

Food Security: Challenges for a sustainable world

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Introduction

On June 12, 2012, the Food Security session was held during the Forum on Science, Technology and Innovation for Sustainable Development at the Pontifical Catholic University of Rio de Janeiro, with co-conveners Prof. Thomas Rosswall, Chair, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), and Dr. Lindiwe MajeleSibanda, CEO, Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), South Africa.

The invited speakers composing the session were Prof. Tim Benton, Champion, UK Global Food Security (GFDS) programme, Institute of Integrative and Comparative Biology, University of Leeds, UK; Prof. Ram Bandan Singh, Indian Academy of Agricultural Sciences; Prof. Adrian Fernández Bremauntz, Advisor on Sustainability to the Dean of the Metropolitan University, Mexico City and Prof. Ruvimbo Mabeza-Chimedza, Department of Agricultural Economics and Extension, Zimbabwe.

Prof. Thomas Rosswall started the session giving some points of departure for the discussion. According to him, agriculture is fundamental for economic growth. It is the single largest employer providing livelihood for about 40% of the world's population. We need to increase food production at least 70% until 2050, and this cannot be done without engaging agriculture in a sustainable way. Rosswall also claimed that agriculture is very important for poverty reduction, holding a responsibility bigger than any other sector.

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Agriculture is seen as a problem source for climate change, biodiversity conservation at the same time that enhances desertification. However, it can also bring solutions, and the Food Security session intends to discuss some of them.

During the session the panelist addressed the theme in different manners lecturing about challenges faced today and solutions that have been developed all over the world. The effects of climate change and population growth were also largely discussed, as well as the role that science and policy have to play in the development of strategies to confront food and nutritional insecurity. Speakers talked about environmental problems like biodiversity loss, water crises and desertification and solutions brought by technology such as genetic engineering.

After a round of questions answered by the panelist, the co-conveners Prof. Rosswall and Dr. Majele Sibanda made the final strategic recommendation from the panel and closed the session.

Presentations Given During the Food Security Session

Prof. Tim Benton opened the presentations talking about agriculture as the biggest industry in the world and the great engine of development. However, agriculture is based on a paradox like an engine that creates its own fuel, and brings several problems.

Agriculture is practiced all over the world covering most of the Earth surface. As population grows, the area for food production per capita diminishes. Therefore, agriculture yield needs to grow at the same rhythm, and that growth rate can only be achieved by intensification.

Intensification or increasing outputs per unit area does not necessarily mean industrial farming; it generally means finding ways to increase production without effecting the environment, which points to sustainability. The problem is that modern agricultural production methods are not sustainable because they have hidden inputs.

As described by Prof. Benton, studies are now being developed in order to attribute economic value to environmental services and natural goods. Ecology is being faced as a key element to scientific research, since we cannot carry on affecting nature the way we have been without harming the things we most depend on.

Understanding and valuing the environment for what it gives us is very important. Our agricultural footprint is huge, causing several environmental impacts. 75% of the gains in agricultural land come with the price of deforestation, low air quality, water degradation and loss of biodiversity.

Increasingly, we are recognizing that in order for agriculture to be sustained in the long-term, production methods cannot continue to use resources and erode natural capital at the current rate – despite the need for food.

The problem lies in the fact that sustainability cannot be easily measured, and sustainable actions might solve a local problem at the same time that it creates a global one. Therefore, we must establish a global vision to deal with the challenge of making yields grow while ecosystem services stay the same or, making ecosystem services grow while yields stay the same.

According to Prof. Benton solutions starts by integrating ecologist and environmental scientists into the productive industry, ensuring both sustainability and intensification.

Although we can control or measure the impacts of agriculture, we know it needs drastic changes, such as managing impacts and ensuring landscape management at landscape scale. It is imperative that we guarantee preserved unit areas to supply the ecological services that agriculture destroys and depends on.

Prof. Benton then discussed the sustainable intensification concept (increasing productivity, minimizing environmental impacts and enhancing ecosystems services). He emphasized that it is a journey, a learning process. Intensification is not only about technology and industrialization: it is about increasing inputs and yield per unit area. And that might mean increasing labor or chemical and mechanical inputs.

Prof. Benton then concluded his presentation by suggesting some action items. The relationship established (again emphasizing the ecological balance and functionality) in the search for sustainability can be translated into a profitable relationship in which the maintenance of land units for production, the efficient use of various resources and the valuation of ecological services (based on the protection of water sources and forests, for example) are seen as interesting solutions. However, these actions require a strong

governance effort involving different scales of government (whether local, regional or national).

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Prof. Mabeza-Chimedza focused her presentation on how Africa has been facing food security challenges with a regional view that informs different arrangements under the framework of the African Union, the common African Agricultural Development Program. This framework was adopted by all member states. It is not a program in terms of activities on the ground but it is a framework for Africa and its efforts to achieve food security.

The major causes of the lack of sustainable agriculture in Africa are related to climatic conditions. In the recent past they suffered frequent droughts, deregulated rain pattern and human-made natural resources degradation.

Prof. Mabeza-Chimedza also presented some data stating that 30% of the population in that area suffers from severe hunger; 80% of the population lives in rural areas; 65% of the total labor force is in agriculture; 65% of Africa's agricultural land is degraded; 31% of pastureland and 19% of woodlands are classified as degraded; Women contribute with over 75% of household food production, with 90% or more of the post-harvest management and almost 100% in some countries of the food processing.

Some of Africa's countries have the highest numbers of civil conflicts and wars. The conflicts in Somalia, Sudan, Ethiopia and Uganda have destroyed livelihood activities and caused a negative impact on food security and agriculture development.

The low productivity in Africa is due to insufficient technological innovation, which is a very serious challenge that African state members are trying to address collectively.

Bad governance contributes quite a lot to African's food insecurity. Corruption, poor or inappropriate policies or regulatory frameworks do affect availability for many vulnerable people in Africa. Poor agricultural practices which lead to environmental degradation have also contributed significantly to food insecurity. In addition, despite of

the significant role played by women in Africa's agriculture, African women do not have access or control over resources.

Despite of the given data Prof. Mazebe-Chimedza claims that a lot has been done in the continent to address the challenges of agricultural and food security. Most regional groups are trying to establish regional stock facilities in order implement reserves and prepare to respond to emergencies of food security. Most of the countries have built national and regional food stock facilities, starting from the community level.

Countries in the different parts of Africa are very diverse and a regional approach on food security has to take into account the specificity of each area. Cooperation may be common to some but not to all countries, so there is the need to form sub-groups of countries on agro-ecological basis and trade corridors.

The "Common Market for Eastern and Southern Africa – COMESA" is the largest sub region organization with 15 countries as members. There is also the Intergovernmental Authority for Development (IGAD), as the Regional Food Stock Facility; The Management of Shared Resources for water, agriculture and consumption; Trans-boundary Animal Disease Management Cooperation Program and the "Southern Africa Development Cooperation – SADC".

All those regional organizations have put together their frameworks trying to address the challenge of food security. Despite all of the efforts not much has really happened to change food insecurity in Africa.

In 2003 the heads of the state of African countries endorsed a new strategy to revamp African agriculture called Common African Agricultural Develop Program (CAADP). It has 4 priority areas, called "pillars" for intervention. However, it does not dictate to the countries what are the priorities or the path to follow; it is just a framework that facilitates national programs. The four pillars are:

- Sustainable land and water management: Address the issue of increasing area of agricultural in a sustainable manner, eliminating poor agricultural practices and management of share of resources;

- Improvement of rural infrastructure and enhanced market access: Address infrastructure for distribution;
- Increased food security and nutrition security: Address disaster risk management, safeness and the question of availability of food to vulnerable people;
- Improving agricultural research and technology dissemination and adoption: Identify regional cooperation.

There are cross cutting issues which are African gender and youth, HIV/AIDS, livestock and risk management.

Prospects and opportunities are the information sharing, harmonization of policies and programs, systematization and coordination of existing pipeline and future programs, coordination of development assistance, delineation of strategic regional investments that individual countries acting alone cannot afford and regional spill-overs and economies of scale in technology, human and policy development benefitting agricultural growth at country level.

There also challenges on implementing such initiatives as the weak capacity of Regional Economic Communities (RECs) for coordination and facilitation of regional processes, weak national institutions in terms of human resources and systems, inadequate financial resources for implementation of programs and weak private sector and civil society participation in both design and implementation of policies and programs.

The private sector has a very important role to play but one of the problems is that they do not participate.

Each African country identified the priority areas for intervention and brought them together for coordination. The benefits of a regional approach project are very clear and concludes that “despite of the shortcomings of the regional organizations, there is some enthusiasm for CAADP by African countries and many investors, because the CAADP Framework captures most of the overall challenges in achieving food security and sustainable agricultural development, this integrated, holistic and coordinates policy

approach should lead to increase resilience and sustainable agriculture and food systems.”

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Dr. R. B. Singh, third panelist of the session started his presentation discussing the present situation of hunger in the world. According to his data, despite of the increase in food production in the last years, 925 million people still suffer with hunger and food and nutritional insecurity, especially in poor developing countries of Africa and Asia. Researches show that 85% of the people who suffer with hunger are residents in these two continents.

Countries in Asia and Africa are also the most affected by the impacts of Climate change, which aggravates there situation due to the loss of arable land, desertification and water scarcity. High rates of population growth also impacts food production as the area of agricultural land per capita diminishes.

These factors also affect food prices and markets making the access to food even harder to poor people. Crops are seen as commodities and prices vary according to demand and markets trends. Maze, rice and wheat crops are among the most affected yields.

According to Dr. Singh the yield gaps that still remain can be filled by a combination of technology, market organization and production techniques that results in a considerable increase of productivity.

Taking all these factors into consideration, Dr. Singh focused his research on the development of climate resilient crops through biotechnology and genetic engineering. Species with efficient use of nitrogen and tolerant to harsh environmental and climatic conditions such as water stress, high salinity, high temperatures and pests.

For the panelist the investment and development of new technology can provide the answers we need, In addition, science policy must subsidize the confluence That Increases providing synergies between the government, the business class and the population. The main objective is to reach a 20/20/20 relation where we achieve 20% increase of production, 20% reduction of emissions and 20% reduction of poverty.

Singh acknowledges the success of Brazil's *Fome Zero* Program and gives key messages such as: Eliminate hunger; security to most vulnerable; accelerate adaptation;

invest in research and technology; enhance farmers' income; science information policy; strengthen governance; minimize trade-offs and maximize synergies.

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Dr. Adrian Bermauntz opened his participation emphasizing the importance of the proximity between science and politics. Science must learn how to transform scientific knowledge into information in order to subsidize policy makers in creating real solutions to the social and environmental problems found today.

According to Dr. Bermauntz the world is experiencing a number of emerging challenges like food insecurity, resource competition and land degradation, as well as the converging threats of population growth, climate change and unsustainable use of resources – although these challenges are not new. Now the social and economic aspects of the problem are imperative and we must succeed in the task of addressing these great challenges and threats.

Agriculture is not only starting to experience the impacts of climate change, it is a source of emissions of greenhouse gases and degradation. Therefore, interdependency is established. We will not be able to feed the world's populations if we do not change agricultural methods. Business as usual will not be enough, since the problem is not a matter of producing more food, but a matter of changing patterns of production, distribution and consumption.

Dr. Bermauntz presented the recommendation made by the Commission on Sustainable Development and Climate Change established by CCAFS with the intention of revising the scientific knowledge available today and providing policy makers with the information needed.

The first recommendation points to the need of integrating food security and sustainable agriculture into global and national policies. According to the panelist, the problem has to be discussed in different levels, not only in global forums, but between governments, taking responsibility to the national level, and break with the usual way of detaching food security issues from the mitigation and adaptation to climate change agenda.

A second recommendation goes through the rise of global investment in sustainable agriculture and food systems for the next decade. According to the researcher, it is not

just new practices or technologies, but rather the construction of a new way of thinking about politics, which incurs a reflection already highlighted by Tim Benton on the impossibility to maintain business as usual and the agricultural production model practiced today. We need to develop production methods that are resilient to climate change impacts. Therefore, it becomes quite clear that the second recommendation is closely allied to the first, since this global change of posture can only be attained with a general behavior modification. The panelist also highlights that need to direct some of the resources that are now available for these issues to scientific research.

The third recommendation points to the optimization of production: finding ways to produce more using less land and generating less impact. This idea relates directly to the idea brought by Dr. Singh of a 20/20/20 development.

Recommendation number four is the need to assist the populations and sectors that are most vulnerable to climate change and food insecurity.

A fifth recommendation is to direct modification on food access and consumption patterns currently implemented. The panelist highlights the moral obligation to rethink distribution patterns in order to reduce waste making sure that the food that is produced reaches those who are hungry. This reduction must happen not only in the developed world, but in all countries where levels of consumption and waste are high.

In addition, the CCAFS commission recommends the need to reduce loss and waste in production systems becomes as a question of sustainability, by targeting infrastructures, farming practice, processing, distribution and household habits.

Finally, according Bramauntz, there is a clear need to establish a comprehensive, shared information system that includes the human and the ecological aspects of the problem. Creating and sharing capacities. Actions depend on access to good information.

Achieve a society that takes care of all the population not just a minority, investments in agriculture, while recognizing that agriculture creates other problems in the world, more investment to better understand the interface between climate, agriculture, science, and politics.

The way forward is continuing to talk about it. We have come a long way since the United Nations Conference on Environment and Development – RIO 92, and the way

we are addressing the problem has changed. The scientific community has put great efforts into multidisciplinary research. Although we are facing a very complex issue, it is possible to find solutions by increasing research, engaging stakeholders and the private sector, and by sending strong messages to the political community.

Integrate food security and sustainable intensification of agriculture into global and national policies for green economic growth in partnership with the private sector. Ensure that food security is addressed in the context of the Rio Conventions. Reshape food access and consumption patterns to ensure basic nutritional needs are met and to foster healthy and sustainable eating patterns.

Final considerations

The lecturers called attention to a number of challenges that need to be tackled in order to achieve food security worldwide, such as climate change, loss of arable land, wars and social/cultural conflicts, population growth, loss of biodiversity, etc.

It is our understanding that Prof. Benton's view is associated with valuing food security from an ecological point of view, in which agriculture is viewed as a key element for development, since it is one of the biggest industries in the world. Professor Benton also noted that environmental damages must be taken into account during the development process of intensification models of agricultural production to ensure environmental, social and economic sustainability. In this regard, he talked about the need to include environmental scientists in the productive industry and on the specialization of production according to local expertise, however, based on a global and planned view.

According to the lecturers, the technical and scientific bases needed to feed the world's increasing population are guided by genetic improvements, using agricultural inputs of a petrochemical origin (fertilizers and pesticides and herbicides), technological mechanization and localized mono-cultural crops.

The payment of a high price in environmental and social terms in exchange for worldwide food security becomes acceptable or even natural given the current global agricultural model. This model does not lead to water sustainability and maintenance of the productive capacity of soils, maintenance of the biodiversity and insertion of the local population into the productive process.

A new Green Revolution has to break away from an environment versus food security dichotomy and should be sustained on new paradigms that seek technical, scientific and social alternatives based on premises within a greater context and configured in multiple systems that communicate and interact with each other. Prof. R. B. Singh strongly believes in a “new green revolution”, he states:

“Today we have a clearer understanding of how to monitor, control – even reverse – land and water degradation. We also have technologies that can increase yields without damaging the environment. These technologies are the key to a second Green Revolution,”

Dr. Bermauntz covered the same topic by stating that we are not going to be able to feed the world’s population if we do not change production methods. The current model will not be enough since the problem is not in increasing production yields, but in crop, distribution and consumption standards.

He recommended the need to assist populations and sectors that are most vulnerable to climate change and food insecurity. In this regard, the creation of a structure that decreases food price fluctuations, the creation of programs that aid (financially or otherwise) these populations and the creation of a framework designed to coordinate activities, policies and programs of donors become basic actions to continuously promote the minimal security of those groups in need. Therefore, it is important to note that this framework will require continuous inspection so that it does not turn into political maneuvers with the goal of obtaining resources that will be used for different ends.

From a critical constructive perspective of the drafters of this review, we consider that one topic was not properly treated by the participants of the Food Security session: taking into account that within the next few years more than 50% of the world’s population will be living in cities and that cities are huge producers of organic material, we must develop efficient peri-urban production models based on organic cultivation practices, small and micro properties with extensive labor use. A Wrong word, but I don’t understand what you mean. model requires that new logistical mechanisms be

implemented based on spatial managerial elements supported by geo-technologies, designed to increase yields and ensure continuous food supply. We suggest some research topics that could contribute for the development of a production model that integrates the interior with the city:

- Increase the development of methodologies to reuse the vast production of organic material in the big cities, directing it for the production of organic fertilizers.
- Increase the development of cultivation methodologies based on the intensive use of organic material, diversity of cultures and extensive use of labor according to the phytogeographic conditions of each location and region.
- Increase the development of spatial managerial methodologies based on Remote Sensing data within a computational context that allow new supply and distribution logics of the peri-urban production.
- Stimulate the development of research methodologies aimed at understanding the potential of the biodiversity and of the local microclimates from a deeper appreciation of the traditional knowledge of the local population.
- Stimulate the development of methodologies aimed at expanding the capacity of the cooperative organization at both urban and rural associations

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