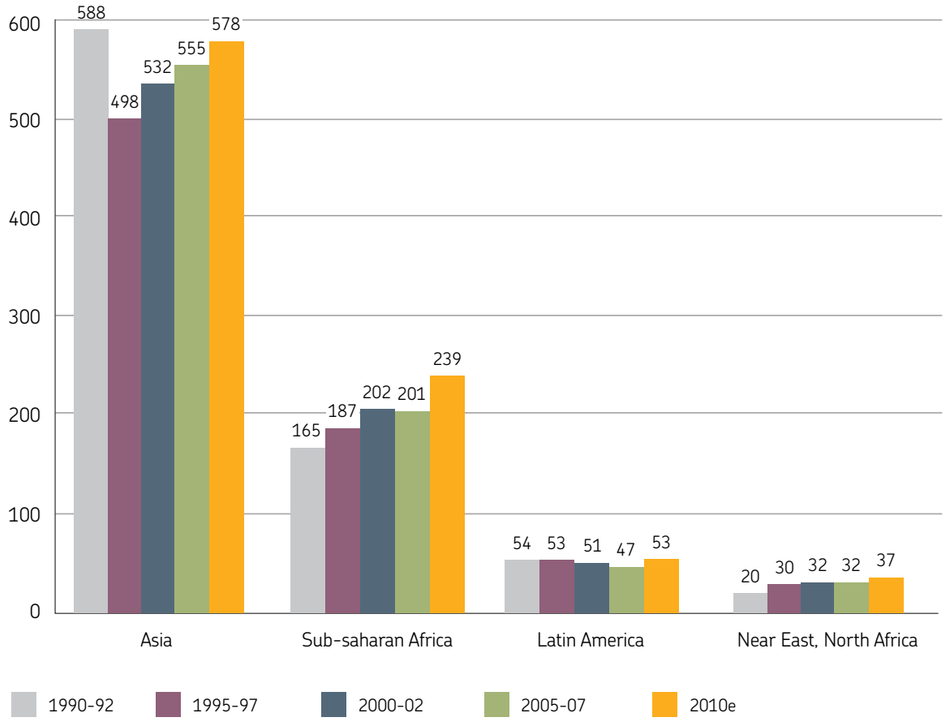
Notwithstanding this positive trend, it is important to evaluate the whole picture, taking account of the significant deterioration which occurred over the last 15 years at the global level. In fact, the data shows an emergency situation for about one-seventh of the world population. Out of a population of about 6.9 billion people,[1] 13.4%[2] is malnourished.

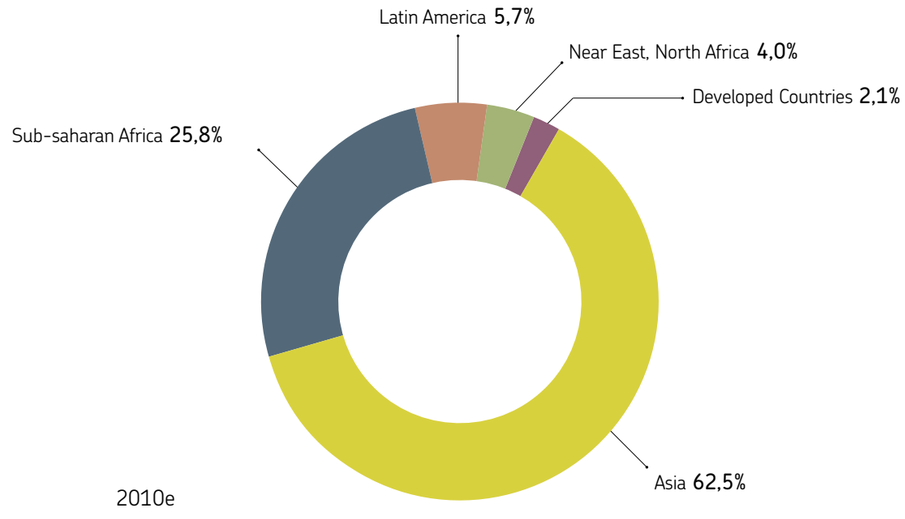
Figure 1.1. Number of malnourished people in the world (millions of people)



Source: FAO, 2011 (the data reported for 2009 and 2010 are estimated values).

Figure 1.2. Number of starving people in some regions of the world (millions of people)





Source: FAO, 2011[3] (the data reported for 2010 are estimates).

Moreover, in late 2010 and early 2011, the prices of some major commodities have picked up again, reaching and exceeding the levels of 2008.

This shows that there may be an actual increase in the number of hungry people in developing countries. Unless this situation is quickly overcome, in a few months there may be an additional 64 million malnourished people in the world.[4] Therefore, in the medium and long term, a deterioration of the overall picture is expected, with a further acceleration due to the economic and food crises of 2008-2009.

The current situation shows that there is a major gap with respect to the figures of 1996, the year when world leaders committed themselves to reducing and then eradicating hunger in the world. This optimism was justified by the positive results obtained in the first half of the '90s by the aid programs managed by the FAO World Food Summit.

DEVELOPING COUNTRIES HAVE THE HIGHEST NUMBER OF HUNGRY PEOPLE

Developing countries have the highest number of hungry people. According to the 2005-2007[5] findings, the number of malnourished people in the developing world amounted to about 835 million, which means that, in 2007, 98% of malnourished individuals lived in these areas of the world. In 2010, in these countries, 16% of the population was starving. Almost one person out of five.

Dick Durrance Ii/National Geographic Image Collection

A closer look at developing countries shows that the region with the highest number of malnourished people in the world is Asia. In fact, in the Asian continent, as many as 554.5 million people[6] suffered from hunger in the 2005-2007 period, more than twice as many as in Sub-Saharan Africa (201.2 million people). In Latin America, instead, this number was 47 million, while in the Near East and in North Africa it was 32.4 million. Moreover, it may be interesting to consider that two-thirds of these people in the world are concentrated in seven countries: Bangladesh, China, the Democratic Republic of Congo, Ethiopia, India, Indonesia and Pakistan. More than 40% of them live in China and in India.

ASIA IS THE REGION WITH THE HIGHEST NUMBER OF MALNOURISHED PEOPLE IN THE WORLD

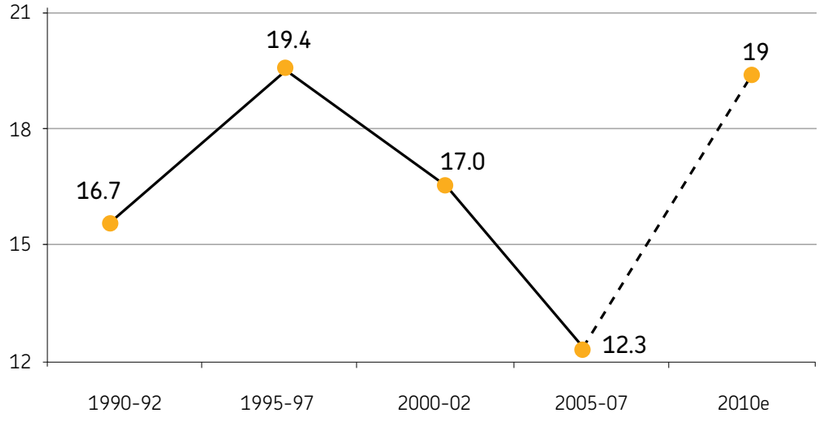
The graphs indicate that the trends of the last 15 years are very different. In Asia, the trend is slightly downwards; in fact, it has been calculated that the number of malnourished people in Asia dropped by 5.7% (about 33 million people) in the 1990-2007 period. The same happened in Latin America (-7.2 million people, equal to -13.3%). Instead, the opposite occurred in Sub-Saharan Africa and in the North Africa and Near East regions, where the number of starving individuals grew by 36.3 million (+22%) and by 12.8 million (+65.3%), respectively.

Unlike developing countries, the developed world had a limited number of malnourished people between 2005 and 2007; that is, 12.3 million individuals.[7] Moreover, this trend improved in the period between 1990 and 2007 thanks to a series of targeted measures adopted by the governments. These were mainly social and economic assistance measures within the different national welfare systems. However, it is important to stress that this number increased by 54% between 2007 and 2010 in the developed countries, bringing this figure from 12 million to 19 million.

THE NUMBER OF MALNOURISHED PERSONS IN THE DEVELOPED COUNTRIES INCREASED BY 54% IN THE 2007-2010 PERIOD

In order to understand how this picture may change in the next few decades, it is necessary to analyze the evolutions of the underlying variables. Following this short introduction, which is mainly designed to stress how important and topical this issue is, in the next few chapters all the variables at stake and their interactions will be described in a systematic form so as to provide a greater insight into the global access to food.

Figure 1.3. Number of malnourished people in developed countries (millions of people)



Source: FAO, 2011 (the data reported for 2010 are estimates).

1.2 THE SCOPE AND MEDIUM-LONG TERM FOOD SECURITY SCENARIO: AN INTERPRETATIVE MODEL

FOOD SECURITY IS DEFINED AS THE "SITUATION IN WHICH ALL PEOPLE HAVE A PHYSICAL AND AN ECONOMIC ACCESS TO AN AMOUNT OF HEALTHY AND NUTRITIOUS FOOD, WHICH IS SUFFICIENT TO MEET THEIR DIETARY REQUIREMENTS AND THEIR FOOD PREFERENCES IN ORDER FOR THEM TO HAVE AN ACTIVE AND HEALTHY LIFE"

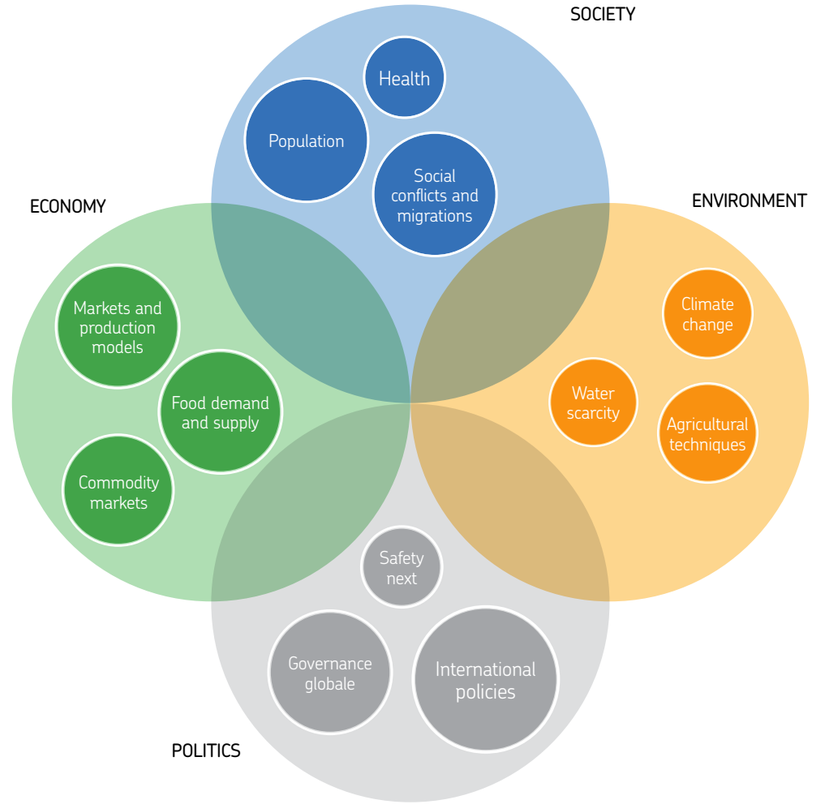
In 1996, the World Food Summit defined food security as the "situation in which all people have a physical and an economic access to an amount of healthy and nutritious food, which is sufficient to meet their dietary requirements and their food preferences in order for them to have an active and healthy life."[8]
Today, this is a central issue for conducting any serious analysis on the future of mankind that is directly or indirectly beset by a significant number of critical issues: some of these have an impact on food security (for example, climate changes), others are influenced by the latter (for example, migrations or social conflicts), with particularly intricate interactions with economic and political aspects, with social implications and with environmental phenomena. In order to understand the complexity of this theme, it is necessary to adopt a multidimensional approach, which roughly includes elements related to economic trends, to political choices, to environmental risks and to social issues. Furthermore, this issue is to be analyzed by integrating two different perspectives: on the one hand, food security is to be seen as the need to provide food to growing populations, especially in developing regions; on the other, the quality and safety of the food produced and distributed is to be guaranteed. Quantity and quality have to go hand in hand.

1.2.1 The economy and food security

THE TURNING POINT IN THE FIGHT AGAINST MALNUTRITION IS THE INCREASE IN WEALTH AND ITS MORE EQUITABLE DISTRIBUTION

The first cause of malnutrition is poverty; therefore, the turning point in the fight against malnutrition is the increase in wealth and its more equitable distribution. It is important to consider that agriculture-driven economic growth is one of the best levers for tackling this problem since most people who do not have enough food are small farmers in rural areas. In this connection, a study conducted by the World Bank showed that an increase by 1 point in GDP generated by the agricultural sector is twice as effective in reducing poverty as the economic growth generated by other sectors.[9] This does not mean searching for single or overly simplistic solutions. However, this shows that the agricultural sector is crucial for the development of strategies designed to improve the living conditions of rural populations.
From this perspective, the growth in the world population, the access to the consumer market of populations which were once excluded and the remaining structural gaps in the world distribution of income do point to the need to identify a concrete path to sustainable development. Besides these medium-long term trends, there is the recent trend characterized by the financialization of commodities, which shows that there is a minimum common denominator in the current trends, i.e. problems in the ways of distributing food and natural and energy resources, which are not easy to solve.

Figure 1.4. Food security: a multidimensional issue



Source: The European House-Ambrosetti, 2011.

1.2.2 The economy and food security

THE TURNING POINT IN THE FIGHT AGAINST MALNUTRITION IS THE INCREASE IN WEALTH AND ITS MORE EQUITABLE DISTRIBUTION

The first cause of malnutrition is poverty; therefore, the turning point in the fight against malnutrition is the increase in wealth and its more equitable distribution. It is important to consider that agriculture-driven economic growth is one of the best levers for tackling this problem since most people who do not have enough food are small farmers in rural areas. In this connection, a study conducted by the World Bank showed that an increase by 1 point in GDP generated by the agricultural sector is twice as effective in reducing poverty as the economic growth generated by other sectors.9 This does not mean searching for single or overly simplistic solutions. However, this shows that the agricultural sector is crucial for the development of strategies designed to improve the living conditions of rural populations.
From this perspective, the growth in the world population, the access to the consumer market of populations which were once excluded and the remaining structural gaps in

the world distribution of income do point to the need to identify a concrete path to sustainable development. Besides these medium-long term trends, there is the recent trend characterized by the financialization of commodities, which shows that there is a minimum common denominator in the current trends, i.e. problems in the ways of distributing food and natural and energy resources, which are not easy to solve.

1.2.2 Politics and food security

THE ROLE OF THE INSTITUTIONS IS CRUCIAL IN REGULATING THE PRODUCTION AND DISTRIBUTION OF FOOD

A crucial aspect in the access to food is the role of local, national and international institutions in regulating the production and distribution of food, in protecting the weakest segments of the population, but also in promoting a more equitable and sustainable development.
The stalemate in the negotiations over the most relevant issues of the so-called "Doha Round" - designed to harmonize trade rules and transparency - is a critical problem which is still causing major difficulties in the trade relations among countries, with major market distortions. Given the strong implications for the world population, it is necessary to develop effective marketing and distribution mechanisms at the international level and to strengthen the control powers of supranational and national authorities.

1.2.3 The environment and food security

CLIMATE CHANGE HAS AND WILL HAVE AN IMPACT ON THE PRODUCTION SYSTEM OF THE AGRICULTURAL SECTOR, ON THE STABILITY OF THE OUTPUT AND ON THE SAFETY OF THE FOOD CHAIN

Agriculture and animal husbandry are still the main sources of income for large segments of the population, especially in developing countries, and water is the fundamental resource for this activity. The most significant challenge for the environment in the next decade is climate change and its related phenomena.
The estimated and expected repercussions of climate change on food security are found in the main four key aspects of food security: availability, stability, access and the use of food. This means that climate change has and will have an impact on the agricultural production system, on its output, on the purchasing power of individuals who live on subsistence farming and on the safety of the food chain, which is allegedly threatened by the spread of viruses and bacteria. This threat is to be considered with great attention. It will suffice to consider that bacteria and contaminations are the main reasons why the largest amount of produce in developing countries does not have the sufficient food quality and security standards required to be exported to developed countries.

1.2.4 Social variables and food security

AN ADEQUATE AVAILABILITY OF FOOD HAS ALWAYS BEEN A CRUCIAL FACTOR FOR SOCIAL PEACE

Starting with the end of the Cold War, political and military issues have been accompanied by other problems – from poverty and the risks linked to the environment, to the availability and the use of natural and food resources, to health – which have been critical risk factors for conflicts, especially in the form of domestic civil wars, often when the shortage of food, water and natural resources is associated with an inherent and fundamental social and economic instability. An adequate availability of food has always been a crucial factor for social peace, both inside the countries and in the relationships among countries. Similarly, a sufficient degree of social stability is an indispensible condition for dealing with a limited availability of food. The four areas indicated – economics, politics, the environment and society - will be analyzed in greater depth in the next chapters.

Pete Mcbride/National Geographic Image Collection

2. ECONOMIC VARIABLES AND THE PRICE OF FOOD

Michael Nichols/National Geographic Image Collection

2.1 THE DYNAMICS OF PRICES IN THE FOOD COMMODITIES MARKET

THE ROOT OF HUNGER IS POVERTY

Although it is not the only important aspect, the economic factor is certainly crucial to the access to food. In fact, the root of hunger is poverty, which, in order to be eradicated, requires equitable and sustainable economic development, especially in agriculture. It is estimated that 75% of the people below the poverty level live in rural communities and are primarily small farmers.

The recent awareness of the centrality of the role played by agricultural development in aiding access to food, driven by the tensions sparked by the food crisis of 2006-2008, represents an element of discontinuity with regard to the previous 20 years of the *neglect of agriculture*[1] (1985-2005), as it was defined by De Janvry.[2] In fact, following the progress and innovations introduced by the green revolution (in the Sixties and Seventies), which had helped to greatly increase yields and lower agricultural commodity prices by 60%, the last two decades have witnessed a decline in public and private investments in agriculture, also because of low prices (leading to more modest economic returns) and the belief that the market would regulate itself.

THE LAST TWO DECADES HAVE WITNESSED A DECLINE IN PUBLIC AND PRIVATE INVESTMENTS IN AGRICULTURE

So, if in 1979, 18% of world aid to development was used for agriculture, in 2004 this proportion had fallen to 3.5%: "The world did not think that eating was a problem: there was so much food, at low prices," said Kostas Stamoulis, Director of the Agricultural Sector in Economic Development Service of the FAO.

However, the agricultural price crisis of 2006-2008 marked a sharp turnaround: in 2007 alone; some 75 million people fell below the line of poverty due to the food crisis, thus bringing to the fore the question of the relationship between development, access to food and agriculture, leading many to hope for a second green revolution.

THE FAO FOOD PRICE INDEX UNDERLINES AN EXTREMELY CRITICAL SITUATION

The FAO Food Price Index is a measurement of the monthly variations of international prices of a basket of food products; it consists of the average index of the price of five groups of products (cereals, dairy, oils/fats, meat and sugar), considering the average shares of exportation of each of the groups for the 2002-2004 period.

As you can see from Figure 2.2, the FAO Food Price Index (FFPI) follows a trend that has been growing strongly for 10 months now, except for a slight decline in March. The data, expressed in real terms, underlines a very critical situation that has not been previously found. If we consider the nominal index, the figure for February 2011 has even reached 237 points, an increase of 2.8% over the previous month: the highest figure ever recorded since January 1990, i.e., since the FAO started the measurement.

It is important to consider how, in recent years, not only has there been an increase in prices, but also a sharp increase in volatility and, hence, uncertainty.

The numbers of the new food crisis are clear even if one considers separately the differ-

The 2008 food crisis

The year 2008 was marked by a serious food crisis. At the end of the year, prices of the main food commodities were found to be 40% higher than the average price recorded in 2007 and more than 76% compared to 2006 levels. Cocoa marked an increase of 520%, sugar increased by 110%, wheat by 55%, soy beans by 36%, oats by 20% (increases recorded previously coincide only with another period that was significant for world food and agriculture, the two years of 1973-1974). The social and economic relevance of these generalized increases are clearly linked to the role that food commodities have in most processes of production/distribution of commonly consumed foods: significant variations in the prices of these commodities generate consequences, both direct - the selling price of bread, pasta, cereals, and the purchasing power of families - and indirect - the costs for raising livestock that affect the price of foodstuffs such as meat, eggs and dairy products – on the level of the citizens' welfare and the profitability of the companies involved in the food chain (and not only due to the reallocation of the consumption choices of individuals).

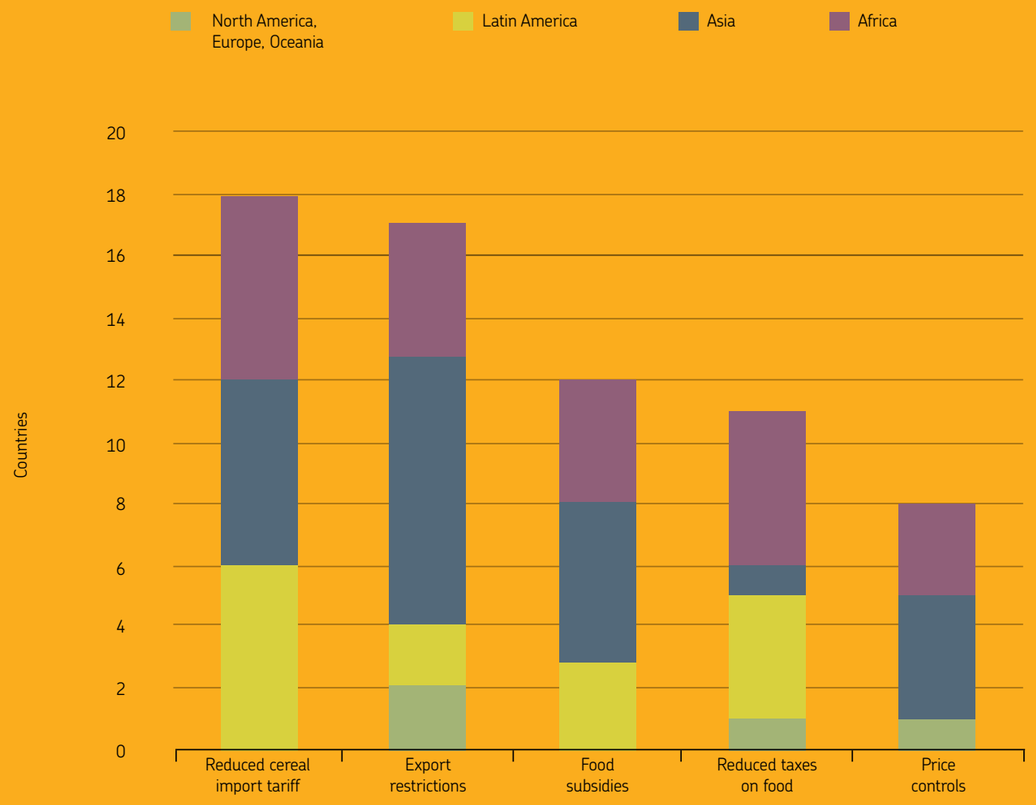
The sudden and rapid increase in prices of almost all commodities - extended by the loss of value of weaker currencies at the expense of the dollar and Euro, the money with which agricultural goods and food on international markets are usually exchanged – has had negative impacts on markets, industries, retailers and consumers, but it has also damaged that part of the world's population already living in conditions of poverty and malnutrition, forcing 115 million more people below the subsistence level, for a total of one billion people in conditions of chronic hunger. The price increase, coupled with the relative dependence of some markets, has made food a crucial factor for nations - according to some readings of the phenomenon, now equal to that of energy and of armaments -, persuading governments to strengthen their level of intervention in the food industry.

Following the crisis, more than 40 governments have imposed price control measures and forms of restrictions on exports. In particular, insulation measures have been adopted by many developing countries to reduce the impact of higher prices of international markets on the purchase price in the domestic market. Analyzing the data of the long-term effect adjusted according to a non-specified inflation,[3] it can be seen how, for about 30 years, the international markets for agricultural and food goods have had decreasing (or stagnating) prices in real terms. In general, from the Seventies onward, food prices fell on average every year between 2% and 3% in real terms until 2008, when there was a turnaround in real terms (mirroring the actual "strength" of the crisis that took

place between 2007 and 2008).
In light of the long-term, therefore, the historical significance of the increase which occurred in 2008 should be reduced and the many adjectives used by the international press seem to be partly unjustified.

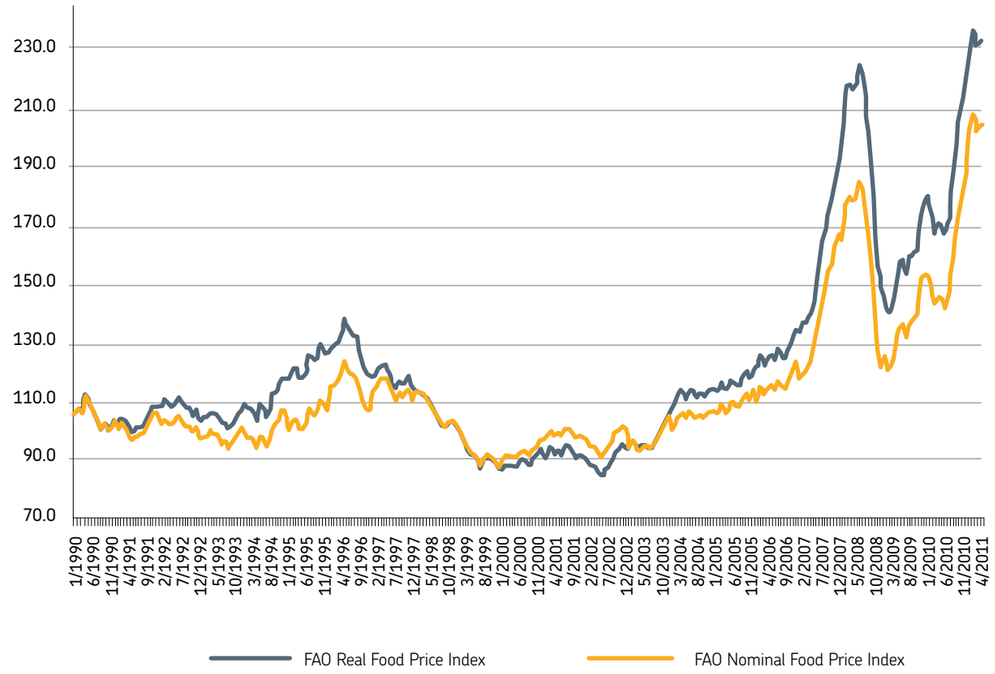
More than the absolute size of the oscillation of prices, it was the rapidity of the increase occurring in 2008 that alarmed the markets and caused extensive loss of purchasing power of the poorest countries, with the reversal of a trend (downward), which seemed irreversible.

Figure 2.1. Policies adopted in response to the increase in prices in 2008



Source: The European House-Ambrosetti elaboration on data from FAO, 2008.

Figure 2.2. Dynamics of the price of food - the FAO Food Price Index (January 1990/April 2011)



Source: FAO, May 2011.

ent indexes that make up the FAO Food Price Index. In fact, one can see how – in the April 2010/April 2011 period – the following increases were recorded:
- Oils Price Index: +49.3%
- Sugar Price Index: +49%
- Meat Price Index: +14.6%
- Dairy Price Index: +12%
- Cereals Price Index: +71.2%

Also, from the analysis of the following graphs, it can be seen how agricultural commodities have had extraordinary fluctuations, both upward and downward, in the last four years.
The Commodity Price Index registered upward variations of 116.7 percentage points from July 2005 into 2008, which then sharply dropped to 121.3 points in five months. Since the beginning of 2009, the index has recorded an increase of 105.9 percent.
The same dynamics, once again, has also affected food prices. As shown in Figure 2.4, the Commodity Food Price Index recorded gains of 71.3 percentage points from September 2006 to June 2008 – months in which the highest peak was recorded – then dropped to 60.1 percentage points over the next six months. From early 2009 to April 2011, however, the index increased to 62.8 percentage points.

IN RECENT YEARS, NOT ONLY HAS THERE BEEN AN INCREASE IN FOOD COMMODITY PRICES, BUT ALSO A SHARP INCREASE IN VOLATILITY.

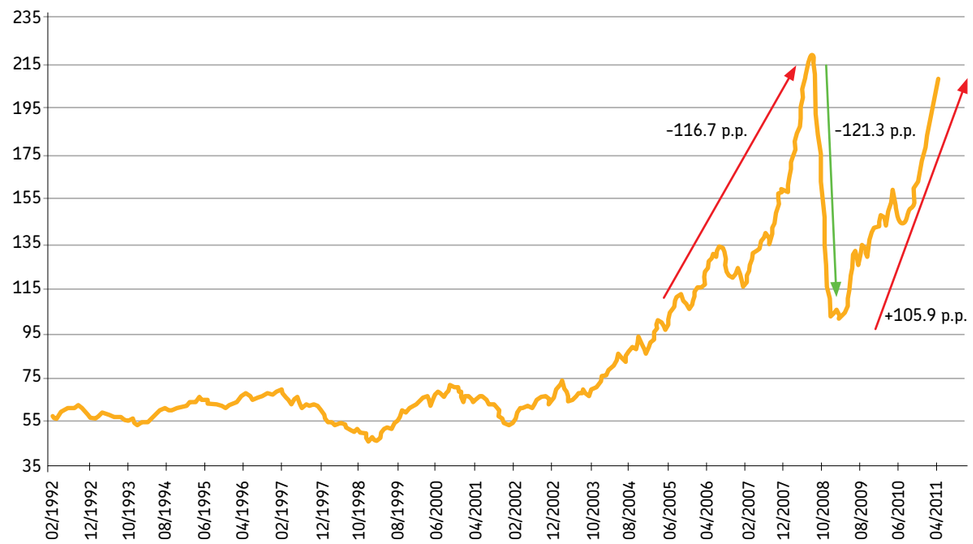
Changes in the price of wheat has been at the center of controversy for its fundamental importance in the diets of the world's population. The recent market volatility has led to a 120.9% price increase from March 2007 to March 2008, when the peak was recorded, and then fell to 56.5% in March 2010. Then in the last year, the price of wheat underwent an increase of 74.4%, creating another dizzying peak.

Like with wheat, the trend of the price of rice has also been the focus of speculative dynamics, especially in the period of 2007-2008. To date, however, rice is the only commodity not yet affected by the high food inflation in recent months. It is also important to consider that rice is the staple food for over half of the world's population4 and is now probably the only product that allows us to avoid a food crisis on the level of the one in 2008. Nevertheless, it must be taken into account in order to consider how the export market for rice is very "sensitive" and, therefore, how problems for importing countries could be caused if even just one manufacturer, such as Thailand or Vietnam, decided, not to export its surplus production but to store it instead, as a means of protection against rising prices. Changes in the price of rice, in fact, were on the order of 0.3% from April 2010 up to the present. The reason for the substantial price stability is that production will reach a record crop level this year, while the demand has remained constant. In contrast, the volatility of the price increase of markets had boosted the price of rice by 207.6% from September 2007 to April 2008, then dropped to 45.8% over the next eight months. Since the beginning of 2009 until today, the value has actually decreased by 18.6%.

Even though there has been a deflation of the speculation bubble for the price of rice in recent months, there have been significant consequences on the weaker sectors of the population, who spend between 50% and 80% of their income on food. An increase of this magnitude, thus, has an immediate impact on the quantity and quality of the food consumed. In essence, it means that these people consume mostly food at a lower cost and reduce the number and quantity of meals.

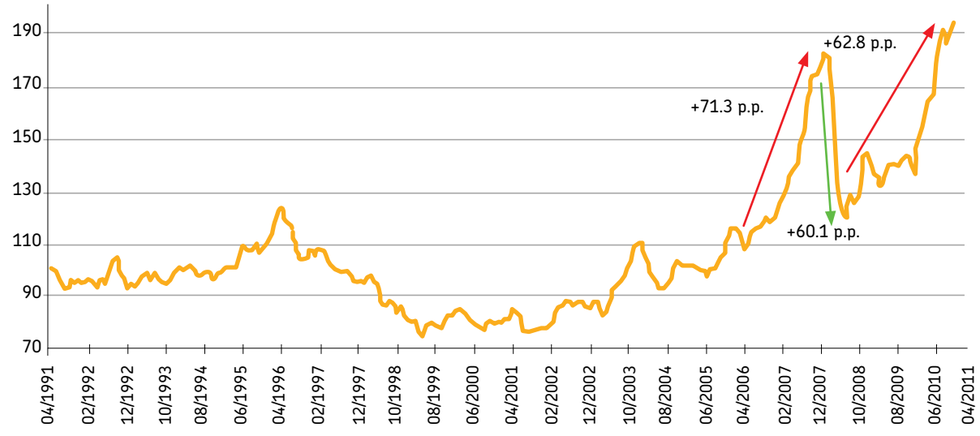
The predictions for the coming months indicate a rather high level of agricultural commodity prices, which will result in higher inflation, especially in poorer countries. For the next few months, therefore, the situation will remain worrisome, while it is still open to the risk of another food crisis like the one that hit developing countries in 2007-2008, mainly due to uncertainty regarding the crops in 2011, the rapid reduction in global cereal stocks and high oil prices. This serious food inflation will have its greatest impact on two categories of people: poor households that spend a large part of their income on food and the citizens of poor countries which have a constant deficit of food and which cannot afford to finance the import of food from abroad.

Figure 2.3. Development of the Commodity Price Index (February 1992/April 2011)



2005 = 100, also includes the Fuel and Non-Fuel Price Indices
p.p.= percentage points

Figure 2.4. Development of the Commodity Food Price Index (April 1991/April 2011)



2005 = 100, includes the indices of prices for cereals, oils, vegetables, meat, fish, sugar, bananas and oranges.
p.p=percentage points

Source: International Monetary Fund, May 2011.

Figure 2.5. Development of the price of wheat (April 1991/April 2011) (dollars per ton)

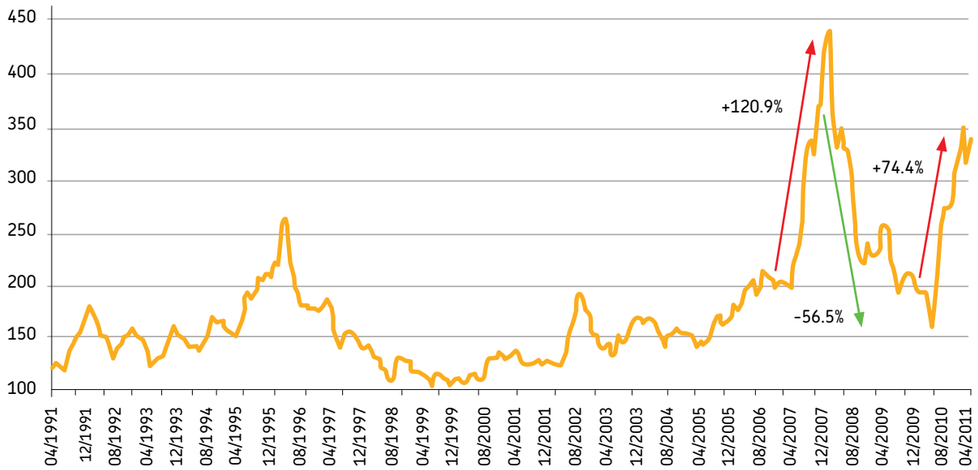
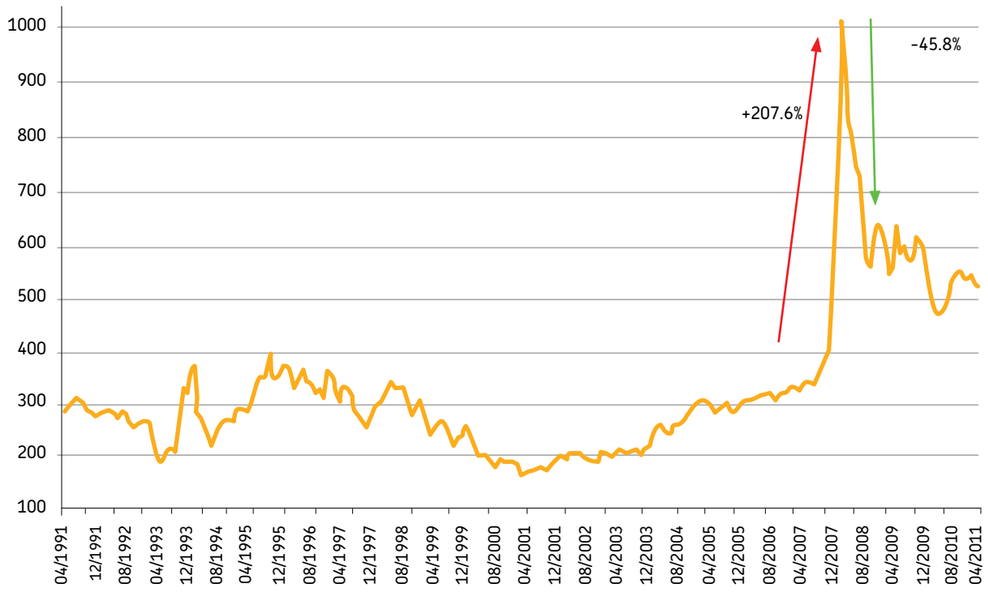


Figure 2.6. Development of the price of rice (April 1991/April 2011) (dollars per ton)



Source: International Monetary Fund, May 2011.

2.2 THE KEY FACTORS IN DETERMINING THE PRICES OF FOOD COMMODITIES

THE FACTORS BEHIND THE AGRICULTURAL PRICES ARE MULTIPLE, COMPLEX AND CLOSELY INTERRELATED

The factors behind the agricultural prices are multiple, complex and closely interrelated. These include issues related to the worldwide macroeconomic and demographic scenario, such as population growth, the appearance on the consumer market of people who were excluded previously, the dynamics in the price of oil, etc. There are also factors related to their cyclical nature and climatic conditions.

In addition to these structural elements in determining the price of food, there is the recent phenomenon of financial activities of agricultural commodities, concerning the prices of raw materials (cereals, rice, sugar, etc.), which has triggered speculative dynamics, creating further tensions in the trade markets.

Then there is the strong increase in demand for agricultural products involved in the production of fuels derived from plants (biofuels) and the persistence of protectionist policies triggered by many governments, which help to introduce additional distortion in the markets.

In summary, the causes of volatility in agricultural prices can be found in the factors determining and influencing the demand and supply of food. So let us try to understand what the cyclical and structural factors at work in defining the possibilities of access and the relative level of prices actually are, and how they interact with each other.

For the sake of completeness, in the following section, the aspects shown in Figure 2.7. will be briefly analyzed one by one.

Figure 2.7. Factors which have determined the high price of food prices over the periods 2006-2008 and 2010-2011

DEMAND	SUPPLY
A Population Growth	A Inefficiency of the economic models of food distribution
B Increase in income levels of developing economies	B Low level of investments in agriculture and low growth of productivity
C Production of biofuels	C Difficult market access
D Low exchange rate of the dollar	D Trade barriers
E Financing of agricultural commodities	E Drought and bad weather in key areas of agricultural production
F Low stock level	F Increases in production costs due to the increase in the price of energy

Source: The European House-Ambrosetti elaboration on FAO data, 2011.

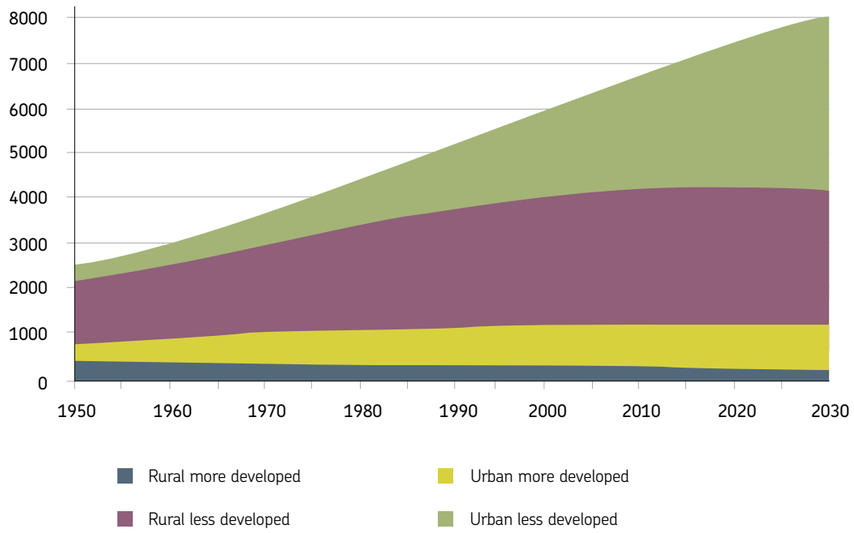
2.2.1 Food Demand

THE DEMAND FOR FOOD PRODUCTS WILL INCREASE, MAINLY DUE TO POPULATION GROWTH

The demand for food products will increase considerably, mainly because of the increase in the world opulation and the rate of urbanization.

A *Population growth*. The most reliable estimates indicate a level of more than eight billion people in the world in 2030. It is estimated that by 2050, this figure may grow to nine billion people. This is discussed in more detail in Chapter 5.

Figure 2.8. The dynamics of the world population (millions of people)

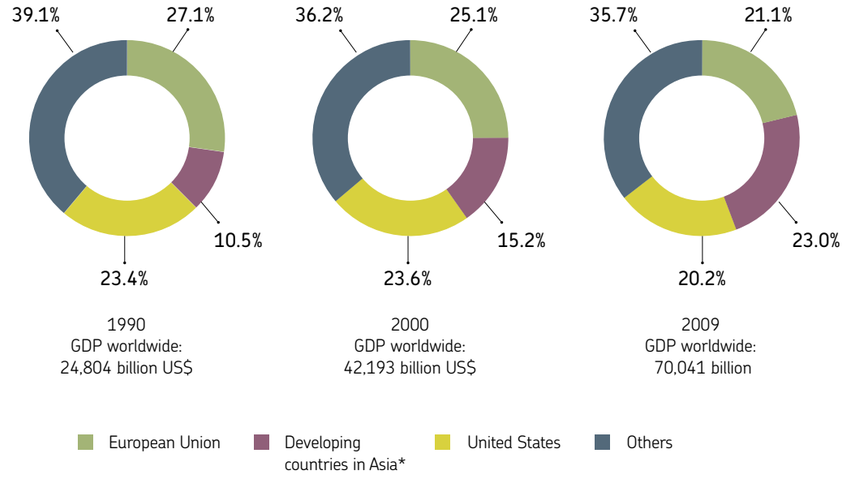


Source: UNDESA, 2008.

THE WORLD'S ECONOMIC CENTER OF GRAVITY IS SHIFTING TOWARD DEVELOPING COUNTRIES AND EMERGING MARKETS

B *Economic Development*. Another important trend is formed by the shifting of the world's economic center of gravity toward developing countries and emerging markets.
Economic growth generally has positive effects – such as an increase of per capita income, which can make it easier to have access to food – but it also poses challenges that should not be underestimated: the increase in food consumption (especially of products such as meat, milk and cereals) will have a truly significant impact on the supply (in terms of volumes and composition) and will require greater use of energy, leading to risks such as environmental impact and scarcity in natural resources that must be appropriately managed. The FAO has shown that increases in the level of per capita income typically mean not only an increase in demand, but also a change in eating habits, with a predominantly higher consumption of meat rather than of cereals. As explained in previous publications of the Barilla Center for Food & Nutrition, most meat production involves a significant environmental impact in terms of water consumption and pollutant emissions.[5] Despite all this, these changes – taken individually – do not seem to have triggered the recent increases in food prices. This is because of structural factors, which the countries and the market can adjust to in the long run. For example, in the Eighties, China and India were importing about 14 million tons of grain; in recent years this share has dropped to 6 million tons, thanks to the increased domestic production of cereals achieved over the last 20 years.
Finally, the impact of the recent economic crisis should not be underestimated. In fact, the reduction of financial aid and assistance by rich countries to help poor ones, associated with the contraction of international trade flows, has made the level of poverty of the latter even more critical. Paradoxically, the developing countries that have suffered from the international economic situation the most are those whose economic growth depends more directly on exports of goods and services or on a sustained flow of direct foreign investments. In other words, these are the countries most closely associated, regarding positive growth and development, with the dynamics of global trade and, therefore, with a more promising outlook for economic growth. Growth prospects that raise questions today, at least in part.

Figure 2.9. Economic weight of the GDP (billions of dollars)



*Group made up of 26 countries: Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, China, Fiji Islands, India, Indonesia, Kiribati, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa; Solomon Islands, Sri Lanka, Thailand, East Timor, Tonga, Vanuatu and Vietnam.

Source: International Monetary Fund, March 2011.

C *Biofuels*. In recent years, several structural factors (such as accelerated growth rates of emerging countries) and events (today, the nuclear crisis in Japan and the persistent unrest in some areas of the Middle East and North Africa) have weighed on the development of crude oil prices. Faced with soaring oil prices,[6] several countries have encouraged the production of biofuels.
The demand for food products will increase mainly due to population growth. This practice has found a significant following among farmers, in that it is supported by government subsidies and incentives (paid mainly by the European Union and the United States) and by particularly favorable prices. The FAO has estimated that in 2007-2008, the production of biofuels utilized at least 100 million ton of cereals, 4.7% of the world total. The produc-

BIOFUEL PRODUCTION HAS FOUND A SIGNIFICANT FOLLOWING AMONG FARMERS

tion of these fuels has created negative impacts for developing countries, in particular. The substitution effect that has been created, in fact, has not only pushed cereal prices up, but it has also generated an upward trend on all types of food.

THE WIDESPREAD USE OF FINANCIAL DERIVATIVE PRODUCTS BASED ON AGRICULTURAL COMMODITIES HAS CONTRIBUTED TO VOLATILITY IN PRICES

D *Currency Exchange Dynamics*. One of the main effects of the recent financial crisis was the increase in uncertainty in world currency markets. In global agricultural trade, the currency of exchange that still prevails is the U.S. dollar. Precisely the U.S. currency has depreciated significantly in some periods in relation to other currencies, mainly because of the economic recession in the U.S. The price of the dollar has made raw food materials particularly competitive for those countries that have benefited from the appreciation of their currency. Above all, this situation has triggered a greater demand by these countries and, subsequently, an increase in food prices over the medium-term among farmers, which is caused both by the increasing demand and the attempt to cover the unfavorable exchange rate. In addition, we have to take into account the impact of the huge volume of liquidity provided by the Federal Reserve in the global economic system over the past decade, through policies of quantitative expansion. Cheap money, in fact, tends to push up food prices because food can be considered a perfect commodity in an unbalanced market. Furthermore, this liquidity has been directed toward developing countries, for example China, where the inflationary impact is greater because of the fixed exchange rate.

THE WIDESPREAD USE OF FINANCIAL DERIVATIVE PRODUCTS BASED ON AGRICULTURAL COMMODITIES HAS CONTRIBUTED TO VOLATILITY IN PRICES

E *Financial speculation*. Part of the volatility in agricultural prices in recent years is also due to speculation. In recent years, in fact, the use of financial derivative products based on agricultural commodities has spread. The amount of money invested in commodity futures has exploded from an estimated $5 billion in 2000 to $175 billion in 2007. Over the past five years, the trading of these contracts has more than doubled and the high level of speculation inherent in these instruments has directly affected the level of the real prices of food: in essence, there have been actual financial activities of agricultural commodities.

Although expert assessments tend to differ with regard to the role played by speculative factors in determining food inflation (some experts contend that the exchange of commodity futures contracts did not have such significant consequences), there has been frequent criticism of the current trading system and exchange of basic necessities, occurring in specific commodity exchanges (the main ones are New York, Chicago and London). The most hostile judgments and widespread discontent emerged during the 2008-2009 surge in prices, caused largely by the massive attention investors paid to this type of goods, considered "safe havens" in times of economic instability and weakness in equity markets. In conclusion, there is, therefore, a mixture of finance and basic necessities, where the former, through the choices of investors and speculators, has the ability to adversely affect the efficient formation of the prices of food products.

F *Level of stock*. Regarding the low level of stocks, it is important to remember that, in terms of stocks that are too low compared to agricultural consumption, markets see a significantly reduced ability to cope with shocks on both the demand and the supply. This topic will be discussed more specifically in Chapter 3.

Willis D. Vaughn/National Geographic Image Collection

2.2.2 Food Supply

In general, it can be seen how the production (or supply) of agricultural commodities has increased over the years; on average, it turns out to be higher, in terms of growth rates, than the demographic shift. FAO data shows that 6.9 billion people[7] living in the world today have a food availability that is 15% higher compared to that of the four billion inhabitants of the planet in the Eighties. It is also estimated that the amount of daily calories produced per person is equal to 2,720 Kcal.

FROM A PURELY TECHNICAL AND QUANTITATIVE STANDPOINT, THE WORLD IS ABLE TO PRODUCE ENOUGH FOOD FOR EVERYONE

This means that, from a purely technical and quantitative standpoint, the world is able to produce enough food for all and that fact should be reflected in the improved wellbeing of the people; a situation which in reality does not occur, as evidenced by FAO data on the increase of undernourished people (about 925 million persons estimated for 2010).

The causes behind this phenomenon are multiple and complex.

MANY COUNTRIES THAT ARE KNOWN FOR THEIR CONSIDERABLE WEIGHT IN GLOBAL AGRICULTURAL PRODUCTION SHOW A WIDESPREAD PRESENCE OF UNDERNOURISHED PEOPLE

A *Processes of food distribution*. A first explanation lies in the pattern of food distribution and the national policies adopted. Some evidence has shown that, in many countries, despite their significant importance in world agricultural production, there is still a widespread presence of undernourished people. In this regard, it is estimated that about 75% of the countries that show signs of malnutrition are food exporters in the world.[8] An example is India, which – although there are about 238 million people living there in conditions of malnutrition – in 2000, some 60 million tons of cereals produced in the country were exported. This example – one of the many that international bodies and nongovernmental organizations have reported to the international community – demonstrates the inefficiency of the economic models of food distribution, which appear to favor the commercialization and monetization of food products, rather than the enhancement of food availability and access to it by all segments of the population. The proper functioning of the food market is a precondition for the reduction of malnutrition and hunger in the world. The market, in fact, has the task of promoting the efficient allocation of food to the population and, at the same time, to ensure an adequate financial return to all economic actors involved in the process. However, the market cannot always vouch for that. What is needed, therefore, in some contexts and areas, is intervention by supranational bodies which are able to define, regulate and implement actions and economic and social measures for that purpose.

POLICIES TO SUPPORT AGRICULTURE LOCALLY AND INTERNATIONALLY MUST BE PUT INTO OPERATION

B *Support policies*. Furthermore, in order to improve the allocation of resources for agriculture, policies to support agriculture locally and internationally must be put into operation.[9] In particular, productivity should be increased through public and private investments in support of small farmers (for example, investments in irrigation technology, seeds, technical, scientific and commercial support).

As mentioned at the beginning of the chapter, it is precisely the variability in yields and in the profitability of agricultural production that have led to an increase in the riskiness of investments in agriculture and a consequent decrease in investments, causing a general reduction in the yield of the land. According to FAO data, today the yield per hectare for cereals has recorded a productivity growth below 1% per year, compared with the annual growth of over 2%, with 5% for wheat recorded between 1960 and 1985. It seems evident that a lower investment in agricultural infrastructures and technology will lead to a gradual loss of productivity and to an overall reduction in food supply.

C *Market access*. For small farmers, who represent the majority of individuals living below the poverty level, food security is made possible, in part, by the degree of participation in the exchange of food products and, consequently, by a more or less free access to the input and output elements that constitute it. In general, the factors that determine market access regard covering the transaction costs, understood as transport, storage, information, finance and contracts.

THERE IS ALSO STILL THE PROBLEM OF PHYSICAL ACCESS TO MARKETS FOR SMALL FARMERS

Furthermore, there is also still the problem of physical access to the market. It has been shown that the quality of transport infrastructures has a major influence on access. For example, in developing countries, for 16% of the rural population (about 439 million people), it takes at least five hours of travel to reach a city of at least 5,000 inhabitants, whereas in Africa only 25% of the rural population can reach a city with more than 50,000 people in less than two hours of travel.[10] Finally, another form of physical barrier to access to agricultural markets is represented by the standards of quality and safety.

In fact, some of the cereal crops in developing countries, because of low seed quality, a greater susceptibility to infections, etc., do not meet the quality criteria of the developed nations, thereby preventing its export. Participation in and having access to the market require extreme efforts, especially by the poor. If we consider how a limited participation contributes to further reduce the wealth and increase the level of malnutrition of a territory, it can be inferred how the ease of market access, by reducing transaction costs and infrastructure development, is crucial for the future.

In essence, when we talk about access to the market we are referring to all input factors. Among these, one that deserves attention is the financial and credit market, which is absent in rural areas that are less inclined to fund farming in disadvantaged areas. The lack of financial support makes it impossible to carry out regular agricultural activities, if not in the logic of pure subsistence: it is, in fact, difficult to purchase machinery, seeds, land and fertilizers. In recent years, with the introduction of the practice of microcredit, it has been possible for the poorest segments of the population to have access to the market and reduce transaction costs.

Another possible starting point for making access easier is given by the distribution of land and its use. Often, due to past matters, forms of exercise of local power, of national policies and market distortions, access to land is bureaucratized and expensive, with a negative impact on food prices.

Small producers, who often boast higher yields per hectare than larger farmers, are in difficulty due to the lack of transparency in contracts for the lease or purchase of land. Situations of this kind are also created by a lack of information among the smaller farmers about prices and market conditions. Better access to market information, such as prices, volumes, trade policy and transport, would allow manufacturers to enjoy a clearer picture of the characteristics of the market, thus facilitating their position on the international stage, increasing the efficiency of their work and ensuring greater access to food.

A DYNAMIC FACTOR DISTORTING THE ASPECT OF AGRICULTURAL SUPPLY IS THE EXISTENCE OF TRADE BARRIERS

D *Trade barriers*. Another factor distorting the dynamics of the aspect of supply is the existence of barriers to agricultural trade, agricultural policies and subsidies. In recent years, the major cerealproducing countries (China, European Union, USA and India) have often been geared toward a reduction in volumes traded on international markets. This choice has led to a significant reduction in world food supply, which has helped increase price volatility in the market. Other policies have also created the conditions which restrict the flow of international trade; we are referring to all activities aimed at protecting their domestic market (customs duties, import quotas) or, conversely, at supporting it on the global scenario (export subsidies, agreements). It is clear how these

policies, implemented primarily in response to high food prices, are designed to generate direct benefits for the domestic market, but at the same time, given the strong inter-relationship between the markets, have the ability to create imbalances and short-term effects on world prices. The restrictions on agricultural trade policies described above are clearly the expression of a *beggar-thy-neighbor* behavior[11] by governments, and represent a serious problem for the trading-nations, in that it causes a reduction of the stability and predictability of market opportunities.

In this regard, recent history shows how, since the summer of 2010, the international price of wheat has started a trend of strong growth, triggered by Russia's announcement to suspend wheat exports in the wake of a very critical domestic situation caused by drought and fires. Since then, Ukraine, Belarus, Uzbekistan and Kazakhstan have banned or restricted the export of wheat, while in India, a de facto ban has been maintained on exports of wheat and rice since 2008.

A further example of the negative impact of market restrictions stems from the ongoing negotiations of the Doha Round. It is estimated that an agreement to reduce barriers to international trade on food products would help developing countries with an increase of about $40 billion in annual exports.

However, opening up to international trade in all countries, while on the one hand, is a desirable and necessary choice for alleviating the distorting effects of subsidies and protectionist measures, on the other, it is not in itself sufficient, but must be accompanied by parallel policies of economic and social steps to limit the risks of such aperture, especially for the most vulnerable populations. During the crisis in food prices of 2007-2008, the countries most affected in terms of access to food were actually those which were the most open, precisely because of the absence of sufficient economic and social safety nets. Therefore, a profound rethinking of trade, agricultural and social policies at the local, national and international levels is of fundamental importance..

ADVERSE WEATHER CONDITIONS AND OTHER NATURAL DISASTERS HAD A CONSIDERABLE INFLUENCE ON THE CEREAL HARVEST IN THE 2005-2010 PERIOD

E *Climate change*. Another critical aspect with regard to supply is the environmental/climate factor.

Adverse weather conditions (drought, floods, extreme events) and other natural disasters had a considerable influence on the grain and cereal harvests in the period 2005-2010. The effects on production were manifested in an increase in the level of uncertainty present in the markets and an increase in prices. While these natural events have always been an obvious risk factor for food production, an exacerbation in terms of both frequency and severity due to the climate change in progress is expected. Recently, in fact, natural events which may be responsible for a reduction in supply have been numerous; including floods in Pakistan and Australia (which reduced the supply and simultaneously increased the demand), drought in Argentina – the world's third largest exporter of seeds for oil –, the natural disaster that occurred in Japan and, unfortunately, many others..

THE PRICES OF ENERGY HAVE ALSO HAD AN IMPACT ON THE VOLUME OF THE OVERALL SUPPLY AND PRICE OF FOOD

F *Energy Sources.* The prices of energy have also had an impact on the volume of the overall supply and price of food. In fact, increases in oil prices have a direct impact on fertilizer prices and transport, adding to production costs and ultimately determining reduced production levels, especially for small and medium-size farmers. The International Monetary Fund has predicted that 2011 will be also characterized by pressure to raise oil prices, due to the continued dynamics of the strong demand and, on the contrary, the supply which is too weak and slow if compared to market conditions. As a result, the projection of the IMF in relation to the base price of oil for 2011 is $90 per barrel, compared to the forecasts of October 2010 ($79 per barrel[12]).

More in general, for non-oil commodities, weather damage to crops was greater than had been predicted for the end of 2010. Therefore, it is expected that prices will start to decrease only after the 2011 agricultural season. In this regard, the IMF estimated that non-oil commodity prices will undergo an average increase of 11% in 2011.

IT IS EXPECTED THAT PRICES WILL START TO DECREASE ONLY AFTER THE 2011 AGRICULTURAL SEASON

As we have seen, to ensure an adequate level of food security, it is necessary to ensure the proper functioning of the food market. What is produced must not only be sufficient but also accessible. To ensure that people have full access to food, it is essential to act on the complex system of structural and economic factors that have an impact on the supply and demand for food. In this regard, it is particularly effective to invest in the development and structuring of social and economic models capable of ensuring an efficient allocation of resources and adequate economic returns for farmers.

This, in fact, allows them to invest in rural infrastructures, human capital and scientific research, in order to implement all the strategies for rapid growth as to wealth and in the area of food security.

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3. GLOBAL GOVERNANCE AND INTERNATIONAL POLITICS

POLITICS PLAY A FUNDAMENTAL ROLE IN SEARCHING FOR SOLUTIONS TO THE ISSUE OF POVERTY AND MALNUTRITION IN THE WORLD

The most important and decisive factor for the future is the role institutions and policy makers can play in identifying the causes of poverty and malnutrition in the world and in finding solutions to these problems. This is even more relevant in view of the way in which food is becoming - once again in the 21st century - a strategic superiority factor that is as important as energy and defense. Therefore, the notion of governance has taken on an increasingly relevant role in the political agenda of national and international institutions.

The term "governance" means the management of political affairs by one or more countries at all levels (economic, political and administrative) in terms of effectiveness, responsibility, rule of law, political stability and wellbeing of the population. Today, governing the problems besetting the world is the great challenge facing both countries and institutions.

NON-HOMOGENEOUS AND UNCOORDINATED POLICY INTERVENTIONS DO NOT PRODUCE EFFECTIVE RESULTS, NOR DO THEY REDUCE MALNUTRITION AND POVERTY

In this connection, it is important to stress that, in order to eradicate malnutrition and poverty, it is necessary to adopt a political management approach. This should be characterized by a common vision, with complementary and unique goals and action plans. Non-homogeneous and uncoordinated policy interventions do not produce effective results, nor do they reduce malnutrition and poverty. These are the reasons that led Kofi Annan, the seventh United Nations Secretary General, to state that "good governance is perhaps the most crucial factor to eradicate poverty and to promote development."

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3.1 GLOBAL GOVERNANCE IN THE FIELD OF FOOD SECURITY: MODELS, GUIDELINES, RECOMMENDATIONS PROPOSED BY SOME KEY INTERNATIONAL ORGANIZATIONS

«We, Heads of State and Government, [...] reiterate the right of all people to have access to safe and nutritious food, in line with the right to adequate nutrition and with the fundamental right of each and every person to be free from hunger."[1] This statement by the Heads of Government on the occasion of the 1996 Rome World Food Summit is still considered today the *fil rouge* of global governance in terms of access to food.

Even more significant is the recognition of the central role of nutrition as a fundamental human right, probably for its longstanding historical context. Art. 25 of the *Universal Declaration of Human Rights*, adopted in 1948, states that "each individual has the right to an adequate standard of living for his and his family's health and wellbeing, including nutrition."

THE HEADS OF STATE HAVE ALWAYS ACKNOWLEDGED THE IMPORTANCE OF ACCESS TO FOOD

This shows that Heads of State have always acknowledged the importance of access to food but, in the current context of political and economic instability, this pervasive phenomenon is running the risk of being downgraded to a minor issue. Consequently, it is extremely important for countries' agendas to recognize that the 925 million malnourished people in the world need immediate help and that this can only be provided through policies geared to future sustainability.

ON THE WHOLE, MANAGEMENT POLICIES SEEM TO HAVE FAILED IN THE ATTEMPT TO CONTAIN THE NEGATIVE IMPACT OF THE CRISIS AT THE GLOBAL LEVEL

In fact, on the whole, management policies seem to have failed in the attempt to contain the negative impact of the crisis on a global level. A case in point is the inability to manage, at the international level, the abrupt spikes in agricultural commodity prices, as happened in 2006-2008 and as is still happening.

Unfortunately, notwithstanding the innumerable public statements claiming that access to food is one of the most disquieting global challenges today, adequate policies to contain and to drastically reduce this plight have not yet been identified. In fact, food governance does not always give priority to the access to the natural, public and financial resources needed to allow people to adequately feed themselves and their families (with dignity).

Considering the numerous subjects involved (countries, institutions, organizations etc.), as well as the complex interactions among them, it is not possible to conduct a detailed analysis of all the current positions and proposals here. In fact, the following paragraphs only focus on the guidelines, the models and the positions of some of the most important actors in the field of food security global governance and the statements and the results of some of the most relevant and recent summits and international conferences on this theme.

However, it is important to recall the three universally recognized pillars of governance:

Geopolitics of the global food crisis: relevant variables

It is possible to identify at least six relevant variables in terms of food security, which today – and even more so in the future – will have an impact on international geopolitical equilibriums. These factors have already been extensively discussed in the previous chapter. But here they are briefly investigated, especially in terms of their possible food security, political and governance implications.

1. First of all, in the field of food security – defined as security in terms of production and supply of staple foods – a new and broader geostrategic role is claimed by emerging powers such as India, China, Brazil, Russia, Saudi Arabia, Nigeria, South Africa and South Korea because of their population and GDP performance. First of all, these countries are consumer markets, characterized by the advent of a middle class with changing diets and habits. It has been estimated that by 2020, the population in these areas of the world will grow by 40% and most of them will consume meat, milk and bread rather than rice. However, these countries still have a very fragmented agricultural sector, with small, local, farm producers.

2. From the economic point of view, social and demographic changes often result in the attempt by governments to strengthen domestic production, to support the economy and to reduce their dependence on foreign supplies. This objective is being pursued by raising duties and non-tariff barriers to imports, and by providing high subsidies to the national agricultural sector.

3. Another impact on food security comes from the current climate changes (see the section in Chapter 4), characterized by an increase in unpredictable weather conditions which make it more difficult to plan harvests and export quotas.

4. A further critical element, which contributes to increasing the strategic role of agricultural productions, is oil prices and, more in general, the great global energy challenges. There are at least two aspects to be highlighted in connection with the effects of the fluctuations of crude oil on the agricultural market: on the one hand, there has been an increase in the costs of transportation and logistics for trading food and in the sale price of fertilizers; on the other, major foodstuff-importing countries – which are also oil importers – will have a growing "energy bill."

5. Another – and still controversial – impact on food security derives from the development of the market of biofuels (bioethanol, biodiesel, rapeseed, palm oil and other fuels). The possibility to have a clean energy source to replace fossil fuels has undoubtedly great appeal. Fragile countries and weak economies are, in fact, trying to undertake the risky business of commodities crops for the production of biofuels, an investment which is mainly stimulated by sovereign Funds.

6. Finally, there is the non-negligible land grab phenomenon, which can be considered a great opportunity for development but which - without a regulatory framework and without adequate political and administrative governance - runs the risk of becoming what the FAO secretary general Jacques Diouf called "neo-colonialism."

In the end, it is necessary to consider that the recent trends of the aforementioned variables and the global food crisis have led to a radical change in the virtual value of food products.

As already mentioned in the previous chapter, food is once again becoming a strategic superiority factor, like energy and defense. The price of commodities and the relative dependence of some countries have led governments to strengthen their exclusive sovereignty in the food sector.

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- The *investment in food aid and in the food security networks* to the benefit of the most needy individuals;
- The increase in *agricultural investments*[2] and the promotion of *development policies*;
- Different *International trade policies* between developed and developing countries.

3.1.1 The twin track approach and the right to food in the context of food security global governance: the FAO's position and proposals

IN ORDER TO REACH THE FIRST MILLENNIUM DEVELOPMENT GOALS AND THE ONES OF THE WORLD FOOD SUMMIT, CONCRETE ACTIONS AND MAJORS EFFORTS ARE NECESSARY AT THE GLOBAL LEVEL

The upward trend in malnutrition in the world and the numerous threats and challenges for global food security suggest that in order to reach the first Millennium Development Goals (MDG)[3] and the ones of the World Food Summit,[4] concrete actions and majors efforts are necessary at the global level.

In order to deal with these challenges, governments will have to adopt a twin-track approach, which should be exhaustive and consistent in defining and implementing food security and poverty reduction policies. This approach is expected to include:

- Measures designed to *increase agricultural production*, especially by small farms;
- Measures to carefully *develop social security and protection networks* for the weakest segments of society in terms of food security.

GOVERNMENTS WILL HAVE TO FOLLOW AN APPROACH INCLUDING MEASURES DESIGNED TO INCREASE AGRICULTURAL PRODUCTION AND ALSO TO CAREFULLY DEVELOP SOCIAL SECURITY AND PROTECTION NETWORKS

The institutional context of each country – with its organizations and institutions and their relative powers and interests, as well as the formal and informal rules governing the interactions among the stakeholders – will define how these two tracks are to be implemented.

The FAO[5] said that the failed attempt to successfully reduce hunger has been mainly caused by the failure of food security global governance: fragile institutions, the lack of effective coordination and of strong participation on a global, regional and national level actually hamper the implementation of sound food security plans.

Moreover, according to the FAO, the human right to food[6] and its principles, especially the ones related to responsibility, good governance, participation and to secure and sound institutions, can be the reference framework for coalitions and alliances, so as to give voice to a broad range of stakeholders and to involve even the most vulnerable groups.

ONCE STATED THAT FOOD IS A FUNDAMENTAL HUMAN RIGHT, INDIVIDUALS SHOULD HAVE THE POSSIBILITY TO CLAIM THEIR RIGHTS

Once stated that food is a fundamental human right, individuals should have the possibility to claim their rights

Once stated that food is a fundamental human right, individuals should have the possibility to identify the responsibilities of their governments and, possibly, to claim their rights. This can improve the action of individual governments, thus ensuring that the measures defined in the first and in the second track be effectively and successfully implemented.

That is why, according to the FAO, the right to food will represent the third fundamental track and "the guidelines on the right to food"[7] – unanimously adopted by the FAO member states in 2004 – already provide a conceptual reference framework at the global, regional and national level.[8]

3.1.2 The decisions adopted by the Committee on World Food Security (CFS) – 36th edition

A REFORM WAS ADOPTED WITH THE AIM OF BECOMING THE BUILDING BLOCK OF AGRICULTURE AND FOOD SECURITY GLOBAL GOVERNANCE

The Committee on World Food Security convened its 36th session in the first half of October 2010 at the FAO in Rome. The meeting was organized to intervene and decide on key issues linked to food security and nutrition, such as land ownership and international investments in the agricultural sector, the volatility of food prices and the strategies to deal with the theme of food insecurity in cases of prolonged crises. This meeting led the foundations for a reform designed to become the building block of agriculture and food security global governance. The Committee welcomed the results of the three round tables on the following subjects:

1. "Dealing with the issue of food insecurity during a prolonged crisis: problems and challenges;"
2. "Land ownership and international investments in the agricultural sector;"
3. "Management of vulnerability and of the risk of promoting food security and a better nutrition."

And on these three themes[9] the Committee undertook the following commitments:

1. Examine possible future steps to deal with food security in countries beset by prolonged crises caused by conflicts or natural catastrophes and gather, if possible, a high-level expert panel to define an action plan for the group of countries in situations of prolonged crises; adopt the crucial decision to promote access to food as the future pillar of agriculture and food security global governance, on the basis of a consultation process to draft the first version of the Global Strategic Framework for Food Security and Nutrition (GSF) by October 2012 and to regularly adjust it on the basis of CFS recommendations and decisions. This will be a global strategic framework for food and nutrition security designed to better coordinate the international efforts in the fight against hunger on the basis of the suggestions received from the countries and the stakeholders worst hit by the crisis.
2. "Encourage the continuous development of the Voluntary Guidelines on Responsible Governance of Tenure of Land and Other Natural Resource" to promote international investments in the field of agriculture and the fight against the land grab phenomenon;
3. Ask its panel of international experts to evaluate and formulate recommendations on the causes and consequences of food price volatility (including market distortions and the relationship with the financial markets) and to identify adequate and consistent policies, actions, instruments and institutions in general in order to: manage the risks related to the hyper-volatility of prices in the agricultural sector; protect the access to food of vulnerable nations and populations when volatility provokes market distortions; reduce this volatility through social and production security programs; and review the evaluations of the effects of climate change on food security and nutrition.

Finally, the Committee acknowledged the relevance of the following points raised during the discussion:

1. Food security and nutrition are horizontal issues which require a multidisciplinary

multistakeholder framework at the national and regional level;
2. The regional initiatives add value and provide support to the national efforts in dealing with the issue of food insecurity and malnutrition;
3. Regional and interregional cooperation is a useful tool for sharing knowledge and bestpractices;
4. It is crucial to raise the resources needed to make the regional context operational.

3.1.3 The food security action plan launched by the G20 in Seoul

THE G20 SUMMIT IN SEOUL REITERATED THE CENTRAL ROLE OF FOOD SECURITY

The recent G20 summit in Seoul reiterated the central theme of food security, stating that it is one of the nine "fundamental pillars" defined by the G20 for which urgent actions and reforms are needed in order to guarantee sustainable economic growth and a recovery in developing and low-income countries.
On this occasion, the G20 representatives stressed the need for more investments and greater financial support for agricultural development through the Global Agriculture and Food Security Program (GAFSP), but not only. In fact, they appealed to the private sector, because its financial support plays a strategic and important role in the fight against hunger in the world.
The following is a list of medium-term actions approved by the G20:

Action 1: Adoption of more consistent and coordinated policies:
- In order to strengthen the current research systems in the agricultural sector, the FAO and the World Bank shall examine and suggest result-based mechanisms by March 2011, such as the ones analyzed by the Consultative Group on International Agricultural Research (CGIAR).
- Countries shall definitely implement the commitments already undertaken in the field of food security and sustainable agricultural development; the G20 commitments shall be verified and analyzed, asking the FAO, the World Bank and the OECD – in collaboration with L'Aquila Food Security Initiative (AFSI) – to monitor their progress and to report the results to the Summit to be held in France (March 2011 for the preliminary report; June 2011 for the final one).
- Important international organizations – including the UN Committee on World Food Security (CFS) – shall identify the possible gaps to be filled and the opportunities to be seized so as to make food security policies more consistent, also in line with the Rome Principles. The work is expected to enhance the potential of the agricultural sector so as to promote sustainable economic growth and the reduction of poverty, by strengthening the commitment of the private sector (March 2011 for the preliminary report; June 2011 for the final one).

Action 2: Reduction of price volatility risks and greater protection of the most vulnerable segments of society:
- The FAO, IFAD, the IMF, the OECD, UNCTAD, the WFP, the World Bank and the WTO shall work together with other stakeholders to propose strategies designed to reduce and manage food and agricultural price volatility without market distortions. The ultimate goal of these strategies shall be the protection of the most vulnerable countries and subjects. The World Bank shall work with other ad-hoc international agencies so as to develop measures to improve information on national and regional food stocks and food production projections, to conduct nutritional interventions for the weakest groups and to ensure access to humanitarian aid (March 2011 for the preliminary report; June 2011 for the final one).
- These Agencies shall also promote tenders for small producers and foster their market access, in line with national and regional strategies (mediumterm).
- Finally, the G20 representatives shall encourage all countries and companies to support the Responsible Agricultural Investment principles. As a result, UNCTAD, the World Bank, IFAD, the FAO and other international organizations shall promote responsible investments in the agricultural sector (March 2011 for the preliminary report; June 2011 for the final one)[10].

To conclude, the G20 representatives accepted the Rome principles, which are designed to make policies more consistent on a global level and to mitigate risks in terms of sustainability of agricultural production, access to food, nutrition and crisis prevention.

3.1.4 Guidelines proposed during the 2010 United Nations Private Sector Forum on the Millennium Development Goals

The food security issue was discussed during the 2010 United Nations Private Sector Forum on the Millennium Development Goals, which was held in New York on September 22, 2010.
During the Conference, extremely relevant issues were debated for reducing poverty and hunger in the world. In fact, the Forum focused on the importance of the private sector in stimulating economic growth and employment and, thus, the wellbeing of countries, to which nutrition is closely related.

FOOD-PRODUCING COMPANIES AND FARMS HAVE PROVIDED A BROADER RANGE OF LOWCOST AND HIGH-QUALITY FOOD TO POOR CONSUMERS

As already pointed out, food-producing companies and farms have provided a wider range of low-cost and high-quality products to poor consumers. In fact, with adequate incentives, the private sector can make effective and sustainable investments; it can provide unique knowhow and major innovative solutions to contribute to eradicating hunger.
The private sector often cannot fully capitalize on the many possible opportunities to combat poverty and improve food security. In fact, most poor farmers are not yet able to buy raw materials and the technologies needed to carry out their activity at affordable prices.[11]

OFTEN, THE PRIVATE SECTOR CANNOT FULLY CAPITALIZE ON THE MANY POSSIBLE OPPORTUNITIES TO COMBAT POVERTY AND IMPROVE FOOD SECURITY

And this is the reason why it is important to stress the strategic importance of funding the private sector, in particular food-producing farms – and the key role of collaboration between the public sector and the private sector in the fight against hunger.
To conclude, these are the following solutions proposed to reduce hunger in the world:
- Explore new public-private partnerships and business models so as to extend the supply-chain, to create jobs and income for low-income populations in various sectors, especially in the fields of agriculture and nutrition;
- Strengthen the capacity and the output of small farmers, thus allowing them to access market opportunities at the local, national and global level;
- Implement further effective and innovative actions.

3.1.5 Non-distortive measures to support agriculture: the proposals of the High Level Expert Forum

IN ORDER TO ENSURE ACCESS TO FOOD FOR ALL, IT IS IMPORTANT TO DESIGN AN ADEQUATE SYSTEM OF INCENTIVES FOR AGRICULTURE

In order to ensure access to food for all, it is necessary not only to invest to improve agricultural production, but also to design an adequate system of incentives for agriculture, both for developed and for developing countries. At the same time, it is crucial to minimize their distortive effects, which can be extremely negative for the poorest countries and for the weakest segments of the population in the world.

Over the years, with the diminishing role of the primary sector, developed countries (the United States and the European Union, in particular) have introduced a series of support measures for agriculture in order to stimulate domestic production. These measures have made it possible to increase the profitability of domestic agriculture, limiting its variability and protecting it, for example, from the effects of adverse natural events.

However, these policies can create major distortions on the international agricultural markets (for example by decreasing prices and reducing the demand for imports), thus creating longterm economic disincentives for agriculture in developing countries.

IT IS CRUCIAL TO PROVIDE INCENTIVES IN THE FIELD OF AGRICULTURE IN DEVELOPING COUNTRIES, ALTHOUGH THESE POLICIES CAN CREATE STRONG DISTORTIONS ON THE INTERNATIONAL AGRICULTURAL MARKETS

At the same time, it is crucial to provide incentives to agriculture in developing countries because agricultural development plays a central role in the framework of economic development. The need to avoid distortive effects is seen at the level of the current debate on decoupled support, that is, agricultural policy measures which have a more limited impact on sowing and production decisions. The shift from direct agricultural support to decouple support measures has led to a greater variability in farmers' revenues. In order to counteract this adverse effect, public and private insurance policies have been designed which, however, may have distortive effects. For this reason, these insurance policies must be designed in a more sophisticated way and they have to be linked to less distortive instruments, such as modern financial risk management instruments.[12]

A second economic governance area is international trade policies, whose effects differ depending on whether they are implemented by developing countries or by developed countries. Some distortive policies are tariff and/or non-tariff barriers and export subsidies.

Although protectionist measures are sometimes necessary to support other domestic agricultural policies, their abuse may be detrimental.

Finally, as already pointed out, safety nets for small farmers are fundamentally important to limit the vulnerability of the weakest segments of society.

3.1.6 Agricultural policies and food crises in Africa: the point of view of farmers' organizations and of the African Network on the Right to Food

THE FOUR AFRICAN REGIONAL FARMERS' ORGANIZATIONS ASK FOR THE RECOGNITION OF THE RIGHT OF EACH COUNTRY TO ADOPT AGRICULTURAL AND COMMERCIAL POLICIES GEARED TOWARD FOOD SOVEREIGNTY

The joint Declaration[13] on the status of African agriculture by the four regional networks of African farmers' organizations (EAFF, PROPAC, ROPPA, UMAGRI)[14] reads that poverty, dependence and food insecurity are already very significant in Africa, and they may exacerbate, following uncontrolled liberalization and a considerable opening up of their agricultural and food markets, as envisaged in the WTO agreements and in the economic partnerships promoted by the European Union.

For this reason, these organizations ask that the right of each country be recognized to adopt agricultural and commercial policies in order to reach food sovereignty and to meet their food requirements through regional products. They ask that the major role be acknowledged which family agriculture plays to ensure food security, to fight against poverty and to promote economic and social development in Africa; that land laws be adopted which explicitly protect small farmers and vulnerable groups (women, young people and minorities); that technologies be developed for the sustainable management of natural resources, the protection of the environment and biodiversity; and that producers be prepared to effectively adjust to climate changes.

As to world governance in the field of agriculture, the members of the African farmers' organizations do not believe that it is necessary to set up new ad hoc institutions, but they think that governance should be designed and implemented within the framework of the United Nations, with a greater participation of professional agricultural organizations.

Finally, it is important to increase investments for small farmers and small family-based farms and, consequently, for their professional organizations.

ANOTHER MAJOR ACTOR IN THE FIGHT FOR THE RIGHT TO FOOD IN AFRICAN COUNTRIES IS THE AFRICAN NETWORK ON THE RIGHT TO FOOD (ANORF)

Another major but less-renowned actor which conducts a daily fight for the right to food in African countries is the African Network on the Right to Food (ANoRF). ANoRF is a pan-African network founded in July 2008 in Cotonou, Benin, whose mission is to represent Africa in the fight for a world that is free from hunger and to promote and protect the right to adequate nutrition in the African continent.

In order to attain t his goal, i.e. freeing Africa from hunger, ANoRF identifies a series of concrete objectives and actions, with the following guidelines for the activity of the network:

- Inform decision-makers and communities on economic, social and cultural rights, in particular the right to adequate nutrition and the obligations stemming from this;
- Support and strengthen the power of decision-makers and communities so as to enforce the right to adequate nutrition.

Instead, from a very practical point of view, ANoRF manages the activities of the national coalitions present in each member state to harmonize their work. In fact, these coalitions gather civil society and farmers' organizations which fight to promote the right to adequate nutrition and to implement regional action plans.

3.2 THE INSTRUMENTS TO OPTIMIZE GOVERNANCE ACTIONS IN THE FIELD OF FOOD SECURITY

These considerations emphasize that political actions and public interventions must support the role of the market, seen as the space where private (and public) supply and demand for goods and services meet and as a point of equilibrium of different needs.

Unlike other commodities, raw materials and agricultural products do not have a single regulated market at the global level. In fact, there are many regional/local markets regulated by supply and demand, stock levels, agricultural productivity and different trade policies.

Often, this fragmentation does not allow for controlling pricing and access/distribution mechanisms, or for adopting viable solutions at the international level.

GOOD GOVERNANCE ACTIONS ARE NOT MEANT TO REPLACE MARKET POLICIES, BUT THEY ARE DESIGNED TO ENSURE THAT THE MARKET WORKS PROPERLY

Given the fact that good governance actions are not meant to replace market policies, but to ensure that the market works properly, it is important to mention the instruments that are able to accelerate the economic and social development of developing countries. In fact, these instruments can be used to reduce the number of malnourished people, but they are not consistently utilized at the global level.

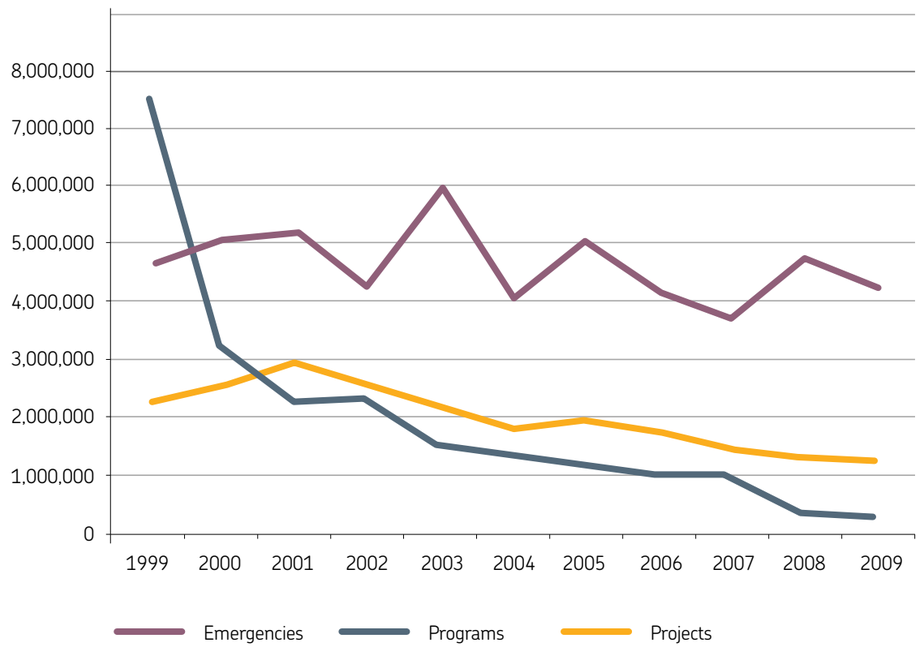
The first instrument is support to ensure and optimize political and institutional governance in developing countries, which are not always ruled according to the principles governing the political life of Western democracies. In fact, there are numerous cases of dictatorship and kleptocracy. Some specific problems require targeted measures. But, in general, supranational organizations should support knowledge and knowhow transfers to optimize political governance and to identify the areas and the processes which deserve structural reforms and changes. Governments (especially in developing countries) should be adequately supported so that they adopt a series of actions, reforms and behavior with a unitary and systemic approach, with stringent control of corruption and of market dominant and distortive positions. This is one of the best instruments for dealing with the issue of malnutrition.

Another tool successfully utilized by international institutions is Food Aid. This is humanitarian aid in the form of cash flow and food to support the Food Assistance Programs for poor countries. Humanitarian aid started in the second half of the last century and was adopted at the institutional level by the United States and Canada in 1954. A consistent approach to food aid at the international level was adopted only in the early '70s with the launch of the United Nations World Food Programme, today the main aid program.

UNFORTUNATELY, TODAY FOOD AID IS NO LONGER SO WIDELY USED

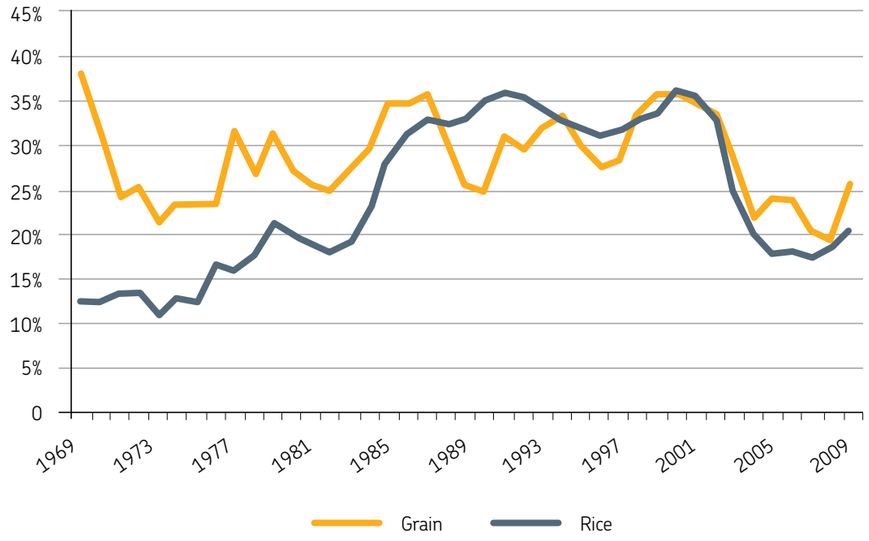
Unfortunately, today Food Aid is no longer so widely used. In fact, if in 1988 global aid – the sum of all the actions to deal with emergencies and aid programs and projects – amounted to about 14 billion tons of distributed food, in 2008 this amount was reduced

Figure 3.1. Global aid by type, 1999-2009 (tons of food)



Source: UN – World Food Programme, March 2011.

Figure 3.2. Ratio of stocks vs. consumption of agricultural products, 1969-2009 (%)



Source: The European House-Ambrosetti work on the data from United States Department of Agriculture, Foreign Agricultural Service, 2011.

to 6.2 billion tons and in 2009 (the last available data) it was further reduced to 5.5 billion tons. The quantitative decrease in the use of this type of aid in the last 10 years is really very disquieting: in fact, the overall amount of the three types of aid mentioned above dropped by 62.5% since 1999.

There are many reasons for this decrease. The main one is linked to the global economic crisis which, in the last few years, has adversely affected major economies from the financial point of view. In particular, the crisis has significantly hit the United States and the European Union member countries, which together account for 77% of total donations.[15]

There are diverging opinions on the efficacy of Food Aid, and the same applies to criticisms against them. Actually, these instruments are highly useful in the short- and medium-term, provided they do not lead to dependency on the part of the recipient countries. It is important to remember that poverty cannot be eradicated by merely donating money and food, but by creating the conditions for economic and social development.

POVERTY CANNOT BE ERADICATED BY MERELY DONATING MONEY AND FOOD, BUT BY CREATING THE CONDITIONS FOR ECONOMIC AND SOCIAL DEVELOPMENT

A further aspect to be carefully considered by policy makers is how to manage cereal stocks. In fact, while up to the '70s, there were organizations of private raw material producers that could ensure market and pricing regulation through compulsory stocks for all members, in the '90s the decrease in agricultural prices due to globalization led many producers to leave these organizations, in part to avoid stocking food and agricultural products with constantly decreasing prices (in real terms). The system became "deregulated" in a natural way, without replacing these private organizations with an official system of governance. This was also due to the lack of interest in this sector at the international level, considered to be mature and not very important from the political and economic standpoint. All this has resulted in the current inadequate stock management situation. As shown in graph 3.2, 2008 was the year with the lowest level of stocks since the '60s.

Finally, perhaps the most adequate instrument is the recourse to regulations and directives in the agricultural sector because of their political and legislative relevance. In this way, governments can actually influence market policies and their structure by supporting prices and farmers.

Ed Kashi/National Geographic Image Collection

3.3 CONCLUSIVE CONSIDERATIONS: CHALLENGES AND POSSIBLE RESPONSES

If the international community is not able to find effective food security governance solutions and to intervene with new instruments, the current population trends and the rate of climate change run the risk of exacerbating the food crisis in the next few years and the development goals defined by the United Nations will not be achieved.

THE INTERNATIONAL COMMUNITY WILL HAVE TO FIND EFFECTIVE FOOD SECURITY GOVERNANCE SOLUTIONS AND TO INTERVENE WITH NEW INSTRUMENTS, WITH RESPECT TO THE PAST

The main challenge facing policy makers will be the *trade-off* between economic development, environmental protection and food security and between local, national and international interests.

By capitalizing on the results of the latest international summits and on the on-going debate at the global level, the recommendations to strengthen global food security governance can be summarized as follows:

SOME RECOMMENDATIONS TO STRENGTHEN GLOBAL FOOD SECURITY GOVERNANCE

– Promote technology investments to maximize potential in terms of agricultural production, water conservation, the fight against overconsumption and prevention of water table pollution. Promote the use of new technologies in the field of agriculture to save water and to rationalize the "drop per product" coefficient;"
– Expand the crop capacity of land which is not cultivated because of lack of short-term economic objectives. In Cameroun, for example, 40% of the land is left uncultivated, notwithstanding its good condition and a very high unemployment rate;
– Promote the transfer of scientific knowledge and of "good practices" to small farmers, as well, through organizations that may act as links between research centers and farmers;
– Draft a stringent international code of conduct and scientific research which should not go beyond the limits of shared ethical principles for the use of genetically modified organisms (GMOs), as proposed by the FAO;
– Foster a concrete, realistic and feasible commitment to fight against climate change;
– Launch food education policies to allow for gradual shifts in dietary and consumption habits in emerging countries and to limit dietary habits with a strong impact on the environment in industrialized countries;
– Review the system of subsidies and trade barriers in order to go beyond the short-term perspective, according to which, supporting an economic sector jeopardizes the subsistence of millions of people;
– Encourage cross-boundary technical cooperation to avoid future wars to control water courses;
- Introduce mechanisms which are able to better supervise the markets of agricultural commodity derivatives in order to limit speculation.

4. NATURAL RESOURCES AND CLIMATE CHANGE

Jodi Cobb/National Geographic Image Collection

4.1 NATURAL RESOURCES AND FOOD PRODUCTION

NATURAL RESOURCES ARE ESSENTIAL FOR FOOD PRODUCTION, RURAL DEVELOPMENT AND SUSTAINABLE GROWTH

Natural resources – soil, water, air, energy sources, climate, biodiversity – are essential for food production, rural development and sustainable growth.

As pointed out in the previous chapters, the current profound, structural transformations (population growth, economic development, increase in energy demand, urbanization etc.) call for attaching greater importance to the systematic management of natural resources. In fact, there is mounting pressure on natural resources in different regions of the world and growing concern as to how to use them more efficiently, how to preserve them and how to limit the negative effects of economic development. Competition for exploiting and hoarding scarce and unequally distributed resources generates conflicts, violence and the impoverishment of this common natural heritage. This situation may become exacerbated by changing crop requirements due to climate change, extreme weather conditions and scarce water supply.

In the first half of this century, the global demand for food, fodder and fibers is estimated to almost double,[1] while agricultural products are going to be increasingly used not as food but as biofuels. Farmers will be forced to adapt to climate change and to respect natural habitats. Thus, they will have to compete with urban dwellers for land and water resources. Moreover, arable land is expected to become drier and degraded, posing a major challenge for the agricultural sector, which will be required to produce a higher amount of food on smaller and smaller plots.

LAND DEGRADATION AND CHANGE IN ITS USE MAY LEAD TO A REDUCTION IN THE AMOUNT OF ARABLE LAND BY 8-20% BY 2050

In fact, it has been estimated that, without incisive corrective actions, land degradation and change in its use may lead to a reduction in the amount of arable land by 8-20% by 2050. In addition, the joint effects of lack of water, climate change and pest infestations may reduce the current production by another 5-25%.[2] However, this is only one aspect of this multifaceted issue; the indirect effects – social and economic repercussions – may be even stronger. The more limited availability of arable land will have an impact on the incomeproducing capacity of rural populations in countries whose economic sustainability is based on food exports. Moreover, the increasing spread of diseases and contamination of agricultural products jeopardizes the security of the whole food chain and the health of individuals.

The second part of this chapter focuses on the main challenges/threats that will have to be dealt with in the next decades, in order to protect agricultural productivity and meet the food requirements of a growing global population. These challenges/threats are:

1. Risks related to shrinking croplands and land use competition;
2. New global biofuel-oriented policies;
3. Land degradation;
4. Land grab.

4.1.1 Risks related to shrinking croplands and land use competition

THE EXPANSION OF GRAIN CROPLAND MAY OCCUR TO THE DETRIMENT OF BIODIVERSITY

Over the last five decades, the increase in agricultural commodity production was obtained by pushing productivity up (about 78% on the whole), which in turn was made possible by the use of fertilizers and irrigation, by the expansion of arable land (15%) and by increasing crop density (7%)[3].

An increase in crop yield is necessary to meet future food requirements. However, only part of these needs will be met using past agricultural practices (fertilizers and better irrigation) and the expansion of land destined to grain crops may occur to the detriment of biodiversity.

Out of 13.5 billion hectares in the world, at present about 8.3 billion (61%) are earmarked for grazing and woodland, while only 1.6 billion are allocated for agriculture.[4] Another two billion hectares are considered to be suited for irrigated crops (figures 4.1 and 4.2), but they are mainly covered by woods, swamps and plants that are important for the preservation of biodiversity and for the absorption of CO_2.

In sum, although 90% of the future growth in agricultural production is expected to derive from the increase in crop yields and from greater crop intensity, in order to meet global food requirements, croplands will have to be expanded in the next few years by about 120 million hectares in developing countries, especially in Sub-Saharan Africa and in Latin America. In Asia, further increases will not be possible because about 95% of potential cropland has already been used.

Moreover, it is important to stress that, although there is still sufficient arable land in the world to increase production, most of these areas are suited only for certain crops and are located in a limited number of countries.[5]

In addition, part of this land is exposed to urbanization. In fact, a large number of countries in the Middle East, North Africa, and South Asia have already reached or are about to reach their limit of available land. Urban development, industrial development and the construction of infrastructures such as railways, roads and bridges have all changed the way in which land has been used over time and in some cases they have led to land degradation.

IF THE URBAN EXPANSION OCCURS TO THE DETRIMENT OF AGRICULTURE, BY 2030 ABOUT 0.37 MILLION KM^2 OF LAND WILL NO LONGER BE USED FOR CROPS

On the basis of current growth projections of the urban population,[6] the urbanized areas or the ones used for infrastructures are expected to expand from 0.4% of the total global amount of land in the year 2000 to 0.7% in 2030, and to 0.9% in 2050 (about 1.2 million km^2). The ratio of "built-up" areas vs. croplands was 3.5% in the year 2000, while it is expected to reach 5.1% by 2030 and 7% by 2050. Which means that if urban expansion occurs to the detriment of agriculture, about 0.37 million km^2 of land will no longer be used for crops by 2030 and another 0.30 million km^2 by 2050.

4.1.2 Biofuels: an opportunity or a threat?

In addition to urbanization, world food production will also compete against the biofuel market,[7] "which may change the fundamental trends of the world agricultural market,"[8] considering that projections indicate an increase in production by about 90% over the next 10 years.

Biofuels have been in the limelight for some time now, raising the attention of economists, the media and institutions. Because of the high price of oil and of the potential environmental benefits which derive from the replacement of traditional fuels (gasoline and diesel oil), the production of and the demand for biofuels has rapidly grown in

Figure 4.1. Increase in production obtained by raising yields and cropland expansion for some main agricultural commodities

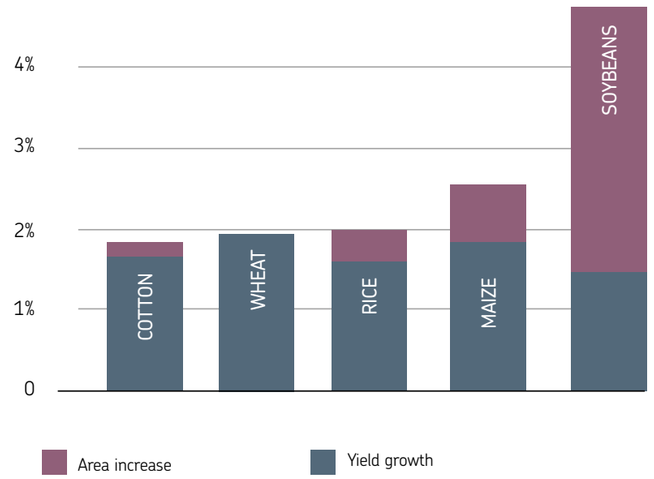
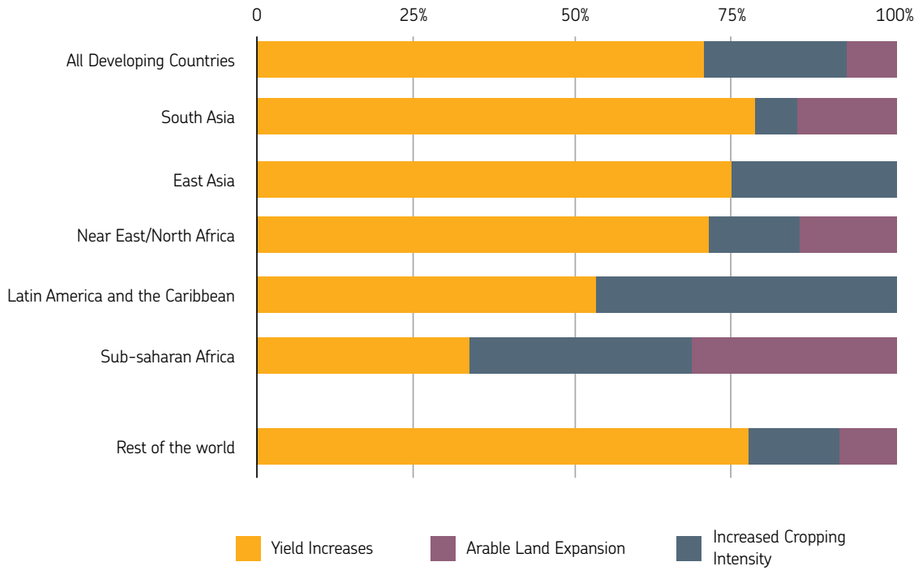


Figure 4.2. Increase in agricultural production as a percentage of the determining factor, by geographical macro areas



Source: World Bank, 2009; FAO, 2006.

Figure 4.3. Projections up to 2030 of the components expected to obtain higher yields

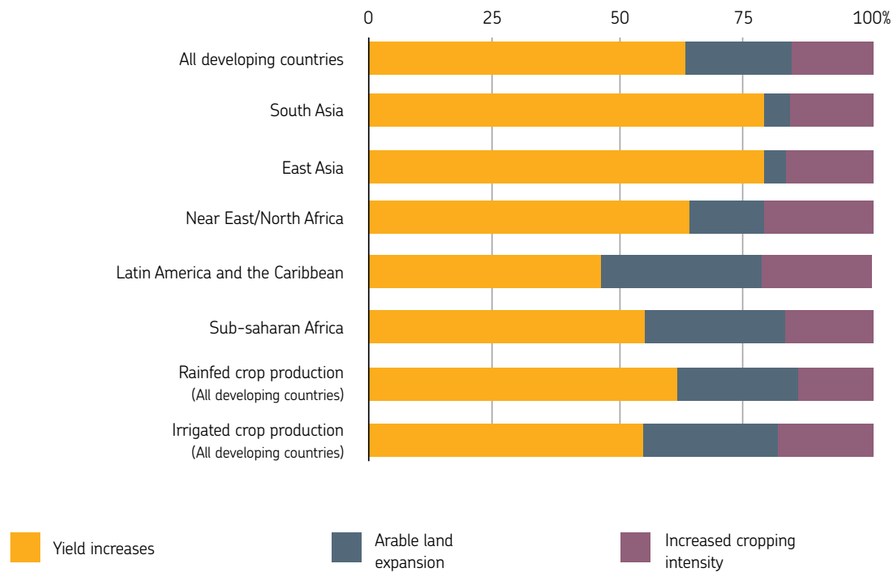
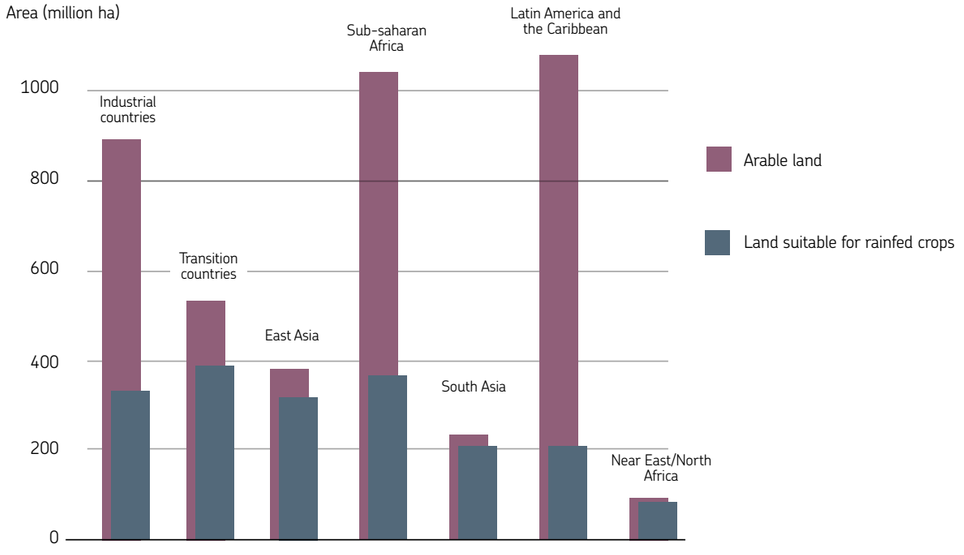


Figure 4.4. Theoretical potential expansion of grain croplands, without considering the preservation of the natural environment



Source: UNEP, *The Environmental Food Crisis*, 2009.

the last two decades. While in 2005, they accounted for 1% of transportation fuels, by 2050 they are estimated to account for 25% of the global fuel market.[9] It is even more significant to look at the daily production of biofuels: in fact, in 2005, their production reached 661.5 thousand barrels per day, vs. 1,635.5 in 2009.[10] This means that in the last five years their production has increased by 147.2%.

It is worth recalling that, within the framework of recent Community energy policy (the so-called "20-20-20" strategy), the European Commission has committed itself to replacing 10% of the fossil fuel demand in the sector of transportation by providing tax incentives and subsidies in order to obtain this result. Incentives and specific policies have also been adopted by countries such as the United States and Brazil, the main biofuel producers and consumers. Brazil, which is currently the second world producer of biofuels, uses about 2.7 million hectares of land (4.5% of its arable land) to produce sugar cane[11].

In this connection, it is worth asking what impact these new biofuel-oriented policies will have on food security. The use of crops – such as maize, sugar, seed and palm oil – other than for the production of food has put significant pressure on the price of agricultural products, thus reducing their availability for traditional uses. Moreover, the conversion of land for the production of biofuels and the exploitation of water resources often occur to the detriment of other food productions, with consequences also in terms of pricing.[12]

THE GROWING DEMAND FOR BIOFUELS MAY BE AN OPPORTUNITY FOR DEVELOPING COUNTRIES

In addition, the increase in agricultural commodity prices has more or less deleterious effects on countries, depending on whether they are net importers or exporters. Some countries will benefit from all this, but the least developed nations – that have had a trade deficit for two decades - will see a deterioration of their situation.[13]

However, in the medium- and long-term, the growing demand for biofuels may be an opportunity for developing countries. In fact, the new demand for crops can revamp the agricultural sector; it can generate investments, relaunch exports and have a positive effect in terms of economic growth.[14]

In fact, the local ecological characteristics of developing countries put them in a privileged position for the production of crops to obtain biofuels. If they adequately exploit this opportunity for rural development,[15] they may derive significant benefits in terms of income and employment. But they need to implement long-sighted policies designed to protect the overall sustainability of their agricultural systems, even for food production.

However, the success of biofuels will depend on the real, long-term production capacity, on the ability to match supply and demand, and on the costs associated to less and less fertile croplands located in tension-ridden areas.

It is important to recall that biofuels have become popular mainly for their potential environmental benefits, if extensively used as fuels in the sector of transportation and for the ability of biofuel crops to absorb CO_2 during their growth. But recent studies do not agree on the net benefit that can be obtained. In fact, the balance in terms of greenhouse gases generated/absorbed depends on several factors, such as the production methodology (the use of fertilizers and the emissions of nitrogen protoxide have far worse adverse effects in terms of global warming than carbon dioxide emissions), the techniques used for land conversion (i.e., deforestation) and the type of crops, as well as the extension of the cultivated area (the results of these studies depend on the characteristics of the country investigated). In addition, considering the volume of water consumed during their life cycle, biofuels are the energy source with the highest impact on water resources.

Figure 4.5. Production of ethanol and biodiesel

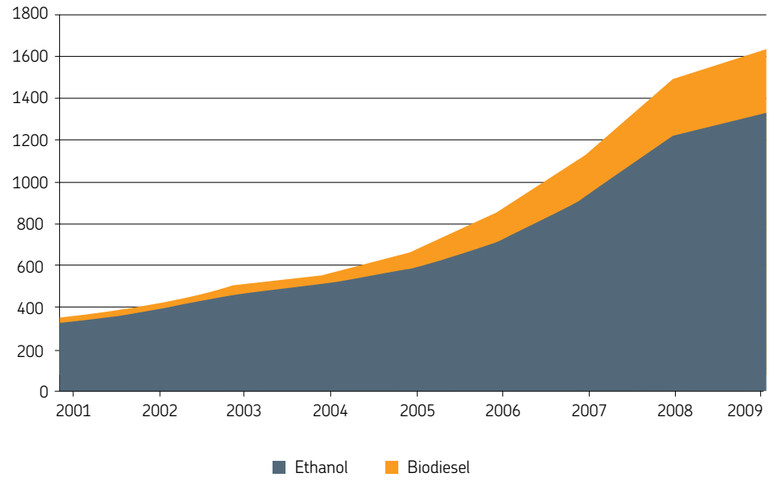
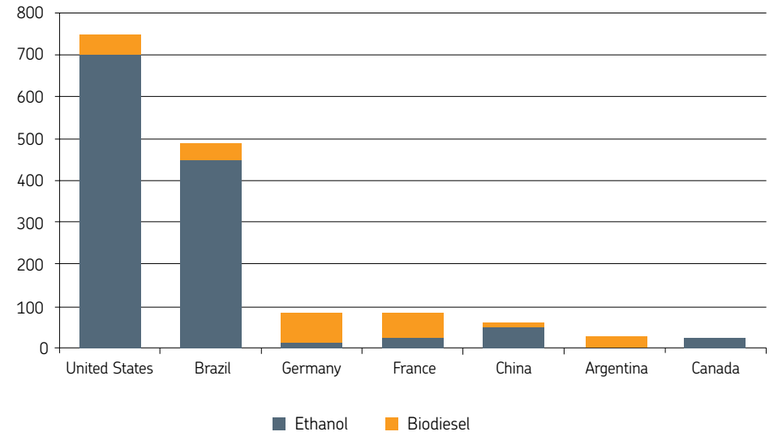


Figure 4.6. The main biofuel producers in 2009



Source: U.S. Energy Information Administration – International Energy Statistics, March 2011.

Instead, the so-called "second generation" biofuels – obtained from the biomass derived from agricultural residues – are believed to be more water friendly because of their higher productivity per unit of raw material used in the conversion process and because of the intrinsic nature of these residues (from maize plants, sugar canes, walnuts etc.) that are not utilized for the production of food. A possible large-scale exploitation of these "new" biofuels is still linked to future developments in production technologies.

Abraham Nowitz/National Geographic Image Collection

4.1.3 Land degradation

Land degradation is a global problem, with severe social, economic, ecological and food security implications.

Land degradation is a long-term degenerative process of the function and the productivity of the ecosystems.[16] Land is impoverished in terms of fertility and it undergoes desertification, gradual soil erosion, salinization and pollution. The process of soil formation and regeneration is very slow. For this reason, land is considered to be essentially a nonrenewable resource. The major causes of land degradation are deforestation, the extraction of nutrients from the soil, urbanization, irrigation and pollution. In addition, cropland degradation is mainly caused by poor land management, by intensive land exploitation and by inadequate irrigation techniques.[17].

LAND DEGRADATION IS A LONG-TERM DEGENERATIVE PROCESS OF THE FUNCTION AND THE PRODUCTIVITY OF THE ECOSYSTEMS

Figure 4.7. Main land degradation factors: meaning and causes

LAND DEGRADATION			
Erosion	**Salinization**	**Desertification**	**Pollution**
Breaking down of the soil due to: ■ **Natural causes:** removal of the topsoil due to the elements, to water and ice. ■ **Man-made causes:** intensive farming, deforestation, intensive animal husbandry.	Accumulation of salts in the soil (in particular sodium chloride and sulphates) which reduces the ability of plants to extract nutrients, thus making it sterile: ■ **Natural causes:** the soil loses water due to evaporation and transpiration instead of percolation. ■ **Soil characteristics:** typical of arid and semiarid areas; intrusion of seawater. ■ **Man-made causes:** irrational irrigation practices or use of inadequate water.	Transformation of land into a desert due to climatic or geological degeneration: **Natural causes:** ■ poor temperature and moisture conditions. ■ **Man-made causes:** deforestation, fires, intensive exploitation.	Introduction of inorganic and organic pollutants in the soil: ■ **Human activity:** fertilizers, pesticides, herbicides, irrigation with polluted water, poor discharge of run-offs, deposit of polluting materials.

Source: review of data from various sources by The European House-Ambrosetti.

AT PRESENT, LAND DEGRADATION AFFECTS OVER 20% OF ALL CROPLANDS

Land degradation can result from natural causes or from man-made activities (see Figure 4.7). It has direct repercussions on agricultural productivity, biodiversity and also climate change.[18] Some studies[19] have looked into a 20-year period and show that land degradation is consistently evolving and is spreading around the world. At present, land degradation affects over 20% of all croplands, 30% of woodland and 10% of grazing land. According to other researchers,[20] every year 20,000-50,000 km^2 of land is abandoned because it can no longer be used,[21] with losses 2-6 times higher in Africa, Latin America and Asia than in North America and Europe.

Land degradation mainly affects rural populations which live off farming, that is one-fourth of the world's population.[22]

Asia has the highest number of people hit by land degradation and desertification. In fact, about 65% of its land is exposed to this plight. Erosion and salinization are the main threats in the western part of the continent, with more than 1.5 million km2 affected (one-third of the region). In the eastern part, in China, the area undergoing desertification accounts for 28% of the whole territory, while land degeneration accounts for 35% of the national territory.[23]

In Europe, Italy is the country with the greatest variety of agricultural and natural land. But its soils are deteriorating: about 80% of the land is poor in organic carbon and it cannot be defined as "high-quality" because of the limited content of organic matter and the high risk of erosion. In Europe, Italy has the greatest land biodiversity, which is at present 10 times as high as the United Kingdom and two times as high as France or Spain. But Italy risks losing this diversity: in fact, there is a dwindling number of species of soil microorganisms which promote fertility and stability. One of the main threats comes from land consumption, which is among the fastest in Europe. With 43 million tons of concrete produced in 2008, Italy is ranked fourth in the world in terms of the ratio of concrete produced vs. the amount of land exploited for this purpose and it ranks fifth in terms of the amount of concrete produced per inhabitant. This phenomenon is called "impermeabilization" and it has multiple adverse effects: large plots of land can no longer be used for agriculture and as natural habitats, and it limits and hampers water percolation and soil water retention, with the risk of flash floods.[24]

EROSION, DESERTIFICATION AND SALINIZATION HAVE A DIRECT IMPACT ON AGRICULTURAL YIELDS

It is important to recall that erosion, desertification and salinization have a direct impact onagricultural yields. In fact, productivity dropped by 50% in certain areas. In Africa – the continent most severely hit[25] – this loss ranges from 2% to 40%, with an average estimated loss of 8.2% calculated over the whole territory. The global repercussions of this plight have caused a productivity drop ranging from 1% to 8%, equal to an annual loss of 400 billion dollars,[26] i.e., about 70 dollars per person.

In Europe, an important economic impact analysis conducted by the European Commission shows that land degradation may cost up to 38 billion Euros per year.[27]

A sustainable approach to agriculture is known to reduce the adverse effects of this phenomenon, to prevent degradation and to restore the soil conditions, where possible. The best corrective measures are irrigation techniques, reforestation policies and land reclamation.

In light of the considerations presented in this chapter, it is possible to say that cropland degradation is a top priority which requires a novel approach by individuals, communities and governments alike.

"The degradation of ecosystems can be stopped by political will. It is necessary to change policies, institutions and agricultural practices and to bring agriculture back to center stage, to preserve the environmental equilibrium to the benefit of future generations," said Alexander Müller, the FAP deputy General Director in 2007. "Without a radical reversal of this trend, environmental degradation will become a major threat to agricultural productivity and food security." This opinion is shared by many other experts, such as Zafar Adeel, Director of the United Nations University's (UNU) International Network on Water, Environment and Health, who stated: "The political changes resulting in better land and plant preservation and in degraded land restoration are crucial for the future of mankind."

4.1.4 Neo-colonialism: land grabbing

Food security, that is, the supply of staple food, is strongly conditioned by the factors indicated in the previous chapters. The drop in agricultural productivity in some areas of the world is linked to negative environmental externalities such as soil dehydration, scarce water resources, climate changes and increasing competition for land use. As a result, some governments have tried to find alternative solutions to ensure enough agricultural production to meet their food requirements. This has been obtained through the so-called practice of land grabbing.

The competition and the race to grab natural resources is often a violent phenomenon. Indeed, the FAO General Director Jacques Diouf defined the current practice of land grabbing a form of "neo-colonialism."

These practices are not always and are not necessarily negative. In some cases, if there are development policies and clear rules of engagement between governments and investors, they become strategic investments that are extremely necessary in the field of agriculture and in the rural areas of developing countries. This new form of colonialism – when it is a form of colonialism – is mainly due to the fact that the "colonized" countries hope to develop and modernize their agricultural sector using the technologies, the capitals and the fertilizers of foreign investors and they are willing to accept this "invasion."

The main concern is related to the impact that land grabbing may have on poor local populations, who may no longer be able to use their land or control the land on which they depend for their living. [28] [29] Since this relevant phenomenon is growing and seems difficult to fight[30] (and it should not be fought in all cases), it is necessary to render its effects as positive as possible. To this end, international organizations should impose a code of conduct and binding standards for investors.[31]

POOR LOCAL POPULATIONS RUN THE RISK OF LOSING ACCESS AND CONTROL OF LAND BECAUSE OF LAND GRABBING

4.2 CLIMATE CHANGE, NATURAL DISASTERS AND FOOD SECURITY

CLIMATE CHANGE MAY HAVE AN IMPACT ON THE AVAILABILITY, THE STABILITY, THE ACCESSIBILITY AND THE USE OF FOOD

Climate change is another crucial factor in terms of the ability of the global agricultural system to meet the food requirements of a constantly growing population. The definition of food security proposed at the beginning of this paper includes four key dimensions: availability, stability, accessibility and use. Climate change seems to have an impact on each of these variables.

Figure 4.8. The potential impacts of climate change on the food security variables

CLIMATE CHANGE			
1. Availability	2. Stability	3. Access	4. Use
■ Impact on the production system: the ability of the agricultural system to meet food requirements. ■ Direct effects: Changes in agricultural productivity (quality of croplands, rainfalls etc.). ■ Indirect effects: Income growth and distribution; demand for agricultural products.	■ The increase in the frequency and severity of extreme events (cyclones, floods, droughts etc.) will result in major fluctuations of agricultural productivity and of local food availability.	■ Impact of the GDP of the agricultural sector on food prices. ■ Impact on the purchasing power of individuals.	■ Impact on the food chain security: - crop contamination from viruses, bacteria, fungi, etc. - livestock diseases.

Source: reviewed by The European House-Ambrosetti, Schmidhuber and Tubiello, *Global Food Security under Climate Change*, 2011.

Thomas J. Abercrombie/National Geographic Image Collection

4.2.1 Availability: effects of climate change on agricultural production

AGRICULTURAL, FORESTRY AND LIVESTOCK RAISING WILL BE NEGATIVELY AFFECTED BY CLIMATE CHANGE, NOT ONLY IN TERMS OF PRODUCTION CAPACITY AND AGRICULTURAL YIELDS

Climate change will have complex effects on agriculture and on its ability to produce food. It has direct effects on the biophysical processes and on the agricultural and ecological conditions of farming, and indirect effects on growth, income distribution and the demand for agricultural produce[32].

The increase in temperature, the changes in seasonal and annual rainfall patterns and the increase in CO^2 concentrations in the atmosphere will affect the land productivity potential, the volume and the quality of yields, as well as the natural environment where farming is practiced. Climate change will also have an effect on water supply and will result in the proliferation of plant diseases and pests, thus radically changing productivity. Moreover, man-made activities – especially in the field of agriculture – are generating very negative consequences for the environment and they have to be evaluated as additional adverse effects for the current environmental scenario. Plus, pollution from nitrates and pesticides is one of the most severe causes of water quality deterioration in rural regions and nutrients such as nitrogen and phosphorus in fertilizers seriously damage the marine environment.[33]

IN THE LOW LATITUDE AREAS OF THE WORLD, A FURTHER INCREASE IN TEMPERATURE WILL LEAD TO THE REDUCTION OF AGRICULTURAL YIELDS

As already pointed out,[34] in the low latitude areas of the world, where most developing countries are located, a further increase in temperature will lead to the reduction and to a greater volatility of agricultural yields, with major consequences on local food security. These negative effects will also be exacerbated by more frequent extreme climate events. A possible result will be a greater dependence on imports and an increase in the number of people suffering from hunger.

Instead, at higher latitudes, productivity is expected to augment. In fact, it has been estimated that there will be an expansion in potential grain croplands, an extension of the vegetative period and an increase in crop yield and variety. However, the current projections do not always consider the risks provoked by extreme events or by pests, which may have a negative impact on local and global agricultural productivity.[35]

Another important factor expected to have an effect on agricultural yields is the atmospheric concentration of CO^2. Since this concentration is an input for photosynthesis, a higher carbon concentration is believed to have a positive effect on different crops. But the benefits of this phenomenon called carbon fertilization are still uncertain and will depend on land management techniques, such as irrigation modalities, and the use of fertilizers.[36] It is also important to consider that increasing yields does not necessarily lead to preserving the characteristics of the land and its nutritional quality.

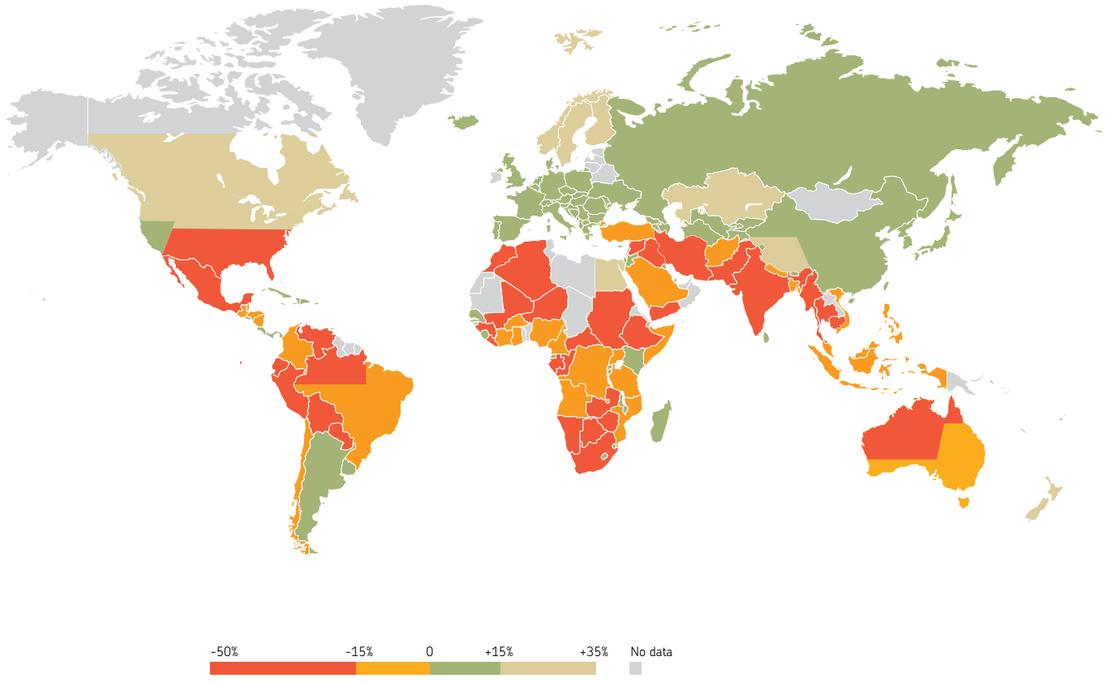
To conclude, it is important to stress that, as a result of climate change, some animal species will be forced to choose among three different options: adaptation, migration or extinction.

These adverse consequences of climate change are expected to have a very negative impact on food accessibility. In fact, climate change affects agricultural production but it also has a potential effect on marine and non-marine populations, with dramatic repercussions on food availability for people whose economy and subsistence is based on fishing[37] and hunting. Climate change may provoke a dramatic reversal of bioclimatic plans, a variation in the distribution of animal species, an alteration of lifecycles and a more limited ability of ecosystems to resist against pest-induced diseases. Therefore, there is no doubt that in these conditions, agriculture, forestry and livestock raising will be heavily affected, not only in terms of production capacity and agricultural yields.[38]

CLIMATE CHANGE MAY BE AN INSURMOUNTABLE OBSTACLE FOR THE GROWTH OF THE GLOBAL AGRICULTURAL PRODUCTION

Therefore, climate change may be an insurmountable obstacle for the growth of the global agricultural production. In this connection, it is worth recalling that the price for not doing anything may be too high, not only for future generations, but for the present one as well.

Figure 4.9. Projected losses of food caused by the adverse effects of climate change (2080)



Source: Cline, 2007; FAO, The Environmental Food Crisis, 2009.

4.2.2 Impact of climate change and of natural disasters on food availability and stability

The increase in the global and regional climate variability and in the frequency and severity of "extreme" events (floods, cyclones, droughts) associated with increased risks of landslides and soil erosion are expected to wreak havoc in the domain of agricultural production in terms of greater volatility in yields and of local availability of food. This will significantly affect the stability of production[39] and of food security, in general.

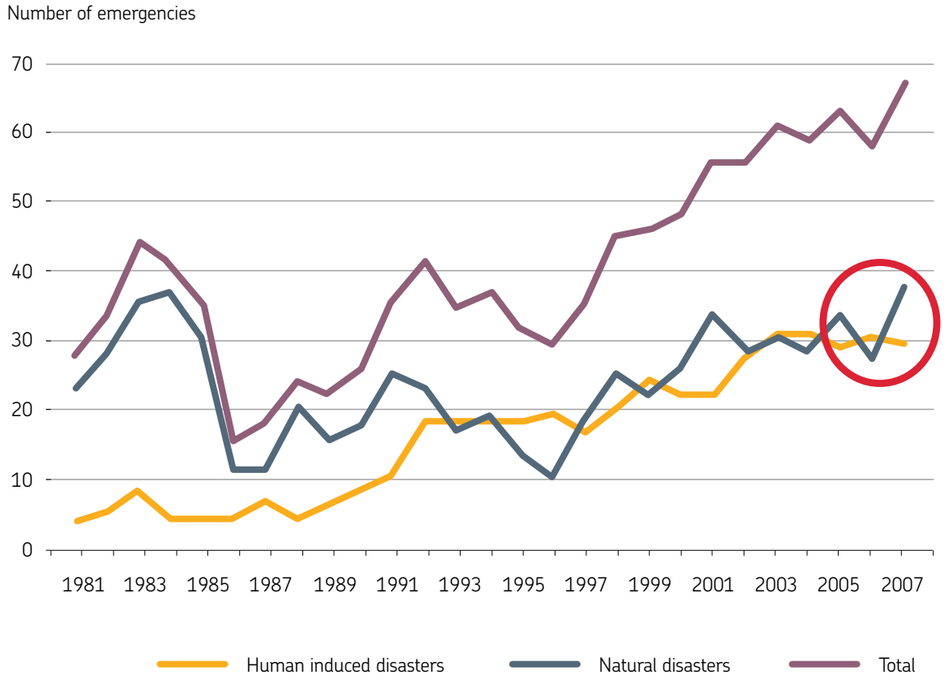
In particular, sudden and violent natural disasters are extreme events, with a major impact on the stability of agricultural production.

ADVERSE CLIMATE CONDITIONS AND NATURAL DISASTERS ARE AMONG THE FIRST CAUSES OF FOOD INSECURITY IN THE WORLD

The FAO/GIEWS[40] states that unexpected and violent events – floods, in particular – have significantly increased from 14% in the 1980s to 27% since the year 2000. The strong association between natural disasters and food insecurity is well known. In this context, it is important to emphasize that these disasters – often caused by climate change – have a heavy impact on the distribution of humanitarian aid and on total volume of aid. In fact, climate change is a huge cost for the global economy and especially for the most industrialized countries that today are the main aid donors. The future is characterized by uncertainty and instability, given the concerns and the pessimistic projections related to environmental and food scenarios over the next few years and the growing provision of aid in emergency situations shown in Figure 3.1, In addition, it may be interesting to screen some information published in a recent report of the FAO, where it is clearly indicated that the 22 countries in the world "in protracted crisis" received a higher percentage of humanitarian aid than development aid in the 2000-2008 period. Among these countries, Korea is an interesting case because it has experienced six natural disasters and three man-made disasters in the last 15 years and it has received an amount of humanitarian aid equal to 47%[41] of the total.

As shown in Figure 4.10, adverse climate conditions and natural disasters have been among the first causes of food insecurity in the world up until the 1990s. And although man-made disasters have outnumbered natural ones during certain periods of time, they have continued to be a serious threat. Since these events hit fast and unexpectedly, these situations are difficult to manage, as are planning and reactions.[42]

Figure 4.10. The causes of food emergencies between 1981 and 2007



Source FAO, 2008.

4.2.3 Impact of climate change on food accessibility

As already pointed out, in the last 30 years, the fall in the real prices of food and the growth in real incomes has led to a general improvement in food accessibility in many developing countries. The growing purchasing power has allowed an increasing number of people to have not only more food, but also a more nutritious diet, with more proteins, micronutrients and vitamins.

Considering the current food market scenario, numerous scientific studies show that climate change will lead to an increase in the number of people suffering from malnutrition and hunger, in particular in communities in Africa, Asia and Latin America, which today are already very vulnerable and exposed.[43]

The economic models utilized in the main studies[44] have evaluated the impact of climate change on the GDP of the agricultural sector and on food commodity prices. The global impact of climate change on the GDP in the agricultural sector is expected to be extremely mild, between -1.5% and +2.6% by 2080. At the regional level, and especially in countries where agriculture is the main source of income, the impact will be stronger. In Sub-Saharan Africa, for example, without corrective measures, the losses are expected to range from 2% to 8%.

Developing countries, which have contributed less to climate change, will probably bear the heaviest brunt in terms of food accessibility. Studies of agricultural commodity prices have produced the following results:

- on average, with a moderate increase in temperature, prices are expected to slightly increase (up to 2050);
- after 2050, and due to a further increase in temperatures, prices are expected to experience a more significant upward trend; some commodities (rice and sugar) are expected to increase by as much as 80%.[45]

DEVELOPING COUNTRIES, WHICH HAVE CONTRIBUTED LESS TO CLIMATE CHANGE, WILL PROBABLY BEAR THE HEAVIEST BRUNT IN TERMS OF FOOD ACCESSIBILITY

However, the price fluctuations caused by climate change are likely to be lower than those induced by social and economic development..

4.2.4 Impact of climate change on food quality

Climate and environmental changes may also lead to a faster spread of diseases and contaminations in food and agricultural products. This will entail more risks and the need for additional controls over the whole food chain.

In conclusion, it is possible to state that climate change will have adverse effects on global food security, increasing the dependence of developing countries on imports and exacerbating the already precarious conditions of the populations living on the African continent, in particular.

The global water crisis[46]

In light of the factors illustrated in the previous paragraphs, one of the greatest challenges facing mankind is the growing competition for water resources and the expected reduction in its supply.

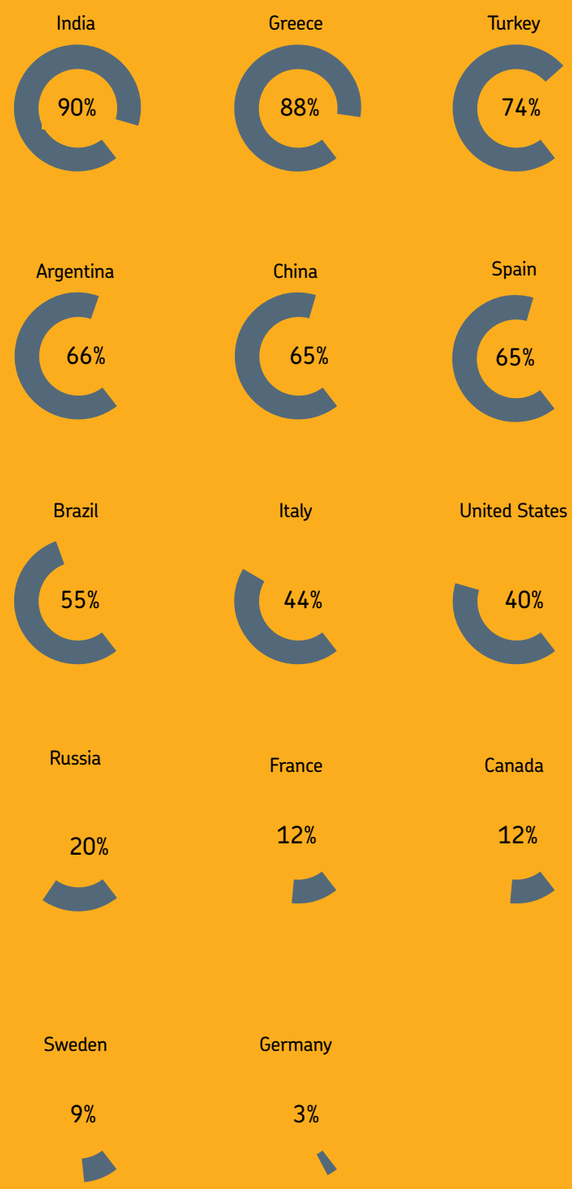
At present, irrigated crops use about 70% of the world's fresh water. This figure is even higher in low- and medium-income countries (in some developing countries this figure is 95%), while in the advanced world, water is mainly consumed by the industrial sector (59%).

A survey of water consumption for agricultural purposes in some sample countries confirms that agriculture accounts for a higher amount of water consumption. Figure 4.11 shows that there are significant differences between the use of water for farming in countries such as India or Greece, for example, and France or Germany, where water consumption for agriculture is equal to 90%-88% and to 12%-3%, respectively, of the total consumption of fresh water.

The yield of irrigated croplands is 2-3 times higher (about 20% of the world's total grain croplands) and they account for 40% of global production[47] – with respect to the ones which only use rainfall water (80% of the total amount of land).

In looking at the disquieting projections pointing to a limited availability of water in the future, it is important to stress that the world population today already uses 54% of the fresh water from rivers, lakes and accessible water tables. Because of population growth, by 2025, in order to meet future requirements, water consumption will increase by 50% in developing nations and by 18% in advanced countries. In particular, by 2025 the global food requirements will augment by 55% with respect to 1998. And this will lead to an increase in water consumption for irrigation purposes (equal to at least 14%). At the same time, water consumption will increase, to respond to primary hygiene-sanitation needs, to produce energy and to support industrial development.[48] Therefore, the relationship between water and food security remains one of the greatest challenges for the future of mankind. Considering that 1.2 billion people already have scarce water resources and that this number will reach over 1.8 billion by 2025,[49] an in-depth analysis is clearly necessary to identify a truly sustainable economic growth model to be pursued with intersectoral and international action plans.

Figure 4.11. Water used for agricultural purposes in some countries (as a percentage of the total amount used)



Source: review by The European House-Ambrosetti on the basis of the FAO, AQUASTAT database, 2010 (last available data).

5. ACCESS TO FOOD AND ITS SOCIAL DIMENSION

The social dimension of the food accessibility issue is mainly characterized by four interconnected domains:

1. human health;
2. population trends;
3. social and political aspects (social conflicts and migration flows);
4. the relationship between supply and demand on the food market. This aspect has already been specifically analyzed in the second chapter. Here, it will be further investigated in terms of health and of population, social and political trends linked to food security and their interconnections.

Stephen St. John/National Geographic Image Collection

5.1 FOOD ACCESSIBILITY AND HEALTH

The relationship between food accessibility and health is very relevant for developing countries beset by chronic and/or acute hunger and malnutrition. First of all, it is important to stress that this relationship has two dimensions. On the one hand, the lack of one or more micro and macronutrients, hunger and malnutrition have effects on the immune system of individuals and on their predisposition to severe and long-term diseases. Moreover, it is associated with other factors such as malnutrition, poor hygiene and sanitation, lack of drinking water and of basic drugs.

THE HUNGER-HEALTH VICIOUS CIRCLE HAS AN EFFECT ON AND IS, IN TURN, AFFECTED BY NUMEROUS SOCIAL AND ECONOMIC VARIABLES

On the other hand, because of the alteration of normal metabolisms and the loss of nutrients, sick individuals lose their appetite and do not have the necessary amount of energy and the ability to uptake food nutrients. This is also linked to a series of other economic and social conditions that exacerbate the relationship between disease and malnutrition, such as the inability to work, social and economic marginalization, and inadequate knowledge about nutrition which impairs the ability of mothers to care for their children. All this will have an impact on future generations.

The vicious circle between malnutrition and disease – a central issue also within the framework of the Millennium Development Goals (MDGs) – is the result of a series of intercorrelated factors which require multiple and synergic actions. In the past, many development programs were mainly designed to directly fight against disease. At present and in the future, it is necessary to adopt a different approach to disease, based on the analysis, the prevention and the treatment of their direct and indirect causes. Nutrition plays a prominent role in this fight.

This vicious circle has an effect on and is, in turn, affected by numerous social and economic variables such as education, living conditions, food prices, general health conditions, and social and economic stability. This renders the reference scenario complex and multifaceted.

The variables that are directly or indirectly linked to the hunger-disease relationship show that there are some long-term patterns and trends and some possible short-term shocks and events that are not all "predictable" or "preventable." The World Food Programme estimates that out of 100 people suffering from "under- and mal-nutrition," only 10% of these cases is due to temporary shocks (civil wars, famines, epidemics etc.), while 90% is due to chronic and long-term situations.

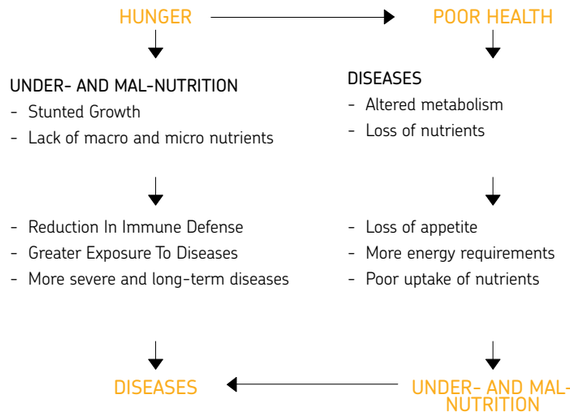
WOMEN AND CHILDREN ARE THE MOST AFFECTED GROUPS

In the context described above, the most affected subjects are women and children, for two main reasons. The first is that, in general, they have less physical resistance to hunger and disease, children in particular. The second reason is that they have far worse social, juridical and economic conditions in some countries, especially in the developing world.

MALNUTRITION ACCOUNTS FOR 53% OF DEATHS IN CHILDREN BELOW FIVE YEARS OF AGE IN DEVELOPING COUNTRIES

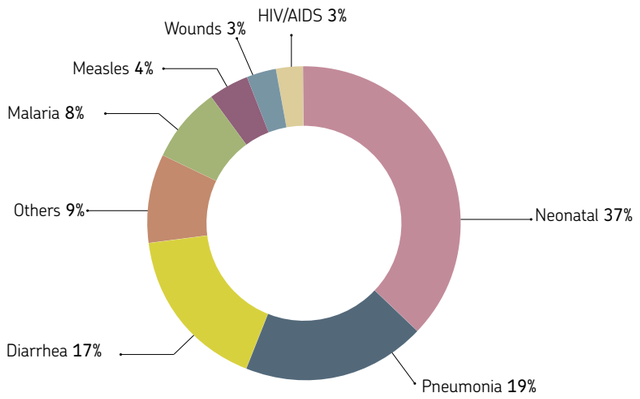
These poor social and economic conditions result in a more limited accessibility to food (and quality food) and in adequate medical treatment and health measures.
According to the United Nations World Food Programme, malnutrition accounts for 53% of deaths in children below five years of age in developing countries.[1] Moreover, more than 70% of the 146 million malnourished children in the world below five years of age live in 10 countries – 50% of which are located in South Asia.[2]
5,6 million deaths per year in children below five years of age are directly associated with diseases that, with adequate nutrition, would not be life threatening, such as diarrhea, pneumonia and malaria. It has been estimated that, with more vitamin A and zinc, 684,000 deaths in children could be avoided all over the world[3].

Figure 5.1. The hunger-health circle



Source: FAO, 2008.

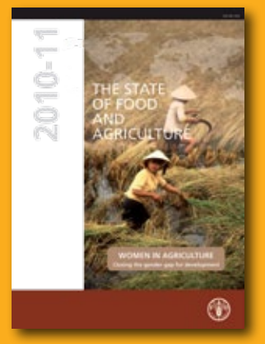
Figure 5.2. Main causes of mortality in children below five years of age in the world



Source: reviewed by The European House-Ambrosetti on the data of the UN World Food Programme,

The role of women in the agricultural sector: how to improve access to food?

Women could play a fundamental role in improving the results obtained in the fight against hunger and infant mortality. In fact, they play a central role in child rearing, farming and harvesting. This is clearly indicated in the report produced by the FAO The State of Food and Agriculture 2010-2011 – Women in Agriculture. This publication emphasizes the crucial role women play in the field of agriculture and rural farming in developing countries. This role varies according to the regions but, in general, women have to overcome many obstacles and this saps their productivity and limits their contribution to agricultural production, economic growth and to the wellbeing of their families, communities and countries. The most severe problem for women is still their access to production resources; women have less control over land with respect to men and the land they control is poorer or their ownership is not always certain over time. In addition, according to the FAO, women have a lower number of heads of livestock and often they do not have direct control over the revenues coming from the management of small animals.[4]
There is enough evidence in the FAO report of the gender gap which exists in the field of agriculture. This paper shows that currently, this production gap amounts to 20-30% and many research studies indicate that this is mainly due to a gap in the availability of resources. The FAO actually states that if women working in farming had the same amount of resources as men, the agricultural production in developing countries would increase by 2.5%-4%. This would also lead to a reduction in the number of people suffering from malnutrition in the world by 12-17%, that is by 100-150[5] million individuals.[6]
According to some suggestions on the actions to be adopted to allow women to play a central role in the fight against hunger and mortality, women should be:
- informed about the risks linked to the use of inadequate or wrong diets, especially for neonates and children below five years of age;
- educated as to the techniques and basic measures to obtain significant advantages in terms of agricultural productivity in a short period of time;
- adequately informed about basic hygiene and sanitation practices;
- given a social and economic status that, unfortunately, is still denied to them.
Notwithstanding some international efforts, the actual condition of women in developing countries is not yet fully understood: there is still much to do to understand and capitalize on the policies designed to educate and involve women in many difficult social and economic realities.



ANOTHER GROUP THAT IS VERY NEGATIVELY AFFECTED BY THE HUNGER-DISEASE VICIOUS CIRCLE IS REFUGEES

Women and children are the highest risk subjects in the hunger-disease vicious circle, but there is another group of people particularly affected by this "plight," i.e., refugees. Huge masses of people who leave their country of origin because of tragic weather and natural events or because of civil wars or political persecution. They are particularly exposed to the hunger-disease "trap." Often, their living conditions do not allow them to have enough food, and in particular, quality food. Malnutrition and hunger weaken their bodies and increase their risk of suffering from diseases. They are subjected to poor hygienic conditions in makeshift camps without any basic health prevention measures. In this situation, there is a high incidence of disease, even epidemics.

In fact, deaths due to forced migration are not always directly linked to a lack of food. But they are associated with the interaction between infectious diseases and persistent underand mal-nutrition; refugees are forced to live in close contact with a high number of other people, often coming from rural areas. And this exposes them to a wide range of infectious diseases to which they have not developed an immune defense. The combination of previous conditions of under- and mal-nutrition and the exposure to new diseases generates an explosive mix.

IN ORDER TO DEAL WITH HUMANITARIAN CRISES, IT IS NOT SUFFICIENT TO PROVIDE FOOD; IT IS ALSO NECESSARY TO CREATE THE SYSTEMIC CONDITIONS THAT NOT ONLY ALLOW FOR THE TREATMENT OF DISEASES, BUT ALSO FOR THE PREVENTION OF EPIDEMIC INFECTIONS

Therefore, in order to deal with humanitarian crises, it is not sufficient to provide food; it is also necessary to create the systemic conditions that not only allow for the treatment of diseases, but also for the prevention of epidemic infections, which are caused by the lack of essential micronutrients necessary for the body and for an acceptable immune defense. The warnings launched by international organizations, information campaigns and the dramatic images often coming from countries hit by hunger and epidemics are certainly contributing to raise the awareness of developed countries, and of developing countries beset by the problems, that action needs to be taken. However, looking at the "state of the art" of the global fight against hunger and for the promotion of human health, it is necessary to stress that, notwithstanding some improvement in health and food accessibility, there are still major gaps in industrialized countries and in and across the developing world. Indeed, as clearly indicated by the United Nations World Food Programme, the situation is characterized by major advances in the right direction but also by major stalemates and severe setbacks with respect to the already serious conditions existing in the past.

THE MILLENNIUM DEVELOPMENT GOALS RELATED TO FOOD AND HEALTH ACCESSIBILITY DO NOT SEEM TO HAVE BEEN FULLY ACHIEVED

In particular, the Millennium Development Goals related to food and health accessibility do not seem to have been fully achieved. Goal 1.C is designed to eradicate extreme poverty and hunger and it aims at halving the percentage of individuals who suffer from hunger by 2015 vs. the 1990 figures. The achievement of this goal is measured on the basis of two specific indicators: the number of underweight children below five years of age and the percentage of the population with a dietary calorie intake below a minimum level (undernourished).

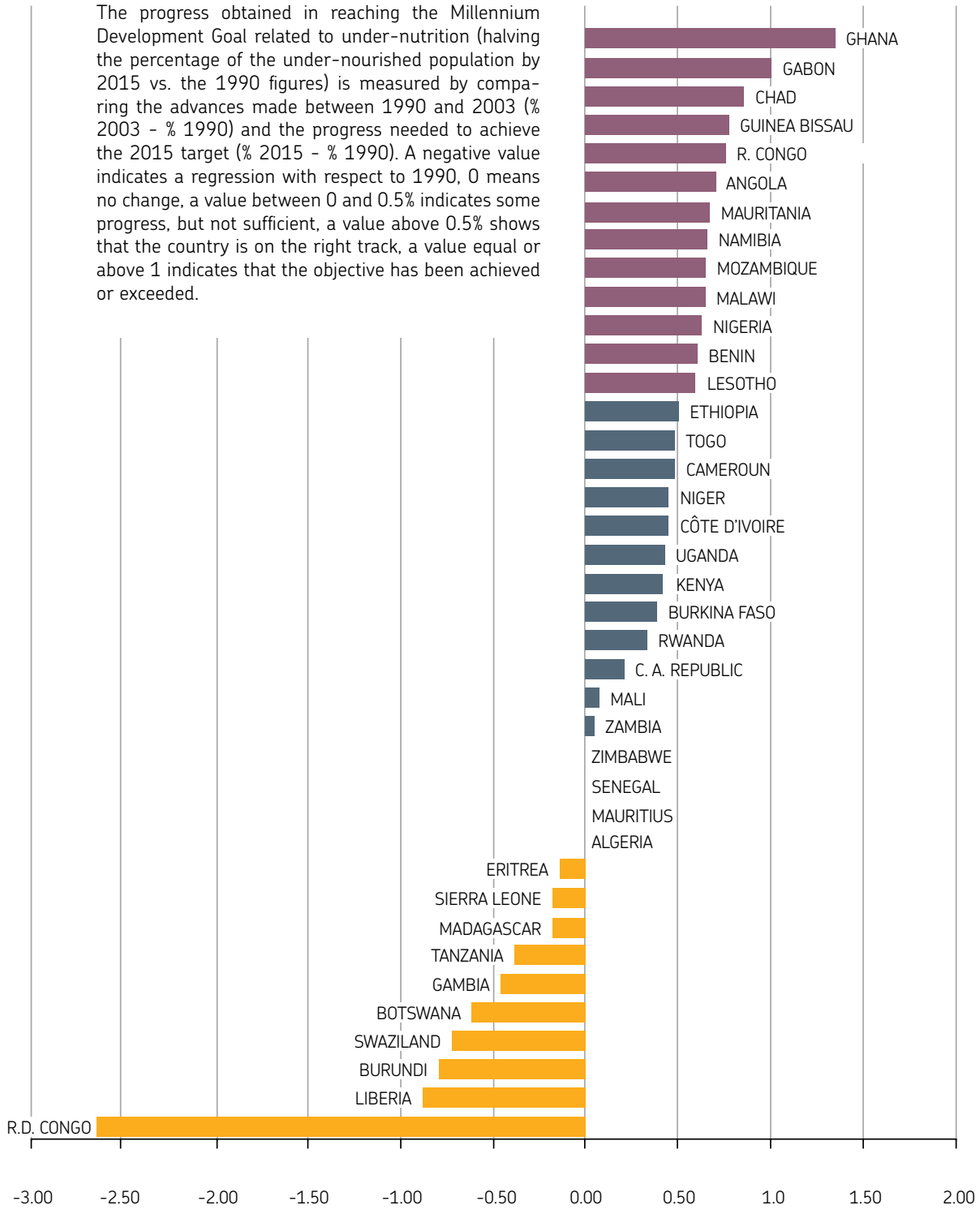
On the basis of the available data, while some key indicators show some improvements, in numerous areas of the world – especially in South Asia and in Sub-Saharan Africa – the situation continues to be extremely bad.

THE ONGOING DELAYS AND SETBACKS APPEAR TO BE UNJUSTIFIABLE

The ongoing delays and setbacks appear to be unjustifiable, both from an ethical and from a strictly economic standpoint.[7] This cannot be considered an exclusively "humanitarian" issue; in fact, the food accessibility-human health vicious circle has a significant impact on the economic development in the countries most adversely hit by this phenomenon because it generates a negative economic spiral. Fewer workers, lower per capita productivity, more conflicts and social tension, greater difficulties in foreign trade relations - just to mention a few – are direct consequences of the failure to solve the problem of hunger and of general poor health conditions which exacerbate an already critical social and economic scenario.

As already mentioned, the achievement of the first Millennium Development Goal – eradica-

Figure 5.3. Progress in Africa in the 1990-2003 period in terms of reduction in the number of under-nourished people



Source: reviewed by The European House-Ambrosetti on the data of the UN World Food Programme, 2007.

tion of extreme poverty and hunger - is measured on the basis of two specific indicators - as an example, the number of underweight children below five years of age. The following graph clearly shows that countries have very different results in the progress toward this target.

Notwithstanding the above-mentioned considerations, it is crucial to focus on the important progress made in the fight against hunger in the world and the commitments undertaken by countries to achieve the Millennium Development Goals. In fact, a major result has been obtained within the framework of the fourth Goal, according to recent information published by the United Nations, i.e., the reduction by two-thirds of the mortality rate of children below five years of age between 1990 and 2015.

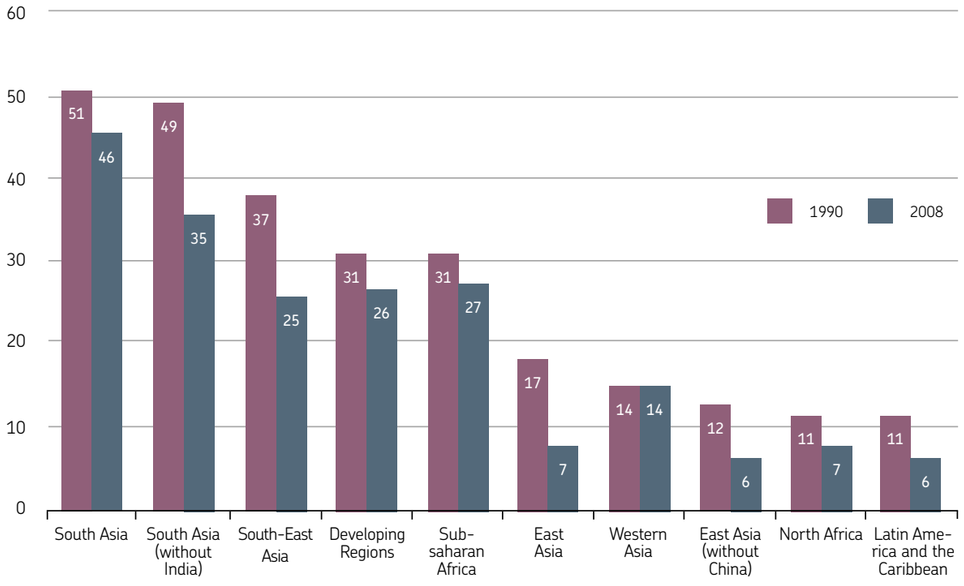
SINCE 1990, THE MORTALITY RATE OF CHILDREN BELOW FIVE YEARS OF AGE HAS DROPPED BY ONE-THIRD

By observing Figure 5.5, the latest statistics[8] clearly show that since 1990, the mortality rate of children below five years of age has dropped by one-third. On a global level, the number of deaths among children below five years of age has actually dropped from 12.4 million in 1990 to 8.4 million in 2009. These results are encouraging because – with respect to the '90s, when a 1.4% average annual reduction was expected – this figure reached 2.8% in the 2000-2009 period.[9] However, it is not possible to forget that there are still countries with unacceptable child mortality rates and that, out of the 64 countries with a high child mortality rate, only are well positioned to reach this target.[10]

MALNUTRITION CAN IMPAIR THE ECONOMIC GROWTH POTENTIAL OF A COUNTRY FOREVER

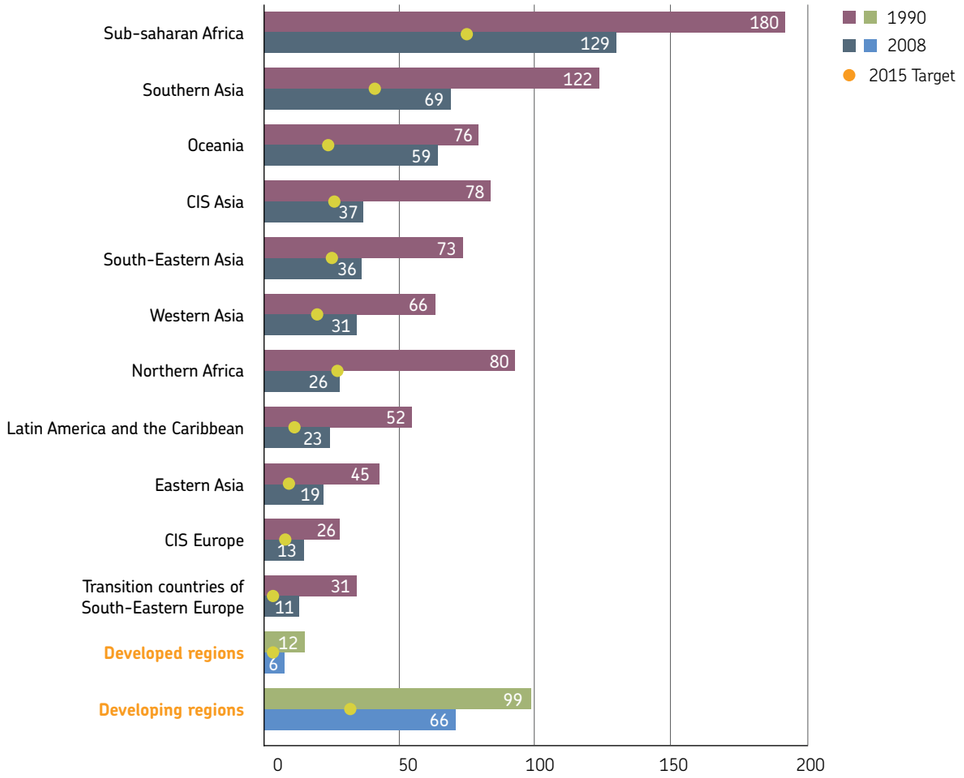
Malnutrition and poor health have a very negative impact on the human and social capital of a country and they can impair its economic growth potential forever. This detrimental effect on economic and social development has long-term and intergenerational repercussions, making it impossible for the countries hit by this plight to break this hunger-disease vicious circle (see Figure 5.6 to have a 30-year picture of the per capita income gap between G7 and African countries).

Figure 5.4. MDG: percentage of underweight children below five years of age (Indicator 1.8)



Source: reviewed by The European House-Ambrosetti on the data from *The Millennium Development Goals Report 2010*, 2011.

Figure 5.5. Mortality rate of children below five years of age out of 1000 births (1990-2008)[11]



Source: review by The European House-Ambrosetti on the data from *The Millennium Development Goals Report 2010*, 2011.

Without economic growth, it is not possible to ensure greater and better food and health accessibility for the population, especially if this population is constantly growing in developing nations; the food and health conditions of future generations are bound to be the same or worse than those of the previous generations, thus descending the decade-long spiral of poverty and mortality. In light of these considerations, it is clear that the most correct timeframe to deal with hunger-disease vicious circle is the life-cycle approach. This analysis is designed to look into the whole life cycle of at least two generations. The nutrition and health conditions of future generations are closely related to the ones of the present generation and to the actions that will be implemented in the near future.

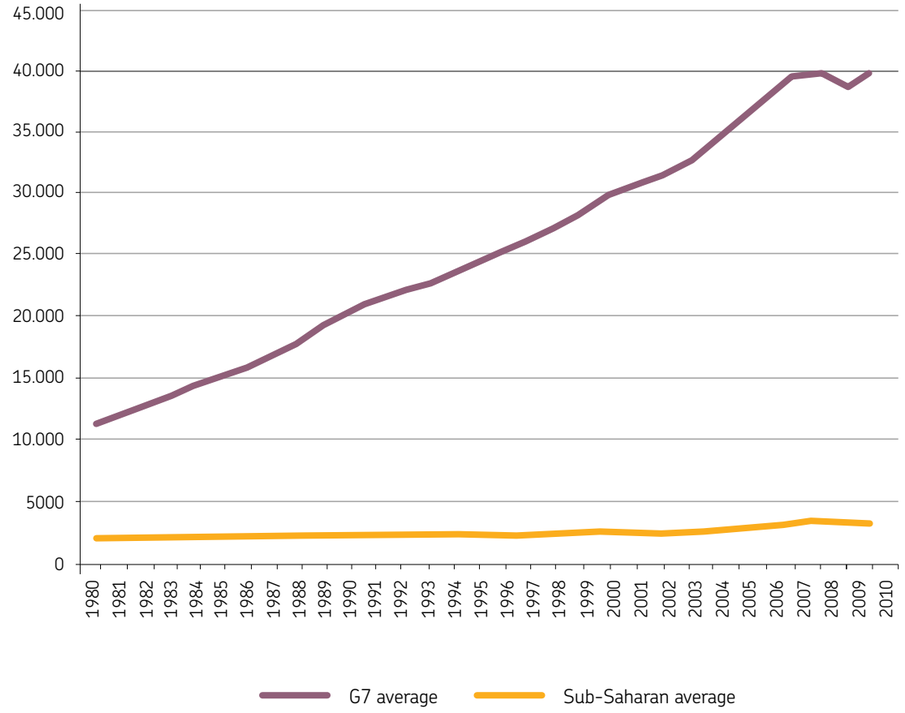
In this context, a central issue today, but also in the future, is the so-called "hidden hunger" which, according to the World Food Programme, affects more than two billion people.

THE WORLD FOOD PROGRAMME ESTIMATES THAT THE PHENOMENON OF "HIDDEN HUNGER" AFFECTS MORE THAN TWO BILLION PEOPLE

"Hidden hunger" means a condition in which, for the same amount of calories, the intake of one or more fundamental micronutrients for the proper functioning of the human body is dramatically limited. This deficiency can be defined as mal-nutrition rather than undernutrition.

It generates functional disorders, as well as stunted growth and, in some cases, very severe psychiatric diseases, especially in younger patients.

Figure 5.6. The per capita GDP in the 1980-2010 period: comparison between the average figure in Sub-saharan African countries and G7 nations



Source: reviewed by The European House-Ambrosetti on the data of the IMF, *World Economic Outlook*, 2011.

VITAMIN A DEFICIENCY CAUSES AT LEAST ABOUT 800,000 DEATHS PER YEAR AMONG WOMEN AND CHILDREN.

Among the micronutrients, vitamin A seems to play a very relevant role. In fact, its deficiency causes at least about 800,000 deaths per year among women and children, according to the World Food Programme. This finding appears even more dramatic if it is associated with evidence produced by the WFP, according to which 684,000 deaths among children could be avoided with the adequate provision of vitamin A and zinc.[12]
Vitamin A is found in vegetables and in cereals. It is useful for many fundamental biological processes, such as growth, vision, reproductive capacity and cell differentiation. The FAO periodically calculates vitamin A (retinol) availability for human consumption in different countries of the world by converting the estimates of the available food for consumption into retinol equivalent (RE) micrograms (mcg). The current data on the 2005-2007 period presented in Figure 5.7 shows that vitamin A deficiency is particularly significant in most developing countries.
Due to a bitter paradox associated with extreme hunger, there is an exponential increase in the incidence of overweight and obese people in the populations of rich countries and a considerable increase in chronic diseases (cardiovascular diseases, diabetes and cancer) which can be prevented with adequate nutrition.[13]
On the basis of these considerations, it is clear that the relationship between nutrition and health is true for all countries, with different outcomes, critical issues and

Figure 5.7. Availability of Vitamin A for human consumption in the 2005-2007 period

Bangladesh	1	Gambia	2	Belgium	3	Malta	3
Burkina Faso	1	Georgia	2	Belize	3	Mauritius	3
Cape Verde	1	Guatemala	2	Bermuda	3	Mexico	3
Central African Republic	1	Guinea	2	Bosnia and Herzegovina	3	Morocco	3
Comoros	1	Honduras	2	Brunei Darussalam	3	Netherlands	3
Côte d'Ivoire	1	India	2	Cameroun	3	Netherlands Antilles	3
Eritrea	1	Indonesia	2	Canada	3	New Caledonia	3
Ethiopia	1	Jordania	2	Chad	3	New Zealand	3
Guinea Bissau	1	Kenya	2	Chile	3	Norway	3
Haiti	1	Laos	2	Croatia	3	Pakistan	3
Lesotho	1	Liberia	2	Cuba	3	Perù	3
Madagascar	1	Libya	2	Cyprus	3	Philippines	3
Malawi	1	Mauritania	2	Czech Republic	3	Poland	3
Mali	1	Mongolia	2	Denimark	3	Portugal	3
Mozambique	1	Myanmar	2	Dominica	3	Republic of Korea	3
Nicaragua	1	Namibia	2	Estonia	3	Republic of Macedonia	3
Niger	1	Nepal	2	Fiji Islands	3	Republic of Moldova	3
Timor-Leste	1	Nigeria	2	Finland	3	Romania	3
Togo	1	Occ. Palestinian Territory	2	France	3	Russian Federation	3
United Republic of Tanzania	1	Panama	2	French Polynesia	3	Rwanda	3
Yemen	1	Paraguay	2	Gabon	3	Saint Kitts and Nevis	3
Zambia	1	Sao Tome and Principe	2	Germany	3	Saint Lucia	3
Zimbawe	1	Senegal	2	Ghana	3	Saint Vincent/Grenadines	3
Algeria	2	Sierra Leone	2	Greece	3	Samoa	3
Angola	2	South Africa	2	Grenada	3	Saudit Arabia	3
Azerbaijan	2	Sri Lanka	2	Guyana	3	Serbia and Montenegro	3
Benin	2	Sudan	2	Hungary	3	Seychelles	3
Bolivia	2	Suriname	2	Iceland	3	Slovakia	3
Botswana	2	Swaziland	2	Iran	3	Slovenia	3
Brazil	2	Syria	2	Ireland	3	Solomon Islands	3
Bulgaria	2	Thailand	2	Israel	3	Spain	3
Burundi	2	Trinidad and Tobago	2	Italy	3	Sweden	3
Cambodia	2	Turkmenistan	2	Jamaica	3	Switzerland	3
China	2	Uganda	2	Japan	3	Tajikistan	3
Colombia	2	Viet Nam	2	Kazakhstan	3	Tunisia	3
Congo	2	Albania	3	Kiribati	3	Turkey	3
Costa Rica	2	Antigua and Barbuda	3	Kuwait	3	Ucraine	3
Dem. Rep. Congo	2	Argentina	3	Kyrgyzstan	3	United Arab Emirates	3
Djibuti	2	Armenia	3	Latvia	3	United Kingdom	3
Dominicana Republic	2	Australia	3	Lebanon	3	United States of America	3
D.P.R. of Korea	2	Austria	3	Lithuania	3	Uruguay	3
Ecuador	2	Bahamas	3	Luxembourg	3	Uzbekistan	3
Egypt	2	Barbados	3	Malaysia	3	Vanuatu	3
El Salvador	2	Belarus	3	Maldives	3	Venezuela	3

1 Less than 300 mcg RE per person per day
2 Between 300 and 600 mcg RE per person per day
3 More than 600 mcg RE per person per day

Source: reviewed by The European House-Ambrosetti on the data of the FAO Statistics Division, March 2011.

characteristics. In developing nations, the food security/health relationship is mainly related to food accessibility and to an adequate intake of micronutrients; in advanced countries, the main problem seems to be a correct and healthy diet.

Steve Raymer/National Geographic Image Collection

5.2 FOOD ACCESS AND POPULATION TRENDS

THE GROWTH IN THE WORLD POPULATION, IN DEVELOPING COUNTRIES IN PARTICULAR, HAS BEEN AND STILL IS A MAJOR CHALLENGE FOR THE GLOBAL FOOD AND AGRICULTURAL PRODUCTION SYSTEM

One of the factors with the greatest impact on food accessibility (especially in terms of the physical access to a sufficient quantity of food) is population growth.

The growth in the world population – in developing countries in particular – has been and still is a major challenge for the global food and agricultural production system, generating exponential growth in the demand for food.

This is not a temporary phenomenon. In fact, population growth will remain a challenge for the future; as shown in Figure 5.8, the population in Africa and in Asia is expected to grow at least until 2050.

In fact, the present trends show that the population is booming in the countries that are most affected by hunger and poverty. A look at the developing countries – considered by the FAO as the most vulnerable in terms of nutrition – reveals that these have and will have the highest population growth rates in the world in the next decades. For example, Ethiopia had 20 million inhabitants in 1950; today, it has 88 million and it will have 162 million in 2030, with an annual growth rate of 2.9%.[14]

Many other African countries with a weak nutritional profile show similar trends. Cases in point are Uganda and Burundi, that have 33 million and 10 million inhabitants, respectively.[15]

The population in these countries currently grows by 3.6%. By 2030, their population will amount to 68 million and 18 million, respectively,[16] with record high growth rates.

On the basis of the considerations made so far, it is worth recalling that the number of undernourished people is still extremely high – 925 million according to the FAO in 2010 – and there are many stalemates or setbacks in the world, notwithstanding the positive efforts made by some countries, as in the hunger-health relationship domain. Besides the so-called “absolute values” in population trends, there is and there will be a major “shift effect” in the world population: for some decades now, inurbation has greatly intensified, with a progressive flight from rural areas and a population boom in urban areas, especially in developing countries.

The shift of large masses of people from the country to the cities is critical for food accessibility for the following reasons:

– the “migration effect,” with the presence of a large number of people in small areas, very often without basic social and health facilities (drinking water, sewers, hospitals, acceptable housing, etc.);

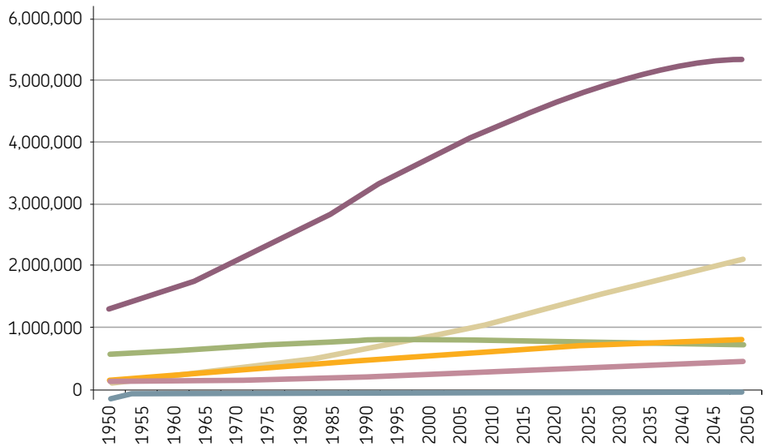
– pressures on the production and distribution of food in these urban areas;

– flight from the land and abandonment of agricultural practices;

– problems related to food accessibility - not only in terms of quantity, but in terms of

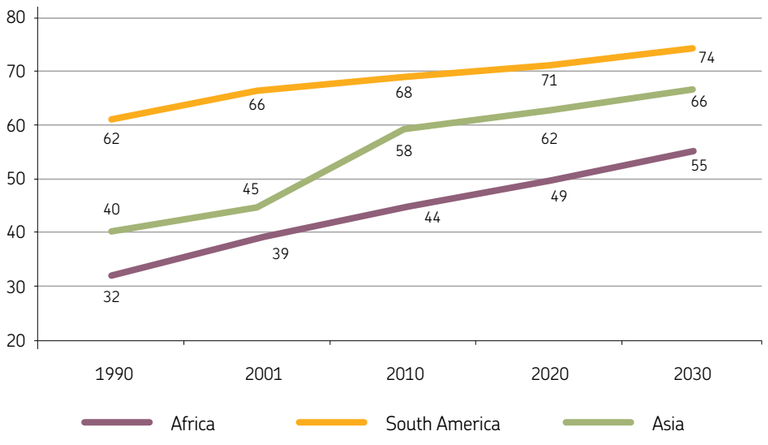
quality – for masses of individuals who are often pushed toward urban areas because of extreme poverty and hunger.
This trend is very significant for the future scenario. According to the United Nations, in Africa the percentage of the population living in urban centers is expected to grow from 32% in 1990 to 55% in 2030, increasing by 72% in 40 years.

Figure 5.8. Global population trends in 2050



Source: reviewed by The European House-Ambrosetti on the data of the United Nations, Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2008 Revision*, 2009.

Figure 5.9. Population in urban areas (as a % of total population)



Source: reviewed by The European House-Ambrosetti on the data of the United Nations Department of Economic and Social Affairs, Population Division, *World Urbanization Prospects: The 2007 Revision*, 2008; United Nations – UN-Habitat, *State of the World Cities*, 2008.

5.3 FOOD ACCESSIBILITY AND SOCIAL CONFLICTS

HISTORICALLY, ACCESS TO FOOD IS THE ROOT CAUSE OF CONFLICTS, BOTH AT THE NATIONAL AND AT THE INTERNATIONAL LEVEL

The presence of natural and agricultural resources, their exploitation and the allocation of the proceeds coming from their production and commercialization have Historically been the root cause of conflicts, both at the national level (in the form of domestic conflicts within the States which have often resulted in civil wars and secessions) and at the international level (more or less openly declared and disclosed wars to control boundary areas rich in agricultural and mining resources).
The strong endogenous link between food accessibility – and recently, food inflation – and civil conflicts has always been a problem which affects and besets the world. Starting with the end of the Cold War, conflicts have been on the rise, especially in the form of domestic civil wars. And in the presence of poverty and political and social instability, the access to and the distribution of food, water and natural resources become essential for the survival and for the economic progress of the ethnic, social and religious groups present in the area.
On the basis of the UNEP estimates, at least 18 domestic conflicts since 1990 have been generated and exacerbated by agricultural and natural resources. Looking at the last 60 years, according to the United Nations, at least 40% of domestic conflicts has been linked to the availability, the use and the exploitation of agricultural and natural resources.
All the international analyses show that major conflicts/critical situations are directly or indirectly related to the availability of food and of natural resources:
– social tensions linked to very poor living conditions;
– social tensions linked to the access and control of agricultural resources;
– migration flows due to very poor living standards (malnutrition and lack of water), in some cases exacerbated by climate change;[17]
– political and social instability and misgovernment in meeting the growing requirements of the population;
– pressures on international governance due to growing imbalances between developing and developed countries.
In the future, there may be relevant risks associated with a deterioration in the availability and the security of food and agricultural products (exacerbated by the ongoing climate change); this may lead to a significant increase in social conflicts, especially in developing areas of the world, where food and water are able to multiply latent and still unsolved ethnic, religious and economic tensions.
In fact, the availability of more natural resources means more income and prosperity. But, on the other hand, this can concretely contribute to instability and conflicts. Often, in developing countries, the expectation of reaching economic and social prosperity by

exploiting the existing natural resources leads to the deterioration of the natural environment. In fact, the revenues from the exploitation and commercialization of natural resources are not used to enhance technologies and improve the living standards of the population, but to strengthen the power of local and often armed groups.

When there are social conflicts – even if not directly designed to control natural resources – these resources often become tools to finance the cost of these conflicts, thus transforming control over the exploitation of these resources into a strategic objective for the warring factions. The governance of resources is also a challenge in stable political and economic situations. But it becomes crucial in countries where local governments are weak and there is no transparency, which leads to opportunistic attempts to extract resources according to nepotistic practices or through illegal trade.[18] In these contexts, the exploitation of natural and agricultural resources is extremely likely to degenerate into civil wars/secessions or into conflicts between neighboring countries (to control common or particularly profitable resources).

SOCIAL CONFLICTS – ESPECIALLY ASSOCIATED WITH NATURAL AND AGRICULTURAL RESOURCES – VERY OFTEN UNDERMINE THE FUTURE ECONOMIC AND SOCIAL GROWTH AND THE DEVELOPMENT OF COUNTRIES

Often these conflicts are mainly considered in terms of their immediate consequences: casualties, wounded people, refugees, land and woodland devastation. But they do not only have short-term consequences. Indeed, social conflicts – especially associated with natural and agricultural resources – very often undermine the future economic and social growth and the development of the countries where they occur (and of the neighboring countries if these conflicts result in migration flows).

The connection between natural resources, conflicts and food security, unfortunately, appears very close, with a vicious circle characterized by war and by the grabbing and devastation of the available agricultural resources. In turn, this leads to hunger, disease and, very often, to migration flows, with major negative consequences in terms of health and in terms of access to water and to a sufficient amount of food for huge masses of vulnerable people. Populations located in areas beset by conflicts over natural resources have to deal with the very difficult – and often impossible - challenge of revamping the development process, even when they are able to survive and go back to a normal existence in countries which are again at peace.

DURING PERIODS OF FOOD INFLATION, THE SO-CALLED "LOW-INCOME" COUNTRIES HAVE EXPERIENCED A DETERIORATION OF THEIR POLITICAL SITUATION

The empirical evidence of the above has been proposed by the very recent paper Food Prices and Political Instability[19] of the International Monetary Fund, which provides very interesting statistics on the correlation between the food crisis and political instability. This working paper presents a survey of the impact of international food prices on democracy and domestic conflicts in over 12 countries between 1970 and 2007. Its empirical results show that during periods of food inflation, the so-called "low-income" countries have experienced a deterioration of their political situation.

From a purely macroeconomic perspective, international food inflation has led to an increase in the real GDP and in per capita investments in food-exporting countries. But, at the same time, the increase in international food prices has reduced real per capita consumption and has significantly deteriorated the income distribution gap. The widening gap between the rich and the poor – already present in many developing nations – has led to hundreds of civil conflicts in the so-called "low-income" countries.

THE WIDENING GAP BETWEEN THE RICH AND THE POOR HAS LED TO HUNDREDS OF CIVIL CONFLICTS IN THE SO-CALLED "LOW-INCOME" COUNTRIES

It is important to emphasize that the main reason for the gap between "low-income" countries and "medium and high-income" countries is the enormous concentration of extremely poor people in "poor" countries. In fact, this segment of the population is the first victim of food inflation, in that a large portion of private expenditure is allocated to buy food.[20]

John Scofield/National Geographic Image Collection

6. RECOMMENDATIONS: AREAS OF INTERVENTION

Alex Treadway/National Geographic Image Collection

6.1 DIMENSIONS AND CAUSES OF THE PROBLEM

In 2009, when we first addressed the issue of access to food, we were convinced that it was a topic of great importance that required greater attention from opinion and policy makers and farreaching, consistent and timely measures. The events of the last two years, beginning with the financial and economic crisis that hit the world with dramatic results, including issues of nutrition, have strengthened our initial conviction. Hence, the decision to return to this topic with an update, on the eve of what appears to be a very delicate and critical new phase of access to food for the population of our planet.
The study was undertaken with the aim of describing the problem of access to food in its multidimensional aspects, taking into account the complex system of variables involved. Here below, we will try to summarize the key evidence gathered and to suggest possible areas of intervention.

THE CURRENT PRODUCTION CAPACITY IS THEORETICALLY SUFFICIENT TO FEED THE ENTIRE WORLD POPULATION, THIS DOES NOT PREVENT THE PERSISTENCE AND AMPLIFICATION OF HUGE DISPARITIES IN ACCESS TO FOOD ITSELF

From the technical-quantitative standpoint, although the current production capacity is theoretically sufficient to feed the entire world population, this does not prevent the persistence and amplification of huge disparities in access to food itself, the emblem of which is the existence of nearly one billion malnourished people, compared to another billion obese people. Moreover, this paradox has been getting worse in the last two years. This is primarily due to structural reasons concerning the problem of poverty and the need for equitable and sustainable economic development in the more underdeveloped countries.
The resolution of this aspect of the problem requires multidimensional policies to combat poverty, especially in rural areas, through massive, 360° investments in agriculture and economic and social development. These measures should be directed to multiple targets of production, redistribution and respect for the environment: it is not enough to invest in increased production and productivity (primarily in agriculture, through improved technology transfer and improved management of access to water); rather, we need a more equitable distribution of wealth through the creation of income opportunities and a more sustainable use of natural resources (water, soil and the intended use of agricultural crops).

THIS IS PRIMARILY DUE TO STRUCTURAL REASONS CONCERNING THE PROBLEM OF POVERTY AND THE NEED FOR EQUITABLE AND SUSTAINABLE ECONOMIC DEVELOPMENT

In recent years, other elements have been compounded to these structural factors – cyclical in nature but destined to persist if the causes are not eliminated – which are just as important.
First of all, the increasing volatility of agricultural and food markets, which is caused by large global phenomena (such as the volatility of energy markets, the effects of climate change and economic and population growth) and amplified by financial speculation.

Robbie George/National Geographic Image Collection

Among the possible keys for the interpretation of the phenomenon and its recent increase, two stand out as particularly important and timely:

- the failure of the functioning of pure market mechanisms in the food sector;
- the lack of adequate joint action and multilateral economic, social, environmental and trade policies to govern access to food, changing the inequalities found today, in part by applying structural measures.

THE CENTRALITY OF AGRICULTURAL DEVELOPMENT IN THE CONTEXT OF FOOD SECURITY IS CLEAR

In fact, the convergence of financial speculation, protectionist policies of various types implemented by many governments around the world, alternative uses of the land in relation to food production, and so on, have produced phenomena which significantly distort the orderly functioning of markets, making it clear that there is a dramatic lack of governance on an international scale. These problems, reported in the first edition of this document, are all still there, without any decisive progress to report. Seeing as we are talking about food production, and since 75% of the needy belong to the rural population, the centrality of agricultural development in the context of food security is clear.
The drop in investments – both public and private – in agriculture over the last 20 years and the parallel absence of political attention (except, as mentioned, the adoption of protectionist, and often distorting, agricultural and trade policies) may find a possible explanation for the productivity gains, created in the last 30 years by technical developments and the spreading of knowledge in agriculture (the so-called green revolution); earnings that are sufficient to enable a gradual and steady increase in production and a decrease in prices in real terms. This has led to the illusion that the focus on appropriate action to address the sector may be relaxed.
In light of this, some observers have stressed that the pressures on the demand for food in act today would pose conditions – thanks to higher average prices of agricultural commodities that are more attractive for investments by the industry. Investments to support the launch of a new "green revolution." However, the high volatility expected in the agricultural markets themselves implies a high level of risk that still constitutes a strong barrier to investments in agricultural development.
Moreover, the efforts which will increase agricultural productivity are only one facet of a more complex picture of development and poverty reduction. The management of each of the relevant points (agricultural investments and technology transfer, market access and functioning of markets, international trade agreements, creation of social and economic opportunities, creation of safety nets, education and social empowerment, allocation and management of natural resources, etc.) requires the exercise of appropriate action of control and direction on a global scale.

THE EXERCISE OF APPROPRIATE ACTION OF CONTROL AND DIRECTION ON A GLOBAL SCALE IS REQUIRED.

6.2 NEW CHALLENGES AHEAD

New global pressures will be added to the structural dynamics that characterize the problem of food security.
Three in particular: the population and economic growth in some emerging countries (destined to change the consolidated balance); climate change, which will weigh heavily on influencing the food business over the next forty years; and the gradual transition from oil to renewable energy sources and biofuels.

NEW GLOBAL PRESSURES WILL BE ADDED TO THE STRUCTURAL DYNAMICS THAT CHARACTERIZE THE PROBLEM OF FOOD SECURITY: THE POPULATION AND ECONOMIC GROWTH, CLIMATE CHANGE AND THE GRADUAL TRANSITION FROM OIL TO RENEWABLE ENERGY SOURCES AND BIOFUELS

With respect to environmental issues, it should be noted that the response strategies are on two fronts: in the area of strategies of mitigation and in that of adaptation. The more effective the results of actions to contrast the phenomena of climate change are, through a process of broad and shared consultation, the more the strategies in agriculture can be placed in the area of mitigation, with predominantly adaptive adjustments. Unfortunately, the results of the recent conferences in Copenhagen and Cancun do not lead us to expect particularly positive developments in the near future.
The failure of an overall policy of containment of the phenomenon of climate change opens up the prospect of potentially catastrophic scenarios, with not just secondary agricultural upheavals – which is the economic sector most directly affected by the phenomena of climate change – in terms of yields achievable, geographical areas and water resources used.

THE FAILURE OF AN OVERALL POLICY OF CONTAINMENT OF THE PHENOMENON OF CLIMATE CHANGE OPENS UP THE PROSPECT OF POTENTIALLY CATASTROPHIC SCENARIOS, WITH NOT JUST SECONDARY AGRICULTURAL UPHEAVALS

Economic and demographic pressures also pose challenges that should not be underestimated. The projections of population growth over the next 40 years raise the problem of identifying new ways of growth in agricultural productivity. The debate on the need for a technological paradigm shift toward the direction of the use of biotechnology has been going on for some time.
While the debate on renewable energy is the subject of extensive discussion, there seems to be a matter of some importance that has been underestimated: the eating habits of the global population and of emerging countries. In our opinion, this constitutes the variable which still needs to be explored further; it is capable of moving – on equal terms of population growth – the bar of the productivity gains needed to support the increased demand for food.

ECONOMIC AND DEMOGRAPHIC PRESSURES ALSO POSE CHALLENGES THAT SHOULD NOT BE UNDERESTIMATED

What one finds, in our opinion, is not only population growth dynamics in itself – associated with the growth of economic welfare – but the intersection of these dimensions with the styles of consumption adopted by people, in order to identify in time, and possibly redirect, the composition of the demand for food products that will be defined in the near future. It is the unknown equation that could indicate the possible strategic alternatives for the medium to long term.

6.3 AREAS OF INTERVENTION

It is possible to summarize the flow of operations in the food industry, very simply by highlighting the six main areas, placed in sequential order:

1. *research and development*, relating to all possible areas (soil fertility, optimizing the use of production inputs, mechanisms for knowledge transfer, etc.).
2. *production of input factors* (such as seeds and fertilizers) and access to natural resources needed for agricultural production (for example, water);
3. *farming*, in the strictest sense, i.e., the phases of growing, harvesting and storage of agricultural products obtained. This activity may have very different characteristics depending on geographical location, soil structure, the degree and type of mechanization, use of chemical agents, the extent of the plots, etc.;
4. *trade in agricultural products*, both to consumers and toward the next phase of industrial processing;
5. *industrial processing* and the subsequent *distribution* of the finished product;
6. *processes of consumption*.

To give a detailed account of the conditions necessary for the smooth functioning of this complex system and detailed descriptions of activities lies beyond the scope of this document.

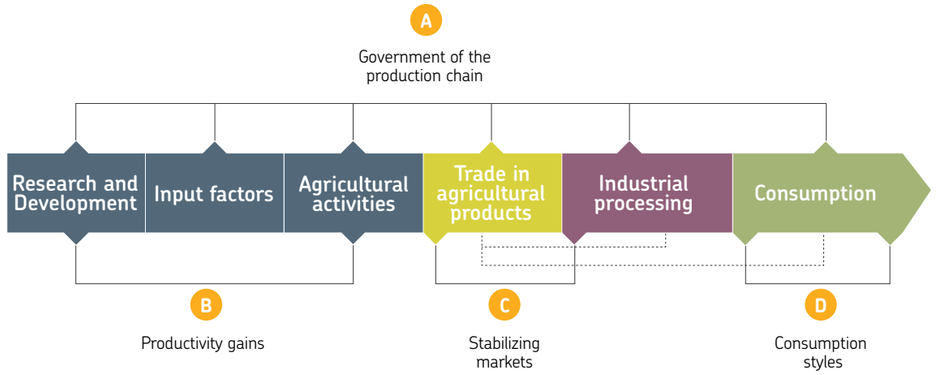
We limit ourselves to pointing out the four macro-areas where the focus should be, in our opinion. Namely:

FOCUS ON FOUR MACRO-AREAS

- A *Governing the entire food chain*, which, in part because of the particular nature of agricultural food production, cannot be left to pure market logic;
- B *Research areas of productivity gains*, acting along the different stages of the entire chain;
- C *The stabilization of markets for food*, to help establish fair conditions that are able to stimulate investments, remunerate the factors of production and increase opportunities for access to food;
- D *Addressing eating habits*, which we have already mentioned, and which we will discuss further in the closing chapter.

6.3.1 Strengthen the mechanisms of global governance

There is an evident lack of overall governance of the food system, which requires rapid and timely intervention on many levels. The particular nature of food – which cannot simply be reduced to a commodity, as has happened in recent decades under the boost of its greater availability – and the failure of the mechanisms of distribution, make it necessary to overcome the paradigm of a self-regulating market, as well as the coordination of global policy and the overall time reduction of protectionist policies of a unilateral nature.



It is therefore essential:

- To return to giving food a central role of importance within the international political and economic agenda. This means that the food chain should be more clearly structured and governed toward the *objectives of accessibility, sustainability and nutritional quality*. In fact, it is fundamental to guarantee and ensure the quality and quantity of the food produced and distributed;
- To that end, there is the need to create *common spaces for dialog and analysis* of issues related to food security: no country, institution or economic actor in the food industry is capable of responding to the challenges posed by the reference context (environmental, political, social and economic) on its own. Instead, there must be a multilateral and transversal approach involving all public and private actors directly and indirectly connected with the agriculture-food sector, in order to further increase the average standard of the industry;
- Place on a higher level the *economic policy actions* aimed at supporting the processes of growth and development of the poorest countries, actions that require the active intervention of the international community. Choices pertaining to this issue, which are of immense importance and very difficult to implement, are unfortunately a necessary condition but are not sufficient for the orderly functioning of the sector.

THE FOOD CHAIN SHOULD BE MORE CLEARLY STRUCTURED AND GOVERNED TOWARD THE OBJECTIVES OF ACCESSIBILITY, SUSTAINABILITY AND NUTRITIONAL QUALITY. THERE IS THE NEED TO CREATE COMMON SPACES FOR DIALOG AND ANALYSIS OF ISSUES RELATED TO FOOD SECURITY

6.3.2 Promote economic development and achieve increases in agricultural productivity

It is necessary to identify, implement and support specific sustainable development routes to define and spread credible and practical tools and solutions applicable to developing countries and in those key sectors for economic growth. The terms of productivity, the measure of the increases needed over the next 40 years to support the growth of food consumption worldwide is, in our opinion, a factor that depends on a complex mix of variables: the growth of world population, the impact of climate change on agricultural yields and the composition of future global food baskets.

This last aspect, if managed correctly, contains the degree of increase in productivity required to support global consumption. The challenge is to continually innovate, and

IT IS NECESSARY TO SUPPORT SPECIFIC SUSTAINABLE DEVELOPMENT ROUTES TO DEFINE AND SPREAD CREDIBLE AND PRACTICAL TOOLS AND SOLUTIONS APPLICABLE TO DEVELOPING COUNTRIES AND IN THOSE KEY SECTORS FOR ECONOMIC GROWTH

INTERVENTIONS SHOULD BE PROMOTED IN SUPPORT OF DEVELOPING COUNTRIES THROUGH THE TRANSFER OF SCIENTIFIC KNOWLEDGE AND BEST FARMING PRACTICES IN ORDER TO ENCOURAGE MAINTENANCE AND DEVELOPMENT OF "LOCAL SYSTEMS" OF PRODUCTION-DISTRIBUTION-CONSUMPTION

strive for the development of models for agricultural production and high productivity, higher quality and lower environmental impact. Scientific and technological research on these issues, also promoted by large flows of public investments, is therefore crucial. Some routes have already been drawn:

- interventions should be promoted in support of developing countries – in order to achieve a state of food self-sufficiency – through the transfer of scientific knowledge and best farming practices to these countries, through programs designed specifically to bridge the knowledge gap that exists today between advanced and backward countries;
- encourage *maintenance and development of "local systems"* of production-distribution-consumption of the food goods, preserving the quality of products and attentive to biosustainability, through appropriate policy and incentive/disincentive measures.

But there is also the need to counter the fiscal and trade policies that are distorting world food markets, especially in developing countries.
These measures alone, combined with a more rational exploitation of the territory, will permit the achievement of significant results. Other routes, linked to a technological paradigm shift – like biotechnology – are certainly to be explored in parallel, in the knowledge that a number of profiles related to their use should be more thoroughly explored and carefully assessed.

6.3.3 Change the food production chain in order to manage constantly growing price volatility and ensure the existence of safety nets

The food industry, destined in the near future to live with a significant and increasing price volatility, must find technical solutions to best manage this new reality.
In order to be in a position to oppose and prevent a future food crisis, it seems appropriate:

- to carry out an evaluation process and selection of best practices at the international, national and local level for the stockpiling of food and raw materials, defining costs, time and roles of such a process of *global "insurance;"*
- to define a *new set of rules* for the markets for food commodities that is able to enhance the role, not merely economic, of the products traded therein; for example, by including active forms of supervision by an independent authority or by imposing position limits to ensure that the money invested does not constitute operations of an excessively speculative nature;
- *coordinate trade policies* at the international level by facilitating access to markets and the qualitative growth of production from developing countries.

6.3.4 Managing eating habits

The key predictive models used today, in our opinion, suffer from two serious limitations: the first lies in the difficulty of incorporating forecast data concerning the development of the phenomenon of climate change because of the objective uncertainty that characterizes possible impacts; and secondly, the difficulty in estimating the evolution of food consumption patterns.
We know that environmental impact and the degree of efficiency in the consumption of natural resources (land, water, feed, etc.) associated with different dietary choices may be very different.

The Western diet and the Mediterranean diet differ mainly with reference to the quantities of meat consumed. It is easily demonstrable how patterns of consumption that are too unbalanced in the direction of the consumption of meat and food of animal origin may affect global food security over time.
On the supply side of food, the central theme of any reflection, therefore, cannot help but be about the *future composition of the demand for food products*, in light of the extraordinary changes that are already possible to predict today. Population growth is indeed associated with sustained economic growth in large parts of the planet, with access to more sophisticated patterns of consumption by large sections of the population of developing countries.
For the first time in history, the *actions to govern and address eating patterns* to account for a profile of sustainability are becoming a decisive variable for economic policy. This is taking concrete shape in the developed world, coping with a health emergency related to the spreading of metabolic and cardiovascular diseases and cancer from improper dietary habits. It will become crucial for developing countries because of the impact this will have on the balance of global production in agriculture. The choice of sustainable food models for the future can also help reduce the emphasis on productivity gains, which, in turn, puts pressure on natural resources and environmental sustainability.

THE ACTIONS TO GOVERN AND ADDRESS EATING PATTERNS TO ACCOUNT FOR A PROFILE OF SUSTAINABILITY ARE BECOMING A DECISIVE VARIABLE FOR ECONOMIC POLICY

Michael Hanson/National Geographic Image Collection

NOTES

CHAPTER 1

1. Source: U.S. Census Bureau - International Data Base, updated March 22, 2011. This body has estimated that the amount of the global population on March 22, 2011 was equal to 6,907,373,920.

2. This figure was calculated using the value of the global population on December 31, 2010 to achieve greater consistency with the data of the FAO estimation for 2010 of the number of undernourished people in the world. It is important to note that the estimate is hampered by significant deficiencies in statistical information related to the availability of updated and homogeneous data on the phenomenon of malnutrition in the world. The data shown in Figure 1.1 for the last two years has, in fact, been estimated by the FAO through the use of the Food Security Model of the United States Department of Agriculture (USDA).

3. The region of Latin America also includes Caribbean countries.

4. FAO, *The State of Food Insecurity in the World*, 2010.

5. FAO, Statistics Division, March 2011.

6. *Ibid.*

7. *Ibid.*

8. "Food Security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996).

9. World Bank, *World Development Report 2008 - Agriculture for Development*, October 2007.

CHAPTER 2

1. Oversight, underestimation of the importance of the agricultural sector.

2. Alain de Janvry is the editor of the World Bank report entitled *World Development Report 2008: Agriculture for Development*. He is a member of the Center for International and Development Economics Research (CIDER) and the Center of Evaluation for Global Action (CEGA). He received a Ph.D. in "Agricultural and Resource Economies" from the University of California, Berkeley.

3. The real prices refer to the nominal prices corrected for the changes registered in the U.S. Producer Price Index, taking into consideration the calculation of the variations in the values in 2000 as equal to 100.

4. Source: International Rice Research Institute, 2011.

5. Barilla Center for Food & Nutrition, *Water Management and Climatic, Agricultural and Food Changes*, 2009.

6. It is important to consider how the increase in crude oil prices also causes increasing costs of production and transportation in the food industry.

7. Source: U.S. Census Bureau - International Data Base, data updated on March 22, 2011. This body has estimated that the amount of the global population on March 22, 2011 was equal to 6,907,373,920.

8. Source: Anuradha Mittal, The Oakland Institute.

9. "The bottom of the pyramid really depends on agriculture. There is no other way to bring them out of poverty except with agriculture" (Suresh Babu, International Food Policy Research Institute - IFPRI).

10. Source: World Bank, 2007.

11. This expression describes the policies adopted in order to bring benefits to a country, even if at the expense of others. In other words, these policies are intended to provide relief to the economic problems in a country with means that tend to worsen the problems of others.

12. Source: IMF, *World Economic Outlook*, January 2011.

CHAPTER 3

1. *Rome Declaration on World Food Security*, 1996.

2. Speaking of the global financial, economic and food crisis during the international summit conference "Water for agriculture and energy in Africa: the Challenges of Climate Change" in December 2008, the Director-General of FAO, Jacques Diouf, pointed out that "the promotion of agricultural production in poor countries is the only lasting solution to fight hunger. We must therefore invest more in agriculture."

3. Millennium Development Goals - MDG 1: reduce by half the proportion of malnourished people by 2015.

4. Return the number of malnourished people to a value corresponding to half the level found in 1992 by and not later than 2015.

5. Through a report by Kostas Stamoulis, Director of the Agricultural Development Economics Division of FAO.

6. The "right to food" is the inalienable right of every person to have regular access to enough food, adequate in terms of nutritional value and culturally acceptable food for an active and healthy life. It is the right to get food with dignity and autonomy, rather than the right to be fed. This right is reflected in the *Universal Declaration of Human Rights*, adopted by the UN General Assembly December 10, 1948 and was subsequently reiterated in the "Guidelines on the Right to Food" adopted by the FAO Council in 2004. Source: http://www.fao.org/righttofood/.

7. In 2004, FAO member countries unanimously adopted the "Guidelines for the right to food" and a unit within the agency to coordinate and assist countries in implementing them. These voluntary guidelines are a practical tool to assist countries in their efforts to eliminate hunger and provide a coherent set of recommendations regarding jobs, land, water, genetic resources, networks of social security, education, etc., and seek to encourage the allocation of budgetary resources to anti-hunger and poverty programs.

8. Stamoulis, FAO, 2009.

9. For more details, see http://www.fao.org/cfs/cfs-home/cfs-36/en/.

10. Seoul Summit - Annex 2 - G20 Action Plan on Development, November 2010.

11. *How to Strengthen the Role of the Private Sector in Global Food Security?*, Shenggen Fan, General Director of the International Food Policy Research Institute.

12. High Level Expert Forum - How to Feed the World 2050, Non-distorting support measures to farmers, Rome, October 12-13, 2009.

13. Meeting held in Rome, April 14-15, 2009.

14. EAFF - East African Farmers' Federation; PROPAC - Plateforme Sous-régionale des organisations paysannes d'Afrique Centrale; ROPPA - Réseau des Organisations Paysannes et

de Producteurs Agricoles de l'Afrique de l'Ouest; UMAGRI Union Maghrébine des Agriculteurs.

15. Source: UN - World Food Programme, March 2011.

CHAPTER 4

1. FAO, 2009.

2. UNEP, 2009.

3. FAO, 2003; Hazell and Wood, 2008.

4. Fischer, 2008.

5. FAO, 2009.

6. In 2030, it is estimated that two-thirds of the population will live in cities. Remember that in 2007, the world's urban population - more than three billion people - surpassed the rural one for the first time in history.

7. Biofuels are hydrocarbons produced from the processing of raw vegetable materials. They can be in the form of liquid (ethanol or biodiesel) or gas (hydrogen and biogas). Only the first form can be used in the transport sector because those in gaseous form need further processing in the area of road cars and need a specific distribution network. The liquid fuels are the ones that are increasingly penetrating the market. In particular ethanol, which is obtained through the fermentation of sugars derived from plant materials, whereas biodiesel is produced from vegetable oils, mainly rapeseed and palm oil. These biofuels, which are primarily derived from edible products, are called "first generation." Those of the "second generation," more closely linked to developments in the technological progress, instead, can be derived from waste.

8. Jacques Diouf, FAO Director-General, the inaugural speech of the forum "How to Feed the World 2050," October 2009.

9. UNEP, 2009.

10. U.S. Energy Information Administration - International Energy Statistics, March 2011.

11. World Bank, 2007; FAO, 2008.

12. Please note that biofuels are only one of the drivers of growth in the prices of agricultural commodities. The drop in yields caused by bad weather conditions, the reduction of global stocks, the rising price of fossil fuels and changes in the structure of demand also affect their price.

13. FAO, 2008.

14. Ibid.

15. The participation of small farmers for agricultural production, including for biofuel, however, requires investments in infrastructures, research, rural financing, the study of markets and in the commercial institutions and legal systems.

16. "Land which, due to natural processes or human activity, is no longer able to properly sustain an economic function and/or the original ecological function" (ISO, 1996).

17. FAO-UNEP, *Land Degradation Assessment in Drylands (LADA)*, 2008.

18. The reduction of vegetation, for example, decreases the Earth's capacity to absorb CO2. It is estimated that 300 million tons of CO2 are released into the atmosphere through the process of desertification every year (about 4% of total global emissions). Sources: UN, *Review of Implementation of Agenda 21 and the Johannesburg Plan of Implementation: Desertification*," 2008; World Resources Institute, *Ecosystems and Human Well-Being: Desertification Synthesis*. Millennium Ecosystem Assessment," p. 8, 2005.

19. FAO-UNEP, *Land Degradation Assessment in Drylands (LADA)*, 2008; ISRIC, Global Assessment of Human-induced Soil Degradation (GLASOD), 2008.

20. Biggelaar *et al.*, 2004.

21. Mainly due to erosion.

22. UNEP, *Global Environment Outlook: Environment for Development (GEO 4)*, 2007.

23. China National Report on the Implementation of the United Nations Convention to Combat Desertification and National Action Programme to Combat Desertification, 2006.

24. ISPRA, "2010 International Year of Biodiversity - Soil alarm: in Italy, 80% is of poor quality," press release, February 2010.

25. Biggelaar *et al.*, 2004; Henao and Baanante, 2006.

26. Calculated on the loss of 75 billion tons of soil due to erosion.

27. Communication from the European Commission "Thematic Strategy for Soil Protection," DG Agriculture, September 22, 2006.

28. Von Braun and Meinez-Dick (IFPRI), *Land Grabbing by Foreign Investors in Developing Countries: Risks and Opportunities*, 2009.

29. Saudi Arabia, Japan, China, India, Korea, Libya and Egypt, among others, are among these countries.

30. GRAIN, *Making a killing from hunger - Against the grain*, April 2008.

31. At the G8 summit which was held in July in Aquila, Italy, it had been scheduled to sign a declaration of intent on these issues, but government leaders did not individuate a convergent solution.

32. These impacts have been quantified in numerous studies, see for example: IPCC, *Quantifying the Impacts on Food Security and Climate Change: Impacts, Adaptation and Vulnerability, Contribution of working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, 2007.

33. Plan Bleu, *State of the Environment and Development in the Mediterranean - 2009*, November 2009.

34. BCFN, *Climate Change, Agriculture and Food*, 2009.

35. These projections depend on the future climate scenario that takes into account the calculation of the impact on agricultural production.

36. Remember that, according to laboratory tests and concentrations of CO_2 in the order of 550 ppm, the yields of crops such as rice, soybeans and wheat will increase by 10-20% and only 0% -10% for maize and sorghum. Source: IPCC, *Climate Change: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, 2007.

37. Jerichow, 2009.

38. Plan Bleu, 2009.

39. Climate change and variability of the same are not new phenomena to agriculture. However, what will change significantly is that the areas affected by this variability will increase.

40. FAO/GIEWS, 2008.

41. FAO, 2010.

42. FAO, 2008.

43. WFP, 2010.

44. Fischer *et al.*, 2002; Reilly *et al.*, 1995; Darwin *et al.*, 1995.

45. Schmidhuber and Tubiello, 2007.

46. For a more detailed analysis of the topic, see *Water Management* (2009) and *Water Economy* (2011), both published by the Barilla Center for Food & Nutrition.

47. WBCSD, 2006.

48. BCFN, *Water Economy*, 2011.

49. FAO, 2007.

CHAPTER 5

1. UNICEF, 2006.

2. *Ibid.*

3. UN World Food Programme, 2007.

4. FAO, 2011.

5. This figure has been calculated considering the recent FAO estimate for the number of undernourished people in the world in 2010; 925 million, of which 906 million in developing countries.

6. FAO, 2011.

7. "We need to mobilize our collective will to make the right choices. The cost of inaction is high – economically, politically and – most importantly – morally," United Nations World Food Programme, *World Hunger Series 2007: Hunger and Health*, 2007.

8. The latest estimates date from August 2010 (United Nations Inter-agency Group for Child Mortality Estimation - IGME).

9. United Nations, *The Millennium Development Goal Report 2010 - Addendum 1*, 2011.

10. *Ibid.*

11. *Ibid.*

12. World Food Programme, Annual Report 2007.

13. For further discussion about this, see the position paper *Nutrition and Health* produced by the Barilla Center for Food & Nutrition, September 2009.

14. U.S. Census Bureau, April 2011.

15. *Ibid.*

16. *Ibid.*

17. The European Council, which adopted the "European Security Strategy" in December 2003, has identified the competition for natural resources and food (especially in relation to agricultural resources and water) among the major global challenges in terms of security: " Competition for natural resources – which in the coming decades will be worsened by global warming – will most likely cause turbulence and migration in various regions of the planet."

18. For more on this issue, see World Bank, *Natural Resources and Violent Conflict*, 2003.

19. Arezki e Bruckner – IMF, 2011.

20. *Ibid.*

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