

“One Billion People Suffer from Hunger”.

Voorhoeve, Joris. “Eén Miljard Lijdt Honger”. *Negen Plagen Tegelijk: Hoe Overleven We de Toekomst?* Amsterdam: Contact, 2011, 69-93. Print. Transl. M. Fresacher.

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One Billion People Suffer from Hunger

Earth provides enough to satisfy every man's need, but not every man's greed.
Mahatma Gandhi (1869-1948)¹

FOOD SECURITY AND HUNGER

The demand for food is growing tremendously. The Food and Agriculture Organization of the United Nations has calculated that because of population growth, urbanization and income growth, 70 per cent more food will be required in 2050². By then, however, the supply of food will have fallen significantly behind, mainly due to a lack of fresh water, new farmland, the competition with biofuels, climate change, scarcity of phosphates, and the reduction of biodiversity. Furthermore, the problem of hunger will not be solved even *with* sufficient food resources, because food prices will go up globally while the poor have insufficient income. Even wealthy countries will feel the impact of climate change, amongst others because of price increase, especially that of meat.

INCREASED DEMAND

As observed in the previous chapter, the world population will have grown by a third in 2050. The FAO (Food and Agriculture Organisation) calculated that the production of cereals needs to be increased from the current 2.1 billion tonnes a year to 3 billion by mid-century. In order to meet the demand for meat, meat production should be more than doubled.

In 2050, more than 70 per cent of the global population will be living in cities. There will be a shift from basic foodstuffs such as rice and wheat to

¹ as cited in Schumacher, E.F. *Small is Beautiful: A Study of Economics as if People Mattered*. London: Blond & Briggs, 1973, 29. Print.

² Wiebe, Keith. FAO. *How to Feed the World in 2050: Insights From an Expert Meeting at FAO, 24-26 June 2009*. Paris: OECD Global Forum on Agriculture, 30 June 2009.
<http://www.oecd.org/agriculture/agriculturalpoliciesandsupport/43256458.pdf>.

vegetables, fruit, meat, dairy and fish. On a world wide scale, in response to an increasing demand for partially cooked and ready-to-eat-food, the market will tend to move towards supermarket chains.

According to projections by the World Bank, the average economic growth rate between 2005 and 2050 will amount to 2.9 per cent per year: 1.6 in high-income countries and 5.2 per cent in developing countries. As a result, the share developing countries have in the gross world product (the global production of everything) will increase from 20 to 50 per cent. The relative differences in GDP (gross national product) per capita between rich and poor countries will diminish, but in absolute terms, the gap between rich and poor people will widen. Differences between countries and regions within the currently developing world shall become larger³.

NATURAL RESOURCES

All food is ultimately dependent on sun, water and soil. There is a lot of land in the world which, in theory, could be used for agriculture. Part of this land has other ecological functions, especially for nature, which would be lost if all land is turned into agricultural land. Most still unused potential arable land is found in a few countries in South America and Sub-Saharan Africa. The inaccessibility of these areas and a lack of infrastructure limit the potential use thereof in the short term. According to the UNs' FAO, farmlands can only be extended with 5 per cent until 2050. In developed countries, 50 million hectares of farmland will be put to other uses, while there will be an increase of farmland in developing countries of around 120 million hectares. The use of additional land will not suffice to meet the enormous demand for food.

Sunlight abounds, but fresh water is scarce. Irrigated agriculture accounts for one fifth all agricultural land, but it produces 50 per cent of the harvest. Thus, water is crucial. The growing livestock industry also requires large quantities of water. Globally, freshwater resources for the required growth of food production are sufficient, but resources thereof are extremely unevenly allocated. Water shortages are related to local power relations (property) rights, pricing, the ability to pay, availability of information, and are mainly influenced by distribution and good or bad governance⁴. Water means power, particularly in arid regions.

³ Ibid.

⁴ HCSS (The Hague Centre for Strategic Studies). "Schaarste ten aanzien van primaire levensbehoeften". *Eindrapport Verkenningen: Houvast voor de krijgsmacht van de toekomst*, deelverkenning ii. 29 maart 2010 http://m.europa-nu.nl/9353000/1/j4nvgs5kjg27kof_j9vviozkr8e2qxs/vig294zneeZl/f=/blg68805.pdf

Biodiversity, the variety of plant and animal species and micro-organisms, is at the foundation of a diversified diet for humans. This biodiversity is rapidly decreasing. Only a dozen of species provide ninety per cent of the human intake of animal protein, and only four species of plants supply half the vegetable calories: wheat, rice, corn and potatoes.

CLIMATE CHANGE

In addition to causing a worldwide temperature increase, climate change leads to more heat waves and droughts, floods, heavier rainfall, storms and hurricanes. In the agricultural sector, the higher temperatures, higher CO₂ concentrations, changes in precipitation, more weeds, insect pests and illnesses directly affect food production.

In the northern hemisphere, higher temperatures may mean that larger areas become potentially suitable for agriculture. Also, longer periods in which plants grow may occur and bigger yields may be harvested. Contrarily, in the southern hemisphere there may be a harvest reduction and a higher frequency of extreme weather such as droughts and floods. This could lead to a clearly negative effect on the overall food production, especially in the second half of the 21st century, which will cause higher food prices and more hunger.

Accordingly, the developing countries' agricultural sector will particularly be affected by climate change. The International Food Policy Research Institute contends that the yield of major crops per hectare will show a significant reduction. South Asia will be affected most. For Sub-Saharan Africa, Latin America and the Caribbean, the implications of climate change will be mixed.

Due to climate change, and compared with crop yields in 2000, irrigated wheat production will fall by 28-34 per cent in developing countries in 2050, and irrigated rice production by 14 to 19 per cent. In some parts of the world, the 2050 harvest will even be halved because of climate change: in South Asia, 50 per cent less wheat will be produced, and the Middle East will show a decrease of 47 per cent in corn production, and 30 per cent less rice crops⁵.

BIOFUELS

Depletion of fossil fuels and concerns about climate change have led to a greater use of plant material as fuel. The production of biofuels, particularly ethanol and biodiesel, has tripled since 2000. It is expected to see another 100 per cent

⁵“Seasonally adjusted: Global warming will make it harder to feed the world in 2050”. *The Economist International Edition*, 1 October 2009. <http://www.economist.com/node/14540051>;
Batka, M., Ewing, M., Koo, J. et al. “Climate Change: Impact on Agriculture and Costs of Adaptation”. Washington DC: IFPRI (International Food Policy Research Institute), 2009. DOI: 10.2499/0896295354.

increase over the next ten years, because of heavy investments made by developed countries in search for an alternative to oil.

In 2009, biofuels accounted for 0.2 per cent of global energy consumption. In the road transport sector, the use of biofuels will increase from 1.5 per cent in 2009 to 5 and 8 per cent in 2030 and 2050 respectively. This has significant consequences for agriculture, because crops that can provide nourishment are used to make fuel.

2 per cent of global farmlands were used for the production of biofuels in 2009. It is expected that this will be 4 per cent in 2030. Already in 2009, 7 per cent of the coarse grain acreage and 9 per cent of the global area used for yielding vegetable oil was used for biofuels. These percentages will rise sharply, since biofuels are perceived (to a large extent incorrectly) as an environmentally sound type of energy.

There are many types of biofuels – of which the reduction of CO₂ emissions, compared to fossil energy, varies widely: from a 10-30 per cent reduction through corn ethanol in the United States to 70-90 per cent reduction through Brazilian sugarcane ethanol. This may seem favourable, provided that the detrimental changes in landscape and the consequences for usable foodstuffs remain uncounted.

Biofuels are often divided into generations. First generation biofuels are primarily food products. They consist of, inter alia, sugars, starch, vegetable oil or animal fats, which are converted into fuels by chemical or fermentation processes. Biodiesel is generated from maize (corn oil), canola (rapeseed) oil palm (palm oil) and soybean (soybean oil). Sugar beet, sugar cane, sugar palm, and also grain render bioethanol. It is rather odd that these foods are used for fuel in a world that knows so much hunger and starvation.

Second generation biofuels hold no foodstuffs. They are made from plants that are grown for this purpose (energy crops) or from inedible parts of food crops. Examples include energy crops such as willow, inedible fruits, wood chippings, straw, animal fat, used cooking oil and waste.

At present, mostly first and second generation biofuels of agricultural origin are used as an alternative for petrol and diesel. For the production thereof, additional land is required – which causes the disappearance of forests, swamps and grasslands, both directly and indirectly. The CO₂ which was held by the soil and vegetation of these areas is subsequently released into the atmosphere. Thus, a ‘CO₂ debt’ is accumulated. Furthermore, it takes decades before the biofuels’

reduction of emissions compared with that of fossil fuels has been earned back. Hence, biofuels actually lead to the opposite of what is intended⁶.

Biofuels are still seen as the future alternative to oil. Yet, oil consumption in rich countries is so high that its substitution by biofuels demands a great deal of land and water. Even if the total current global supply of carbohydrates (cereals and sugar) would be converted into ethanol, it would only replace 40 per cent of the global consumption of crude oil, not to mention the impact this would have on food production⁷.

Various studies have demonstrated that the supply and price of food and the quantity of people suffering from hunger are adversely affected by biofuels⁸. According to the IMF (International Monetary Fund) and the IFPRI (International Food Policy Research Institute) biofuels were responsible for 30 per cent of the price increase of food during the 2008 food crisis. Biofuels could lead to an extra 600 million people going hungry by 2025 – an additional 16 million for each percentage point of rise in food prices⁹.

Second generation biofuels (that are not food-related) do not solve the problem, because they depend on monoculture: oftentimes the same crop is grown on the same plot. Hence, this still leaves the problem of competition for land, water and other supplies for food production. Instead, biofuels generated from waste from cities, refuse from the agricultural sector, and algae (third generation) are not subject to monoculture, cause much less collateral damage and should therefore be more intensively developed¹⁰.

PHOSPHATES

Phosphorus is essential for humans, plants and animals. It is imperative for the energy management within the cell and for building bones, membranes and genetic material. Phosphates are indispensable for food production: plants

⁶ Wiskerke, Willem, and Jeroen Winckers. *Het verborgen klimaat-effect van biobrandstoffen*. Utrecht: Stichting Natuur en Milieu, 2010.
http://www2.natuurenmilieu.nl/media/2039/100308_brochure_het_verborgen_klimaat-effect_van_biobrandstoffen.pdf.

Oxfam International. "Another Inconvenient Truth: How biofuel policies are deepening poverty and accelerating climate change". Oxfam briefing paper, June 2008.
<http://policy-practice.oxfam.org.uk/publications/another-inconvenient-truth-how-biofuel-policies-are-deepening-poverty-and-accel-114084>.

⁷ Ibid.

⁸ Von Braun, J. *Food Prices, Biofuels and Climate Change*. IFPRI, 2008.

<http://www.ifpri.org/sites/default/files/pubs/presentations/200802jvbbiofuels.pdf> ;

ActionAid. *Meals Per Gallon: The impact of industrial biofuels on people and global hunger*. London: ActionAidUK, 2010. http://www.actionaid.org/sites/files/actionaid/meals_per_gallon_feb_2010.pdf

⁹ Oxfam International. "Another Inconvenient Truth: How biofuel policies are deepening poverty and accelerating climate change". Oxfam briefing paper, June 2008. <http://policy-practice.oxfam.org.uk/publications/another-inconvenient-truth-how-biofuel-policies-are-deepening-poverty-and-accel-114084>.

¹⁰ Ibid.

cannot grow without them. By nature, phosphate levels in the ground are very low and limiting for plant growth. Modern agriculture requires added phosphates, which it receives through manure and fertilizers. Fertilization is especially high in industrialized countries. Frequently, over-fertilization with phosphate is applied in order to achieve a maximum harvest. Around 30 per cent of global use of fertilizers is accounted for by China, 15 per cent by India, 11 by the United States, and 7 per cent by the 15 states of the European Union. In developing countries, fertilization rates are much lower.

Phosphate is a mineral. Much phosphate is lost, first during the extraction in the mining industry, then during the use in farming and further down the food chain. Only a small portion is reclaimed; the bulk ends up on the ocean bed. On account of the growing demand for food (including that for more and more meat) and biofuels, according to calculations, the supply of 'recoverable' phosphates will run out in 75 years, and the entire phosphate stock will be exhausted within 170 years. Since there is no substitute for phosphates, it will then become impossible to produce enough food to feed the world population.

Owing to a tight market and a growing demand, scarcity directly leads to a sharp rise in prices¹¹. Europe, which hardly has any resources of its own, is almost entirely dependent on the import of phosphate. The bulk thereof is situated in Morocco and the Western Sahara (43 per cent) and China (27 per cent). Future shortages could cause geopolitical tension¹².

HUNGER AND POVERTY

Even if a sufficient amount of food is produced to feed the entire world population, food can still be difficult to obtain or far too expensive in many locations.

Hunger is not only a result of poverty, but also its major cause. Poverty prevents people from buying or producing food. Hungry people are less able to work to their full capacity and are more vulnerable to disease. Malnourished children cannot learn very well; some are handicapped for life through hunger and malnutrition related brain damage. As a result, they have no way out of poverty.

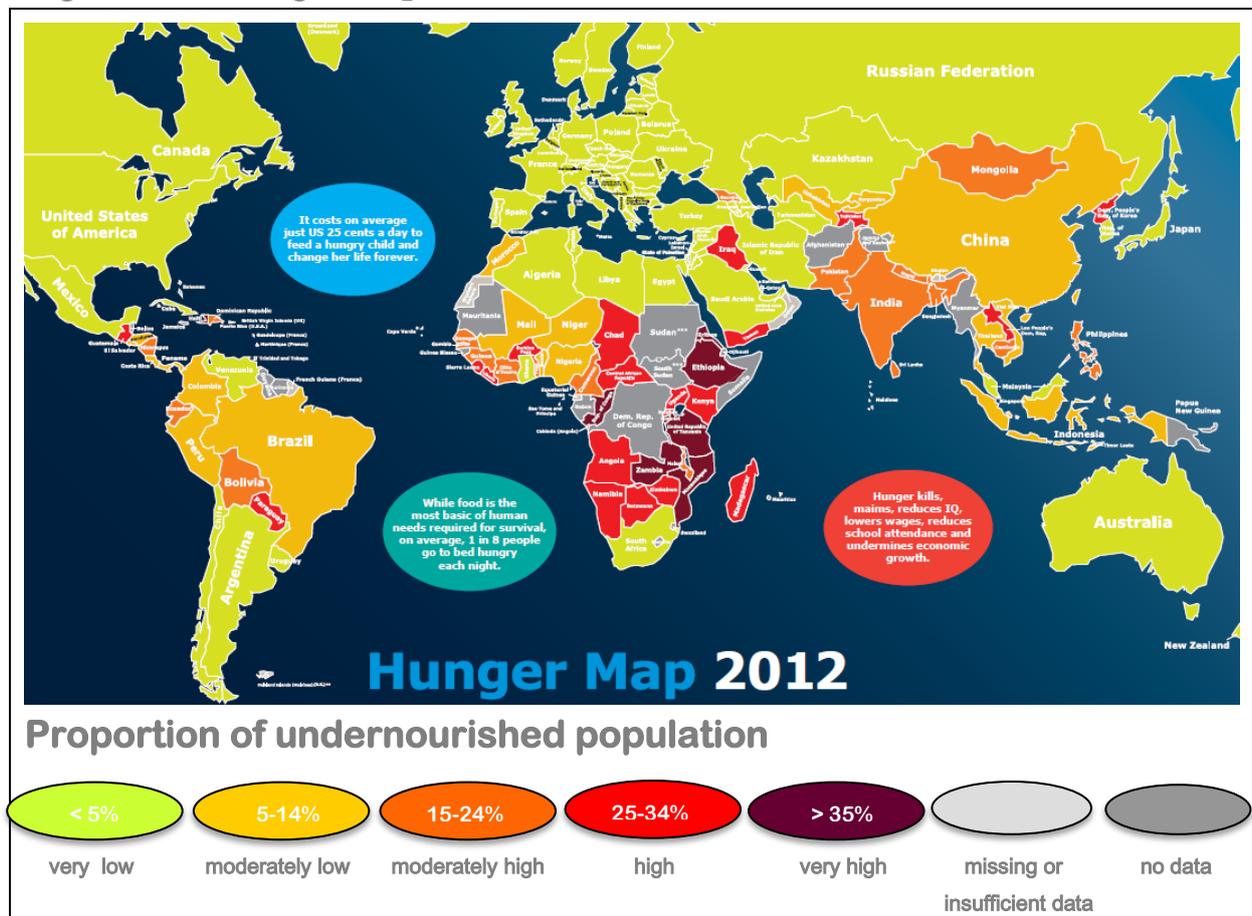
¹¹ As evident in the price of phosphate in 2008-2009 which had skyrocketed from 50 to 425 dollars per tonne of rock phosphate. Factors such as China's temporary export levy on phosphate and the rise in energy and food prices have also played a role.

¹² Udo de Haes, H. A., Jansen, J.L.A. et al. *Phosphate - from overabundance to deficit*. Policy memorandum of the Steering Committee Technology Assessment of the Ministry of Agriculture, Utrecht, 2009. Based on: Bindraban, P. S., Conijn, J.G. et al. *Phosphorus in Agriculture: global resources, trends and development*. Plant Research International: Wageningen, September 2009.
[http://team.bk.tudelft.nl/Publications/Digital%20library/Udo%20de%20Haes\(2009\)Fosfaat%20-%20van%20te%20veel%20naar%20tekort\(Utrecht\)LNV.pdf](http://team.bk.tudelft.nl/Publications/Digital%20library/Udo%20de%20Haes(2009)Fosfaat%20-%20van%20te%20veel%20naar%20tekort(Utrecht)LNV.pdf).

Most of us are generally unaware that more than one in seven people in the world suffer from hunger on a daily basis. Three quarters are women and children. While we pride ourselves on a world of technical progress which is brimming with wealth, this is the harsh reality – and usually located thousands of miles away.

The amount of persons suffering from hunger has increased substantially over the last decades. In 2008, their number exceeded one billion¹³, while falling to 925 million in 2010. Because of soaring food prices, this figure increased again in 2011¹⁴. The most effective way to reduce hunger would entail a country-specific approach, since two thirds of the global total of people suffering from hunger live in only seven countries – Bangladesh, China, The Democratic Republic of Congo, Ethiopia, India, Indonesia and Pakistan¹⁵.

Figure 4.1: Hungermap 2012¹⁶



¹³ FAO. *The State of Food Insecurity in the World, 2008: High food prices and food security - threats and opportunities*. Rome: Food and Agriculture Organization of the United Nations, 2008. <http://ftp.fao.org/docrep/fao/011/i0291e/i0291e00a.pdf>

¹⁴ FAO and WFP. *The State of Food Insecurity in the World, 2010*. Rome: Food and Agriculture Organisation of the United Nations and World Food Programme, 2010. <http://www.fao.org/docrep/013/i1683e/i1683e.pdf>.

¹⁵ Ibid.

¹⁶ WFP. *Hunger Map 2012*.

<http://documents.wfp.org/stellent/groups/public/documents/communications/wfp229327.pdf>

Malnutrition in children begins before birth, when sick, stressed, or poorly nourished mothers give birth to underweight and undersized children with malnourished brains and/or other birth defects. This is the indication in more than half of all deaths among very young children, because it lessens new-borns' resistance to disease. Malnourished children develop more slowly, go to school later and perform less well when they do¹⁷. Thus, the suffering multiplies itself from generation to generation¹⁸.

Besides starvation and famine, hunger has many faces. Chronic malnutrition leads to lack of essential vitamins and minerals, which retards growth, strength and brains. Yet, oftentimes, starvation is not the direct cause of death. People die from the diseases resulting from hunger and dirty water. The four most common diseases in children are diarrhoea, acute respiratory illnesses, malaria, and measles, all diseases which are easily curable and preventable.

In 114 countries, a part of the population lives below the poverty line (1.25 U.S. dollars)¹⁹. India has the highest numbers of very poor (more than 484.5 million), followed by China, where over 211 million people live below the poverty line.

There are 69 states where more than 10 per cent of the population lives below this poverty threshold. In 24 of these countries, this number exceeds 50 per cent, and only three are located outside Africa: Nepal, Haiti and East Timor²⁰. A total of 1.37 billion people were living below the poverty line in 2007, nearly 20 per cent of the global population²¹. This situation was much the same in 2011.

TAKING ACTION FOR THE COMMUNITY (INDONESIA)

One need not be or become famous in order to make a difference in many people's lives. An example: twenty-eight-year-old **Yuni Kurniyatiningsih**.

Yuni dedicates herself to the poor in Indonesia wherever she can. Raised in Java, near Yogyakarta, by parents who were financially better off than the average Indonesian citizen, Yuni studied agricultural law. Already

¹⁷ Although, according to statistics, the percentage of malnourished children had greatly dropped in 2008, a third of the 144 developing countries do not have adequate data to follow trends regarding the achievement of the Millennium Development Goals.

¹⁸ World Bank. *e-Atlas of Global Development*. World Bank Publications, 2011. <http://issuu.com/world.bank.publications/docs/9780821385838>.

¹⁹ UNDP. *Human Development Report*. United Nations Development Program, 2009. http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf

²⁰ Swaziland, Angola, Nepal, Madagascar, Haiti, Tanzania, Uganda, Nigeria, Malawi, East Timor, Zambia, Rwanda, Liberia, Guinea, Mozambique, Burundi, Chad, Democratic Republic of Congo (Zaire), Burkina Faso, Mali, Central African Republic, Sierra Leone and Niger. There are many more, such as Afghanistan, but the list is incomplete.

²¹ See the UNDP Report in footnote 19.



during her studies, she worked with people who were not as fortunate as she was herself.

While working in Indonesia, Dutch student Janneke Bosman met Yuni, who told her about her work and confronted Janneke with the great disparity between rich and poor. The large slums right next to expensive shopping malls were silent witnesses to the bitter facts.

Yuni showed her microcredit projects: each week she visited remote villages surrounding Yogyakarta in order to help the inhabitants set up small businesses of their own, such as a local lamp maker, a goatherd and a tempeh salesman. With a modest loan they could start their small business. They spoke enthusiastically about their new businesses. Yuni advised them and ensured that the loans were repaid. As soon as the project went well, they could continue the trade on their own. The projects stimulate industry and trade in the villages, and provide income for the starters and their families.

After the 2004 tsunami, Yuni traveled to Aceh, where the water had caused horrific devastation. Without having shelter herself, she helped with cleaning up and supporting the victims.

Yuni also showed her a project in Pangandaran, which was hit by a second tsunami in 2006. Together with the local population she worked to bring back the liveability in the abandoned area. Before, it had been vibrant and busy, but because of the trauma of the disaster, for many inhabitants all zest for life had subsided. Yuni's project helped to bring that back. Thereafter, Yuni dedicated herself to an ecological project in North Sumatra²².

ECONOMIC CRISIS

The economic crisis of 2007-2010 in the United States and Europe was caused by excessive borrowing, unstable investments, deceptive transferable securities and the failure of banks. As a result, all of a sudden 2.3 trillion dollars of capital evaporated in 2007-2010²³. Inadequate and untrustworthy financial experts who played on the greed and short-sightedness of consumers pushed the world into a recession. There are and will be major consequences in the short as well as the long term, especially for the poorest among us, who eventually pay the price. Most affluent people in developed countries are able to absorb the impact of the crisis. They eat into their capital, emit weak parts of their investments and holdings, take one less vacation and postpone the purchase of a new car. The

²² Personal visit.

²³ IMF. "Global Financial Stability Report: Meeting New Challenges to Stability and Building a Safer System". *World Economic and Financial Surveys*. Washington, DC: International Monetary Fund, 2010. <http://www.imf.org/external/pubs/ft/gfsr/2010/01/pdf/text.pdf>.

wages for lower classes are moderated and there are layoffs. However, those at the bottom of the world economy have no financial leeway. Moreover, landless labourers and miners cannot pass on the consequences to others who are lower in the economic pyramid.

The map in Figure 4.2 shows the global distribution of income: the lighter the colour, the weaker the economy.

ECOLOGICAL DETERIORATION

Climate change has particularly serious consequences for the poorest countries. Owing to the rise in sea levels, the droughts, heat waves, floods and unusual variation in rainfall, an additional 600 million people are liable to fall victim to poverty and malnutrition over the next few decades. While a lack of water will become a serious problem for many people, at the same time, floods will endanger hundreds of millions of lives in lower areas²⁴.

Because of flooding and droughts which are (partly) a result of climate change, there is the added greater risk of acute famines, especially in dry areas in Sub-Saharan Africa. Furthermore, a greater chance of diseases and pests of farm animals and crops will arise because of climate change. Such diseases can easily be transmitted from animals to humans and between humans by way of contaminated, infected or even toxic water and food.

The poor are the most vulnerable to natural disasters, because they have few means to fall back on. They spend 50-80 per cent of their income on survival. If food is removed by either natural disaster or by unaffordability, it will have far-reaching consequences. Oftentimes children must be taken out of school, or cattle have to be sold. These are emergency measures that will ultimately cause more poverty from which it can be even more difficult to extricate oneself²⁵.

Hunger and poverty are most prevalent in rural areas. Frequently, farmers provide for their families through their own production. After a good harvest, a farmer can pay off debts as and sell the surplus in the city. However, his business can be hampered by erroneous international food aid from surplus regions like the U.S. and the EU which provide the cities with cheap imported food. This causes the small farmer near the cities to lose his selling market. In desperation, he travels to town as a jobseeker. This creates a circle a country

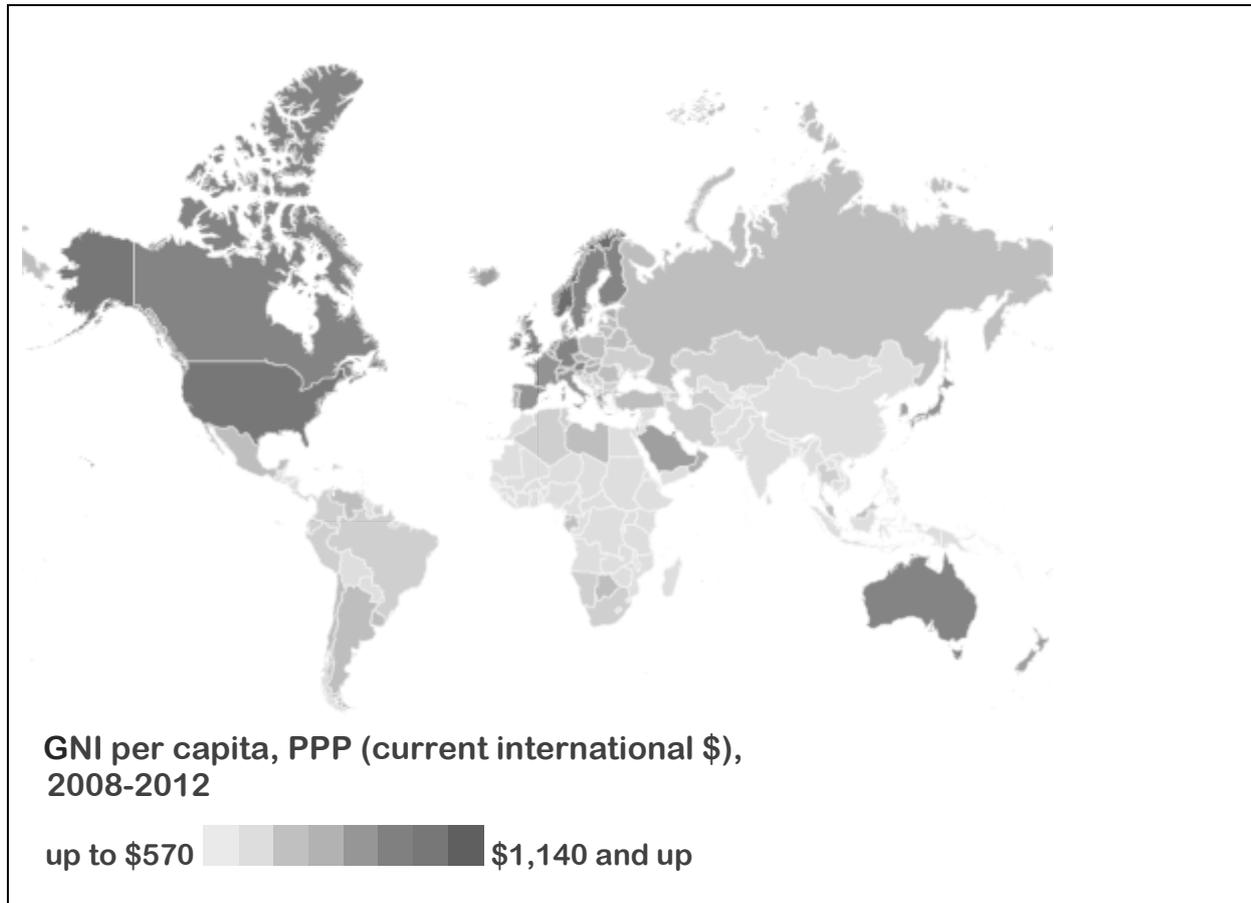
²⁴ UNDP. *Human Development Report 2007/2008: Fighting Climate Change - Human Solidarity in a Divided World*. New York: United Nations Development Program, 2007.

http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf

²⁵ LaFleur, Vincca, Nigel Purvis and Abigail Jones. "Double Jeopardy. What the Climate Crisis Means for the Poor". *Brookings Blum Roundtable 2008*. Washington: Brookings Institution, 2008.

http://www.brookings.edu/~media/Research/Files/Reports/2009/2/02%20climate%20change%20poverty/02_climate_change_poverty.PDF.

Figure 4.2: Gross national income of the population per head (in dollars) (ppp) (2008-2012)²⁶



cannot emerge from if structural food aid does not make way for agricultural development. This detrimental circle also keeps poorly-governing regimes in position, because most revolts against regimes begin in cities. As long as there is enough imported food, corrupt and poor regimes will be able to remain in power.

Because of greater muscle strength and the traditional dominating role of boys and men, males appropriate most of the food, while the women oftentimes work the land, bring forth children and care for them. If women have an income, their earnings mostly go towards the household and the family, while men often spend their wages on other things²⁷. Research also shows that there are fewer cases of illness and malnutrition in families where girls and women are educated. Equal rights between men and women could do much in the fight against the greatest misery.

²⁶ The World Bank. “gni per Capita, ppp (current international \$)”. World Bank Group, 2013. <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD/countries?display=map>

²⁷FAO. *The State of Food Insecurity in the World 2005*. Rome: Food and Agriculture Organisation of the United Nations, 2005. <ftp://ftp.fao.org/docrep/fao/008/a0200e/a0200e.pdf>.

INCREASED FOOD PRODUCTION

The emerging markets of the wealthy and middle classes in China and India and their growing spending power has allowed for upgraded eating habits which in turn led to the growth of meat and dairy markets which require much land, water and energy²⁸.

Sound agricultural policy combines increased food production with economic growth and employment for the poorest people in developing countries, with adaptation to and the reduction of climate change and with the conservation of biodiversity and scarce natural resources. Good agricultural policy kills multiple birds with one stone. Simply producing more food may increase CO₂ emissions. Therefore, sustainable farming using enhanced techniques is needed.

It is possible to meet 20 per cent of the necessary increase in food production by extending existing farmland. In developing countries, especially in Sub-Saharan Africa and in Latin America, 120 million hectares of additional land can be utilised. In many areas however, investments are needed for the removal of obstacles and to gain access to such land.

The remaining 80 per cent of the required extra food must be acquired by increasing the yield per hectare. This will be a major challenge, as the world's annual output growth in of major crops has decreased from 3.2 per cent per hectare in 1960 to 1.5 per cent in 2000²⁹.

Smart input subsidies in developing countries can lead to more food. After a severe famine, the President of Malawi decided in 2006 to supply poor farmers en masse with fertilizer, at a fifth of the market price. This met with resistance from the World Bank because it would disrupt the market. In the meantime, Malawi's economy is growing by 6-10 per cent annually³⁰; it is able, for the first time since 1980, to feed its own population, and even exports food to neighbouring countries Lesotho and Zimbabwe.

It is vital to make the input of farming more efficient, since natural resources are becoming scarcer and the prices of fossil energy, phosphate and nitrogen will go up over the next decades. There are several technologies which are of importance. Sustainable farming (conservation agriculture) can reduce the

²⁸ See footnote 13: FAO. *The State of Food Insecurity in the World, 2008: High food prices and food security - threats and opportunities*. <ftp://ftp.fao.org/docrep/fao/011/i0291e/i0291e00.pdf>.

²⁹ See footnote 2: Wiebe, Keith. FAO. *How to Feed the World in 2050: Insights From an Expert Meeting at FAO...* <http://www.oecd.org/agriculture/agriculturalpoliciesandsupport/43256458.pdf>.

³⁰ Index Mundi. Malawi gdp, Real Growth Rate. http://www.indexmundi.com/malawi/gdp_real_growth_rate.html

energy consumption by 66-75 per cent, while simultaneously storing CO₂. It is expected that the use of manure in developing countries will increase. At the stage of final utilisation, techniques to deploy manure more accurately are particularly valuable. Integrated crop protection offers technical possibilities to monitor pests and to deploy pesticides at the right time. As a result, the use of pesticides is minimized and the harvest increased. Furthermore, in the field of e.g. water management, better ways to maintain soil moisture levels are available, which is substantial for regions with water scarcity³¹.

Although technologies to increase production have been developed, they are not universally applied and the quantity of crop yield differs greatly between regions. Improved seeds and farming techniques are not used everywhere. This is not only on account of farmers' lack of information and insufficient technical skills. Poor infrastructure, weak institutions and unfavourable agricultural policies are serious obstacles for the use of technology. In addition, the technology is often not adapted to local conditions. To solve this, investment in infrastructure and institutions and policy to encourage farmers to use enhanced technologies is necessary.

Moreover, there are few institutions for the dissemination of knowledge, skills, and information about new techniques, plant species and cultural practice in developing countries. And although the majority of farmers are female, it is common that the provided training focuses primarily on males. Overall, women only utilise 5 per cent of the available services³². Strengthening local women's and farmers' organizations in developing countries and focussing international assistance on women can yield great improvements in the agricultural sector.

The average net annual agricultural investment in developing countries necessary for the appropriate increase in production amounts to \$83 billion, which is approximately double the current investment. This number can be broken up in twenty one billion U.S. dollars that is needed for growing crops, 13 billion for livestock farming and 50 billion for supporting services such as storage and processing – not counting additional expenses for public utilities such as roads, ports, major irrigation projects, electricity and other necessities.

Showing a rate of return of 30 to 75 per cent, investments in R&D (research and development) in the agricultural sector have proven highly productive. Since agricultural research in developing countries is dominated by

³¹ FAO. *How to Feed the World in 2050*.

http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf;

—, *Factsheet: The technology Challenge*.

http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Technology.pdf

³² Ibid.

the public sector, additional investments should come primarily from government budgets. In order to attract more private investment in R&D, intellectual property rights are necessary, but this should not be at the expense of small farmers' access to new technology³³.

For the production of food, scarce natural resources should be used in an efficient and sustainable manner. Major methods to prevent the dissipation of resources of extractable phosphates within 75 years involve the recycling of phosphates and the reduction of wasteful deployment thereof³⁴.

Besides producing sufficient food and reducing hunger and poverty, there are also opportunities within the agricultural industry to reduce emission of greenhouse gases. At present, the agriculture sector is responsible for 14 per cent of global emissions. Unless improved farming methods are applied, when food production is stepped up, the emissions will increase likewise.

In this field, especially farming methods where carbon is captured and stored in soil and vegetation offer great promise. Agriculture that minimizes disruption of the soil and keeps it covered and alternates and mixes crops achieves more CO₂ storage. Furthermore, avoidance to plough, the use of remnants for compost or humus and permanent plants as ground cover, improved manners of grazing and re-sowing of grasslands, as well as combining crops and trees will increase the soil's and the vegetation's capacity to absorb CO₂. In this manner, an increase of agricultural productivity may indirectly lead to the reduction of deforestation and the greenhouse gas emissions it causes³⁵.

Currently, the agricultural industry is focused on generating the highest possible harvest in specific weather conditions. However, in a number of decades, it may be more useful if agriculture is aimed at a fair harvest in diverse weather conditions³⁶.

The development of new seeds which are resistant to extreme weather conditions may prove to be crucial. And although genetic manipulation is controversial, it does carry the potential to produce food for billions more people. For example, the DNA of the so-called sorghum (*Sorghum bicolor*) was mapped in 2009. This African version of wheat grows only in extremely hot areas. During heat and drought sorghum is still able to absorb nutrients. With

³³ See footnote 2, 29: Wiebe, Keith. FAO. *How to Feed the World in 2050: Insights From an Expert Meeting at FAO*...<http://www.oecd.org/agriculture/agriculturalpoliciesandsupport/43256458.pdf>.

³⁴ See footnote 12: Udo de Haes, H. A., Jansen, J.L.A. et al. *Phosphate - from overabundance to deficit*. [http://team.bk.tudelft.nl/Publications/Digital%20library/Udo%20de%20Haes\(2009\)Fosfaat%20-%20van%20te%20veel%20naar%20tekort\(Utrecht\)LNV.pdf](http://team.bk.tudelft.nl/Publications/Digital%20library/Udo%20de%20Haes(2009)Fosfaat%20-%20van%20te%20veel%20naar%20tekort(Utrecht)LNV.pdf).

³⁵ FAO. *Harvesting Agriculture's Benefits: Mitigation, Adaptation, Development and Food Security*. Policy Brief 2009. <ftp://ftp.fao.org/docrep/fao/012/ak914e/ak914e00.pdf>.

³⁶ See footnote 5: IFPRI. "Climate Change: Impact on Agriculture and Costs of Adaptation". DOI: 10.2499/0896295354.

genetic engineering, this property could be used for other plants. As a result, scientists are one step closer to producing food on a large scale in extremely dry areas³⁷.

PURCHASING POWER FOR FOOD

Because 75 per cent of the poor live in rural areas, economic growth arising from agriculture, particularly when it involves small farmers, is twice as effective for the poor as growth in other sectors. Therefore, a larger part of development aid should be geared to this. In practice, however, the proportion of public aid from governments (Official Development Assistance) allocated for agricultural development has been reduced from 17 to 3.5 per cent between 1980 and 2005.

The Millennium Development Goals of 2000 may serve as the foundation for an overarching global policy on poverty. However, as some of these goals are not quite explicit regarding location and time, they should be more specified. It was easy enough to record in 2000 what should be achieved by 2015. The heads of state who committed themselves would be retired by then; they are not judged on their pledges. It would be advisable to specify the Millennium Development Goals per country and timespan, and divide them into steps. In addition, the 2000 Millennium Development Goals overlooked to prioritize the improvement of birth schemes.

As for food production: it would be advantageous if the increasing demand for meat in rich countries and emerging economies could be slowed down; much less soy (a component of animal fodder) would need to be produced, and a great deal of land would become available for direct food production for humans. In rich countries, people suffer from increasingly serious ailments, such as diabetes, heart disease and cancer, which are partly caused by too much and incorrect food, many of which contain too much fat, sugar and salt, and too few nutrients such as vitamins and fibre.

Biofuels compete with food. Besides not being a clean alternative to oil, they cause higher food prices. Governments should cease investments that exacerbate hunger, and instead, invest in measures and subsidies which stimulate the reduction of fuel consumption in the transport sector. They might, for instance, encourage people to opt for alternative forms of transport, live nearer to their place of work, and to drive more cost-efficient vehicles. Such measures are less costly and more effective.

³⁷Veldhuizen, R. *Genoom Kaffercoren Bekend*. Kennislink.nl. ,2009.
<http://www.kennislink.nl/publicaties/genoom-kaffercoren-bekend>

Many countries will be dependent on international trade in order to secure their food supplies. In 2050, net imports of cereals in developing countries will have more than doubled, from 135 million tonnes in 2008-9 to 300 million in 2050. This requires a competitive and fair global trading system which contributes to a reliable food market. For fair competition, farmers in developing countries should have better access to this market. Tariff walls, quotas, export subsidies and even food aid disrupt the global food trade³⁸.



**TAKING ACTION FOR THE ENVIRONMENT
(JÉSUS LEÓN SANTOS, MEXICO)**

You must take action yourself to improve your environment. That is what **Jésus León Santos**, a small Mexican farmer, must have thought. He lives in one of Mexico's poorest states, Oaxaca, an area that suffered from one of the highest rates of erosion in the world. Thousands of Mexicans have been forced to move away because erosion had rendered their land useless.

In 1980, the farmers switched to modern corn seeds. This led to an overburdening of the land and to smaller harvests. In addition, due to subsidized U.S. corn exports and agreements within the North American Free Trade Agreement, the price of corn in Mexico plunged. As a result, farmers could no longer afford to purchase the pesticides their new varieties of corn needed. Moreover, erosion had caused 500 000 hectares in the Mexican state of Oaxaca to become barren.

In the early eighties, this small farmer, Jesús León Santos, decided to tackle erosion by means of reforestation of the region, in cooperation with the local population. For this purpose he set up the democratic organization CEDICAM, aimed at the integral development of small farmers in the Mixtec habitat, which is also a part of Oaxaca. Currently, they plant 200,000 trees a year. The trees revitalise the land: erosion has stopped, land and water are retained by the tree roots, more carbon dioxide is being absorbed from the air, green zones re-emerge and trees provide cleaner and more sustainable firewood for the inhabitants.

León also organized the digging of ditches and canals for irrigation purposes. He advocates sustainable agriculture with natural compost and native seed species.

³⁸ See footnote 2, 29, 33: Wiebe, Keith. FAO. *How to Feed the World in 2050: Insights From an Expert Meeting at FAO*...<http://www.oecd.org/agriculture/agriculturalpoliciesandsupport/43256458.pdf>.

Together, the farmers have by now reforested over than 1,000 hectares of land and ensured an increase of 50 per cent in local proceeds of arable farming. Areas where previously only 25 to 30 per cent of the land was still fertile for agriculture are now 80 per cent fit for crop growing. As a result, emigration has been greatly reduced. In 2008, Léon received the Goldman Environmental Prize³⁹.

Poverty means hunger. Poverty means lack of shelter. Poverty means being ill but unable to see a physician. Poverty means not going to school and not being able to read. Poverty means being out of work, afraid of the future, and living a hand-to-mouth existence. Poverty means losing a child to illness caused by contaminated water. Poverty means having no choice, to be a powerless prisoner of one's situation. Poverty is lack of freedom⁴⁰.

Why should human beings, who are able to develop inconceivably complicated technology for space travel and spend hundreds of billions to do so, be unable to provide their own species with sufficient and appropriate food, water and income? It is a matter of priorities, and therefore of political vision and ethics (Chapter 2).

³⁹ The Goldman Environmental Prize. "Jésus León Santos. Mexico. Sustainable Development". <http://www.goldmanprize.org/2008/northamerica>.

⁴⁰ The World Bank. *Overview: Understanding, Measuring And Overcoming Poverty*, 2010.