



# PORGMUN Research Paper

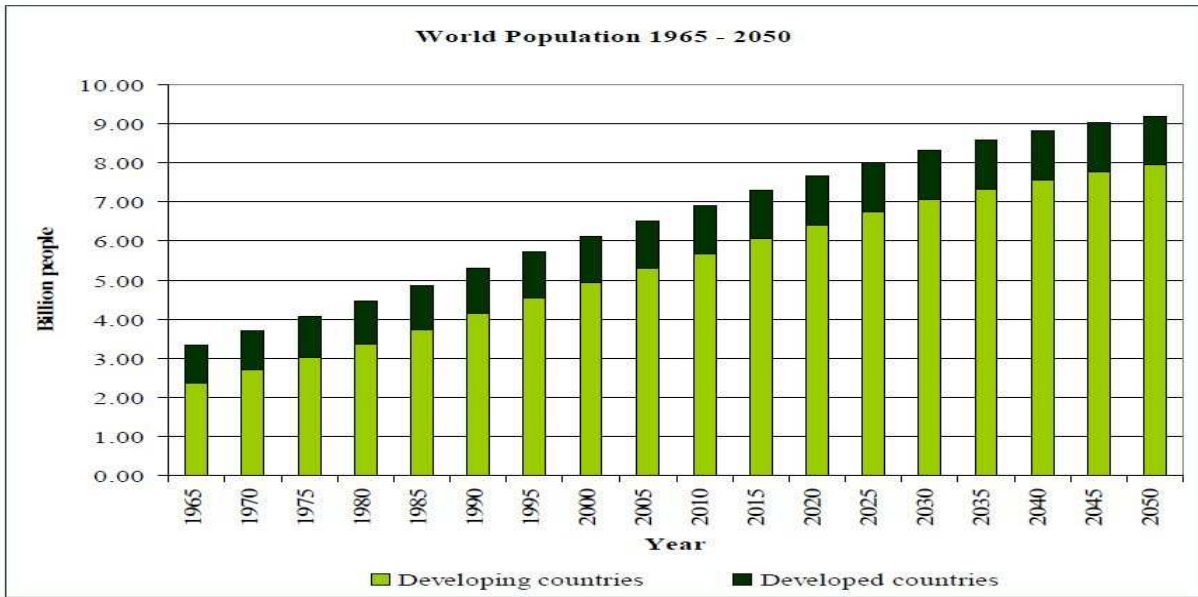
## Research paper: Meeting increasing nutritional needs of the developing world through access to agricultural technology

### Background

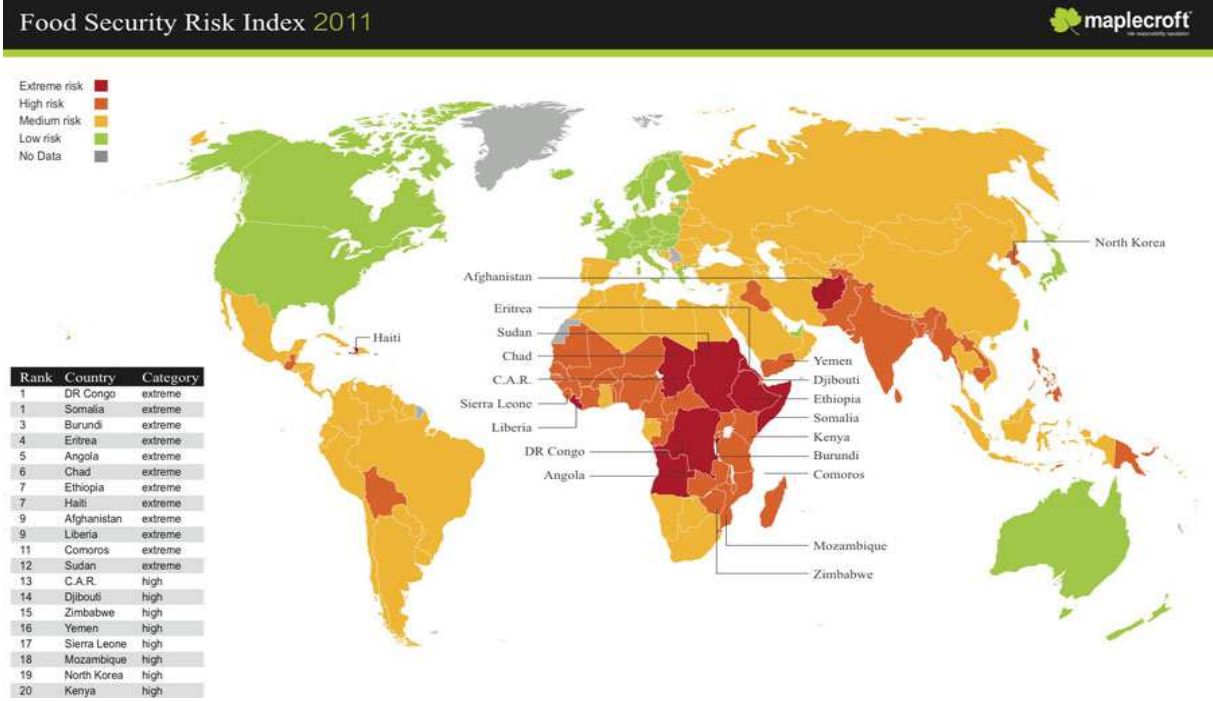
By the year 2050 the population of the planet Earth will reach the number of 9 550 000 000 habitants, 86% of which will belong to less developed regions – among others, Sub-Saharan Africa or Asia.<sup>1</sup> More people means rise in the food demand. Unfortunately, our planet does not provide enough resources to satisfy that demand. Even today, the number of malnourished people (means both undernourished and over nourished) is constantly rising. Therefore, present agricultural procedures are not sustainable anymore and have to change. Such a progression will lead to the necessity of the growth of food production within at least 70% (it is said, that 80% of this change should belong to cropping intensity and 20% to expansion of agricultural land). However, there are much more problems connected with elevated food demand. Therefore, food production has to be complemented by other policies to ensure overall food security. To explain, food security is based on three main pillars: food availability, food access, food use.

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<sup>1</sup> Department of Economic and Social Affairs of the United Nations Secretariat. *Population Division: World Population Prospects: The 2012 Revision* [online]. [cit. 2015-02-20]. Dostupné z: <http://esa.un.org/unpd/wpp/index.htm>



Source: FAO



Source: Maplecroft

Besides the growth of human population on Earth, there are other threats, which are influencing world consumption of nutrition sources:

- 1) *Climate change*: Elevated carbon dioxide concentration in the atmosphere has a severe impact on forestry and agriculture –

implicitly on food production, its stability and access to food and food utilization. We should avoid the misconception that the effects have been minor so far. Scientists have proved that climate change will harm agriculture horribly during the second half of 21<sup>th</sup> century. Paradoxically, the least developed countries will be the ones affected the most, despite the fact that these are not general originators of greenhouse gasses, which causes the change. In that case, the global share of hungry people could rise to 40-50% on behalf of these countries. Even more absurd is the fact that agriculture itself produces 14% of greenhouse gasses.

- 2) *Land degradation:* In many cases, thoughtless agricultural practices cause fatal degradation of rural land. Preparation of such a land is often connected with land clearance (mainly deforestation). Later, an inconsiderate farmer can harm the soil by depletion its nutrients through poor practices, inappropriate irrigation, over drafting or contamination through inorganic herbicides and insecticides.
- 3) *Utilizing crops in biofuel production:* Today, cultivation of biofuel crops is much more profitable than the cultivation of other types of crops. However, it is not sustainable in relation to land fertility, since soil needs crop rotation to remain healthy. Furthermore, the conversion of all smallholders to only one type of crop leads to scarcity of other crops.



*Source: energisauro.it*

4) *Price volatility*: Fluctuations of the prices of crops threaten their availability in many places. These can be brought about by production variability, macroeconomic instability or the fluidity of the value of a currency.

Apparently, the need of innovation and investments to science and technology has never been bigger. Confronting these challenges we encounter three main parties: 1) consumers, whose health and wellbeing is the goal; 2) farmers, whose livelihood could be improved by the possibility of the use of technologies; 3) land, water and biodiversity, the main resources of the food, which have to be handled with caution – in other words, environmental-friendly. So far, technological advancements have been benefiting mainly farmers of industrialized world; however the majority of food is produced by smallholders. These recently lack access

to many of existing tools and information. To build a sustainable system of satisfying nutritional needs of all the society, we have to fix this drawback.

“We must approach the challenges of this century in a comprehensive way, mindful of the value and limitations of each of the tools available to us. If the world is to produce the amount of food necessary to feed more than 9 billion people in a way that considers nutritional needs and resource scarcity, that enables us to grow food in the face of global climate change, and that improves the livelihoods of farmers globally, the adoption of technological advancements in our food and agricultural system is necessary to achieve that goal.”<sup>2</sup>

## Steps to achieve solutions

Even though we will focus mainly on the solution through new technologies and the administration of current, there are more goals that need to be executed. Among these we distinguish:

- 1) *Institutions*: Every action has to be backed by efficient institutions that can provide space to develop and accomplish processes. These institutions should be, according to their function and sphere of activity, both national and international. Both should also intermediate the dialogue of all stakeholders involved. Moreover once the food is produced, it has to be coordinated and distributed to target area properly. At the same time, fair and competitive international trade should be guaranteed. Many countries will rely chiefly on imported crops.
- 2) *Support of smallholders*: Smallholders form the basis of possible success; therefore we need to support their activities in favor of sustainability as much as possible. Firstly, they need money to pay for these activities. Private investors have to be encouraged to invest. Notwithstanding that rates of return of investments to

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<sup>2</sup> The DuPont Advisory Committee on Agriculture Innovation and Productivity. *The Role of Technology in Agriculture* [online]. 2012 [cit. 2015-02-21]. Dostupné z: <http://foodsecurity.dupont.com/wp-content/uploads/2012/07/DuPont-Agriculture-Committee-The-Role-of-Technology-in-Agriculture.pdf>

the agriculture are usually between 30% and 75%, smallholders are currently exceeded by public sector. Hence, this alternation needs to be started off by a governmental investment.

Furthermore, smallholders have to have willpower to cultivate and help according to the needs of population. On the contrary they would become one of many who cultivate colza for more profits. To support this, governments should assure smallholders that it is prepared for the situation of food crisis through coordinated emergency system of joint finance. Last but not least, smallholders need to be given access to all the information and tools needed to achieve the goal.

- 3) *Extermination of land degradation*: As we mentioned before, one of the most significant threats is the degradation of land. To eradicate this threat, smallholders need to be educated how to use the land in sustainable way. Conjointly, this effort needs to be endorsed by investments in maintenance and rehabilitation of land.
- 4) *Investments and supervising to agricultural research*: Hand in hand with the invention of new technologies go investments and supervising to agricultural research. If inventing was not strengthened by extended research, it would not yield sufficiently purposeful technologies.

## **Examples of technologies**

During the 20<sup>th</sup> century much money was invested into inventions that have helped to widen possibilities of cropping. Agriculture has experienced much advancement which has led to big achievements. Nevertheless, the challenge society will confront next few years require innovations and actions of higher dimension. Here are some technologies and processes that offer a good promise:

- 1) With contribution to the improvement of cropping practices

- a. *Plant breeding*: Procedure of optimizing plant's genes for the purpose of producing plants with desired characteristics. Plant breeding offers various techniques, through which can be achieved desirable effect.
    - i. *Hybridization*: Hybridization means crossing two or more lines of genes of plants to cultivate hybrid plant with better characteristics. This technique was widely used to obtain high-yielding crops.
    - ii. *Agricultural biotechnology*: Agricultural biotechnology is another way by which we can acquire the better characteristics of crops. So far, this technique has enabled scientists and farmers to produce crops resistant against insects, diseases, herbicides, extreme weather as well as crops with improved nutritional quality.
  - b. *Crop protection*: This technique is based on protection products that empower plants to combat against insects, diseases and so on. Among these products can be distinguished chemical tools (insecticides, herbicides...) and non-chemical tools (biological pest control...).
  - c. *Irrigation practice*: Good irrigation of the soil can increase crop productivity within tens of percent.
  - d. *Fertilizers*: Fertilizers are specialized products that supply crops essential nutrients missing from the soil. Plants animated with such a product can be much more productive and can contain more nutrients.
  - e. *Mechanization*: Mechanized procedures of cropping can save the farmer much time and energy. Therefore, farmer can extend the productivity of crops.
- 2) With contribution to the improvement of manipulation and the contents of food

- a. *Fortification*: (in other words, enrichment of food) Process of adding extra micronutrients to food. These are usually vitamins and minerals. The reason for this is the lack of micronutrients in a product or commercial choice. It is said that most fortified foods are milk, tea and cereals. Fortification can be divided into bio fortification, which is based on cultivating crops with more nutrients, or synthetics fortification, which is based on adding nutrients artificially to the food.
- b. *Incorporation of other healthy ingredients*: Beside fortification food is often enriched by other substances as proteins, fibers or bio-cultures.
- c. *Avoiding or reducing unhealthy ingredients*: On the contrary, in some cases food is rid of unhealthy ingredients, for example fat, sugars, caloric contents or salt.
- d. *Preservers*: Preservers are substances, which can make food eatable longer. Nowadays many natural preservation techniques are developed. Companies use enzymes, special cultures and plant extracts to do preserve food. However, almost one third of the food produced is wasted every year – in many cases because of its short consumable period.<sup>3</sup>

### 3) With contribution to the sustainability of agriculture

- a. *"Modern seeds"*: Scientists modify considering certain shortages. For example, it is known that agriculture composes more than a half of the world water consumption, so it is emphasized to cultivate a seed that would consume less water. Moreover, new seeds are resistant against larger changes of weather.
- b. *Reduction of pesticide and herbicide applications*: Land degradation is connected with the use of chemicals that

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<sup>3</sup> Food and Agriculture Organization of the United Nations. *Cutting Food Waste to Feed the World* [online]. [cit. 2015-02-23]. Dostupné z: <http://www.fao.org/news/story/en/item/74192/icode/>



pollute soil. Therefore, many farmers either work with less preparations of this kind possible or use preparations of biological base.

- c. *Zero tillage*: A small but very beneficial change is the reduction of soil tillage. Zero tillage, or no-till, agriculture is a special technology that uses remains of previous crops for the next. In fact, it reduces 93% of the soil erosion and almost 70% of the water drainage.<sup>4</sup>

### Important institutions

- Food and Agriculture Organization of the United Nations (FAO)
- World Health Organization (WHO)
- Organization of Economic Co-operation and Development (OECD)
- L'Aquila Food Security Initiative (AFSI)
- Consultative Group on International Agricultural Research (CGIAR) > Research Program on Agriculture for Improved Nutrition and Health
- International Food Policy Research Institute (IFPRI)

### Important events

“Following the Summits and international pledges of recent decades, a new and additional momentum could now be sought through dialogues on food security at the level of individual countries. Two types of dialogue could be envisaged; one at intra-national level involving governments and domestic stakeholders, and another involving the governments concerned together with their international development partners. The aim could, in both cases, be to clarify the significant political, social and economic gains to be obtained from reduction of hunger and malnutrition. The aim would also be to draw the attention of governments to their obligations under

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<sup>4</sup> The United Soybean Board and the U.S. Soybean Export Council. *The Benefits of Biotechnology Benefits – Scientific Assessments of Agricultural Biotechnology’s Role in a Safer, Healthier World* [online]. [cit. 2015-02-23]. Dostupné z: [http://www.soyconnection.com/pdf/usbs\\_position/English/English\\_The\\_Benefits\\_of\\_Biotechnology\\_Compndium\\_2011\\_HR.pdf](http://www.soyconnection.com/pdf/usbs_position/English/English_The_Benefits_of_Biotechnology_Compndium_2011_HR.pdf)

the UN Charter to respect, protect and fulfil human rights, including the right to food. The right to food concept can add value to effective food security strategy by ensuring transparent policy processes, legal frameworks, accountability of public institutions and clarification of government obligations and of rights and obligations of rights-holders.”<sup>5</sup>

- 1) World Food Conference – 5-16 November 1974, Rome
- 2) World Summit on Food Security – 13-17 November 1996, Rome
- 3) World Food Summit – 10-13 June 2002, Rome
- 4) High-level Conference on Food Security – 3-5 June 2008, Rome
- 5) High-level Conference on Food Security – 26-27 January 2009, Madrid
- 6) How to Feed the World in 2050 – 12-13 October 2009, Rome
- 7) World Summit on Food Security – 16-18 November 2009, Rome
- 8) The United Nations Conference on Sustainable Development (Rio+20) – 20-22 June 2012, Rio de Janeiro

## Sources and documents to study

- 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](http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf)
  - [http://www.fao.org/fileadmin/templates/wsfs/docs/Issues\\_papers/HLEF2050 Global Agriculture.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Global_Agriculture.pdf)
- IFPRI: Global Food Policy Reports – <http://www.ifpri.org/book-9464/gfpr>
- Millennium Ecosystem Assessment: Reports - <http://www.millenniumassessment.org/en/Reports.html>
- Global Harvest Initiative: Global Agricultural Productivity Report (2011) - <http://www.globalharvestinitiative.org/index.php/gap-report-gap-index/2011-gap-report/>

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<sup>5</sup> Food and Agriculture Organization of the United Nations. *How to Feed the World in 2050* [online]. [cit. 2015-02-23]. Dostupné z: [http://www.fao.org/fileadmin/templates/wsfs/docs/expert\\_paper/How to Feed the World in 2050.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf)

- The DuPont Advisory Committee on Agriculture Innovation and Productivity: The Role of Technology in Agriculture (2012) - <http://foodsecurity.dupont.com/wp-content/uploads/2012/07/DuPont-Agriculture-Committee-The-Role-of-Technology-in-Agriculture.pdf>
- The United Nations Sustainable Development Knowledge Platform (based on Rio+20 Conference 2012): Documents - <https://sustainabledevelopment.un.org/index.php?menu=902>
- G8: Statement on Food Security from Summit in Hokkaido Toyako - <http://www.fanrpan.org/documents/d00559/>