Research Report

Special Conference II: Development and Sustainability

Promoting sustainable agriculture in order to support food security

MUNISH '14

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Forum	Special Conference 2: Development and Sustainability
Issue:	Promoting sustainable agriculture in order to support food security
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Introduction

Food is an integral part of every human's life and it is a human right to have access to sufficient quantities of food with enough nutritional balance to remain healthy. However, the population of the world is increasing exponentially and so it is becoming increasingly difficult to feed every person with the finite resources available.

The need to ensure that we use what is available to us is becoming ever more pressing; already, hunger is present in the world and this is inevitably going to worsen unless action is taken. In order to avert this it is necessary to turn to sustainable agricultural techniques that not only produce the necessary food, but also may be continued indefinitely; they must be able to be carried out without leading to anthropological climate change and must not be dependent on resources that may not be replenished.

The Millennium Development Goals include the eradication of both poverty and hunger, and this is intended to be completed by 2015. While it is not only food supply that challenges food security, turning to sustainable agriculture will serve to lower food prices and thus reduce the economic barrier to food faced by many in less economically developed countries.

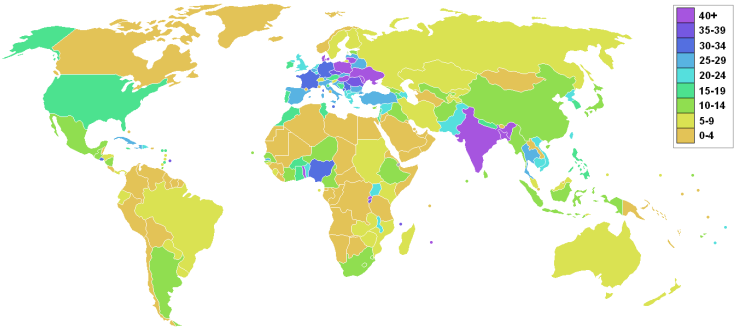
However, there are reservations towards certain advancements that may lead to increased agricultural sustainability. The organic foods movement, that begun in the early 1990s, advocates the exclusion of herbicides, pesticides and other chemicals that are used in order to bolster crop yields due to beliefs that naturally grown foods are more nutritious and that the alternative could have adverse effects upon health. Additionally, while genetically modified organisms have been praised by many for their ability to substantiate crop yields significantly, there are those who feel that they may lead to unforeseen health problems and that it can disturb ecosystems.

There is a requirement to turn to modern sustainable techniques but with all of them, there are a variety of benefits but these but be considered against factors such as cost, availability and their individual, ethical implications.

Definition of Key Terms

Arable Land

Land that is used in order to cultivate crops; it is therefore able to contribute to an increasing crop yield which is an important factor in ensuring food security hence being important to maximise the amount of arable land; this can been done through means such as desalinization, seen in Israel, and carbon farming, seen in Australia. Additionally, it is important to protect arable land from desertification, which in cases can be the result of irresponsible farming practices.



Percentage Arable Land Map
"Percentage Arable Land Map." Map. *Wikipedia.org* 05 07 14 Web. 25 07 14. < http://en.wikipedia.org/wiki/Arable_land>.

Desertification

Desertification is degradation of land quality and as a consequence it becomes agriculturally barren. While, in instances it may be attributed to natural climate change, it may be accelerated on account of anthropological climate change and disruption of ecosystems. Most often, this is due to the removal of vegetation, which leads to various consequences. Firstly, as nutrients in soil are often sourced from the decomposition of biomass, when vegetation is removed the soil soon deteriorates and lowers in nutrient density; additionally, the presence of plants acts as a barrier from erosion and so when they are removed soil is easily moved by floods or wind.

Famine

The epitome of food insecurity can be viewed as famine. This is the extreme scarcity of food for prolonged periods of time often leading to significant instances of death due to food deprivation. During times of famine there is commonly an inability for food

supplies to meet the demands and so causes may be due to increased demands, through means such as rapid population growth, or due to lack of food supply, caused by natural disaster or large scale crop failure. It is worth noting that not all instances of famine are derived from food shortage and instead can be linked with failures of food distribution, as was the case during the 1974 Bangladesh Famine.

Food Security

Food Security is the ability for any person to have access to adequate food supplies in order to sufficiently nourished and healthy. This is dependent on both the physical availability of food, and it is therefore important to ensure global food supplies are high, but also the economic barrier that in cases may prevent people being able to buy food. The UN Food and Agriculture Organisation (FAO) acknowledge four pillars of food security: availability, access, utilisation and stability. Furthermore, the FAO also conceived The Integrated Food Security Phase Classification (IPC) which serves to show instances of food insecurity and their severity; this may be used alongside other indicators such as the Household Hunger Scale (HSS) in order to determine problematic regions.

IPC Phase Classification	Indicators
Generally food secure	- Crude Mortality Rate - Malnutrition prevalence - Food Access/ Availability - Dietary Diversity - Water Access/Availability - Coping strategies - Livelihood Assets
Chronically food insecure	
Acute food and livelihood crisis	
Humanitarian emergency	
Famine / humanitarian catastrophe	

IPC Phase Classification
"IPC Phase Classification." Table.*FAO.org* 2007. Web. 21 07 14. < http://www.fao.org/docrep/013/al936e/al936e00.pdf >.

Genetically Modified Organisms (GMO)

It is possible to genetically alter an organism, such as a food producing crop, in order to grant them favourable characteristics; these are called Genetically Modified Organisms. While there are people who oppose the use of this technology, it can serve to allow greater yields of crop or, with certain alterations, allow the cultivation of crops in conditions usually impossible such as heavily waterlogged fields.

Intensive Farming

In order to maximise the efficiency of their land, agricultural workers may make use of intensive farming techniques that are designed in order to ensure large output from the land; it requires heavy labour and large inputs of capital in forms such as fertilisers or technology. While these large inputs act as a barrier in less developed regions, it may be necessary to turn to intensive farming methods in order to ensure

that food demands may be met. Additionally, some groups or individuals may have an aversion to intensive farming, particularly when the ethical implications relating to the treatment of livestock are taken into account.

Malnourishment

Malnourishment is when an individual fails to receive the proper intake of nutrients in their diet and, as a consequence, they may develop a range of nutrient disorders. It may be subcategorised into two different types: protein energy malnutrition, and micronutrient malnutrition. The former is often considered more severe and is associated with a lack of access to food while the latter is linked with poor dietary variation as a consequence of restricted access or a lack of education relating to dietary requirements.

Sustainable Agriculture

Sustainable agriculture is that which is able to produce plant and animal products perpetually whilst not adversely contributing towards the surrounding environment. The term was coined by Gordon McClymont and entails the ability to match the human requirements from the produce, economic viability, and not deteriorating the environmental balance by means such as, large carbon emissions or consumption of non-renewable resources. Within this term is large variety as it can range from practices such as crop rotation and no-till farming, to the theoretical implementation of large scale vertical farms.

General Overview

Maximising agricultural output

A large component of sustainable agriculture is that not only is it sustainable in that it is environmentally sound and does not consume significant quantities of non-renewable natural resources, but also that it is able to support a population and therefore it is vital to maximise agricultural output.

Ensuring sufficient arable land

For agriculture to remain sustainable there has to be sufficient areas to grow crops on and raise livestock. It is therefore important that in areas where deemed viable, land may be reclaimed through methods similar to those in Israel, although this does

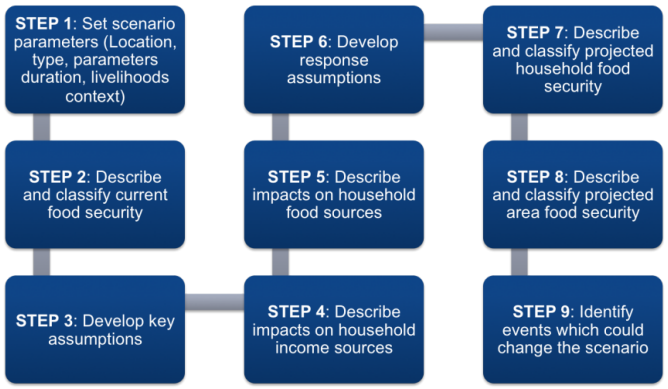
consume energy. However, more important is to protect currently arable land from desertification. Therefore, factors such as improper land use should be addressed. Additionally, in instances land use may be very inefficient; land planning may be poor or the nature of the agriculture may use large amount of land for small output, such as the raising of animals, which require large grazing grounds.

Production of crops for other purposes

The rise of biofuels has resulted in many farmers changing from producing food crops to ones such as rapeseed plants due to these being more profitable. The result of this is that contribution to world food supplies has decreased and been moved into energy. While this may be beneficial as a replacement for fossil fuels, it is important to remain aware of the fact that this affects food crop production. Furthermore, there are other uses that individuals criticise, most notably the feeding of agricultural output to livestock. This results in human food being derived from higher trophic levels and is therefore less efficient; this may act as an incentive for low meat or vegan diets.

Anticipating food insecurity

In order to increase the efficiency with which food insecurity is dealt with, there are manners in which it may be predicted. The most widely used is the Famine Early Warning looks at a regions susceptibility of famine through its vulnerability to certain changes. These are important in taking a proactive response to food insecurity, as reactionary responses will tend to be less effective.



Scenario Development Methology
"FEWS NET's Scenario Development Methodology." Illustration. *FEWS.net* Web. 21 07 14. < http://www.fews.net/our-work/our-work/scenario-development>.

Food Utilisation

Food utilisation encompasses a wide variety of ideas such as the application of nutritional balance however it also takes into account the techniques used to store, process and transport food. Every year, approximately one third of food intended for human consumption is lost due to spoilage and waste; this is not sustainable. It is therefore important that agriculture minimises the vulnerability of food affected by issues such as the E. coli breakout, primarily affecting Germany. Authorities such as the International Food Safety Authorities Network (INFOSAN) serve to promote proper management of food so as to minimise the risks associated with it which is an imperative as spoilage of any food results in less consumption.

Factors barring agricultural workers from sustainable practice

An issue faced in terms of this issue is that sustainable methods of agriculture are not the most profitable to the farmers that are expected to implement these technologies and practices. While they may be beneficial over a larger timescale, often they do not have the required funds to invest in various capitals or need to overwork their lands in order to make the money needed in the immediate future. Therefore, actions penalising workers who do not act in a sustainable manner may result in the destruction of their livelihood and could be detrimental to the overall effort. Furthermore, many do not understand the nature of sustainable agriculture and how they can benefit and so, as with many issues, education could serve an important role in promoting sustainable agriculture.

The importance of water

Water is an integral part to many agricultural systems and so in areas where precipitation does not meet the requirements of a farm, irrigation technologies are often a necessity. However, in order for an irrigation system to be sustainable, there needs to be a suitable source for this water that is not diminished faster than the rate of replenishment. While advancements in irrigation technology like drip water irrigation reduce the amount of water needed, there is still a need to provide a sustainable source of water for agriculture, particularly when there are instances of drought.

Risks of inadequate food security

Public health

The issue of food security is one that is intuitively linked to public health. The lack of it can give rise to malnourishment which can, in instances, lead to death due to food deprivation. Every year malnourishment has the deaths of approximately six million a children attributed to it annually and hunger affects 32.5% of children in developing nations which leads to the inhibition of growth at the time where it is most important. While the issue of public health in relation to food security is most prominent in under developed regions, such as Sub-Saharan Africa, it is by no means confined within these bounds; in Europe it is estimated that 33 million individuals are at risk of malnourishment.

Stunted socioeconomic development

These issues have negative implications on the development of undeveloped regions. Any problems with health impede workers from carrying out their jobs which results in

difficulties for countries to escape poverty. Additionally, hunger has been a major contributor to civil conflict as was the case in the Arab Spring and this not only further instigates food insecurity, but leads to a plethora of other socioeconomic issues.

Major Parties Involved and Their Views

Bangladesh

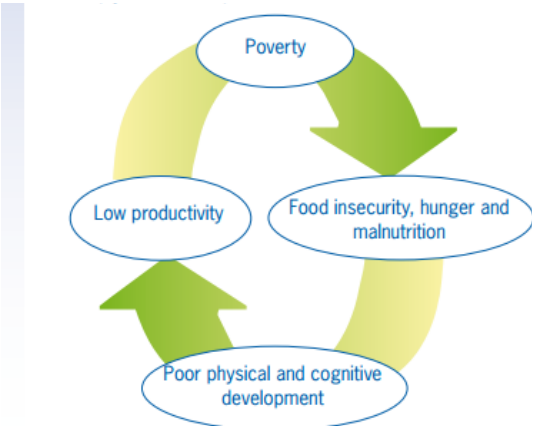
In 1974 Bangladesh was subject to a famine due to the flooding of the Brahmaputra River and resulted in an estimated 1 million deaths. Outside of starvation, there were deaths as a result of diseases such as cholera to which people were more susceptible due to the famine. The famine catalysed recognition of famine as a serious issue in the modern world, and that measure needed to be taken to ensure food security; this culminated in the World Food Conference later that year.

Brazil

In Brazil there is wide scale practicing of slash and burn farming which involves the removal of woodlands in order to make space for farming land. This has been deemed an unsustainable practice as, not only does the destruction of forest adversely affect biodiversity and release carbon into the atmosphere, the land quickly becomes infertile. This is an example of pressures to meet short term crop demands serves to compromise agricultural sustainability in the long term.

United Nations Development Project (UNDP)

As shown in figure 4, a lack of development is a major contributor to food insecurity and creates a situation in which the situation exacerbates itself. Therefore, the United Nations Development Project, founded in 1965, which acts to improve global development levels, has an investment in the issue. In order to tackle the issue of food security, it is important to provide support to rural areas in order so that they may become more agriculturally active as this will act as an important catalyst for further development.



Food Insecurity and Development
"Food insecurity, malnutrition and poverty are deeply interrelated phenomena." Illustration. *FAO.org*. 2008. Web. 21 07 14 <http://www.fao.org/docrep/013/al936e/al936e00.pdf>.

United Nations Food and Agriculture Organisation (FAO)

The United Nations Food and Agriculture Organisation is arguably the most relevant organisation to the issue of promoting sustainable agriculture in order to support food security. Set up in 1945 following World War II, the FAO consists of seven departments which may be looked at in order to gauge how best the FAO may be involved.

International Fund for Agricultural Development (IFAD)

Created in 1977, the International Fund for Agricultural Development concerns itself with the development of agriculture in poor rural locations; this is achieved through the utilisation of low interest loans that allow farmers to safely begin agricultural practice. The importance of developing agriculture in rural areas can be viewed as twofold; it provides a source of income to improve standard of living and allow the economic capabilities to purchase food, and it also serves to bolster world food supplies in order to ensure that the supply is able to surpass the demand.

Israel

In Israel, only 20% of the land is naturally arable however this has done little to prevent agriculture in Israel from flourishing; many dub it the nation that made the desert bloom. This is on account of the vast areas of land that Israel has been successful in making agriculturally productive through desalinisation technologies and use of drip water irrigation. Israel remains a prominent figure relating to the development of agricultural technologies that could be used in order to promote sustainable practices. However, the process of desalinisation can be criticised for the large quantities of energy it consumes and it is therefore important to ensure this energy is sourced sustainably if this is to be promoted.

World Food Programme (WFP)

Founded in 1961, the World Food Programme is a UN organisation involved in providing aid in order to reduce world hunger and support food security. Of their four objectives, the second directly addresses food security and states that they shall ‘Support food security and nutrition and (re)build livelihoods in fragile settings and following emergencies,’ and so they have bases in many countries that have issues with food. Additionally, the WFP is one of the major contributors towards to Zero Hunger Challenge and so supports improvements to sustainable agriculture in order to achieve food security.

World Health Organisation (WHO)

The World Health Organisation is a UN Organisation created in order to combat worldwide health issues and one of those targeted is malnourishment. The World Health Organisation has endorsed the treatment of malnutrition through Ready to Use Therapeutic Food (RUFT) which is used in order to combat acute malnourishment. However, responses like these are reactionary and are therefore unsustainable as a long term solution; it should be used for palliative reasons while other solutions are put in place.

Zambia

Zambia is a country, alongside many other underdeveloped African nations, that has suffered acutely due to a lack of food security. According to a World Food Programme publication, 47.4% of the population is undernourished and this places it as the most undernourished country in the world. This stems from an unfortunate combination of factors such as drought, floods and cattle disease which serve to inhibit the agricultural capabilities of Zambia. As a result, Zambia, alongside similarly afflicted nations, would greatly benefit from improvements to food security.

Timeline of Events

As shown below, famine and food insecurity are by no means issues only relevant today. Famine has existed even before the first mentioned event and can lead to significant change, as seen by the fall of the Roman Empire. Furthermore, it has the potential to be a problem encountered well into the future, as exponential population growth will lead to significant pressure on agricultural systems to support the demand. Particularly after the Bengali famine, international action has been taken and ideally should continue to.

Date	Description of event
400-800 AD	Wide scale famine across western Europe leads to significant population drops and has been connected with the Fall of the Roman Empire
1845-1852	The Great Irish Famine or Irish Potato Famine leads to the death approximately one million due to dependency on the potato
March 1974	Bangladesh Famine of 1974 begins and lasts for approximately seven months
November 5th – 16th 1974	World Food Conference begins in Rome
November 13th – 17th	1996 World Summit on Food Security

1996	
September 8th 2000	Millennium Development Goals established and include the eradication of hunger
December 14th 2010	First global meeting of the International Food Safety Authorities Network (INFOSAN) in Abu Dhabi
May 2 2011	European E. coli breakout leads the deaths of 53 due to contamination of food
March 28th 2012	United Nations General Assembly adopts resolution declaring the year 2014 will be The International Year of Family Farming
2025	World population forecast to reach 8 billion

UN involvement, Relevant Resolutions, Treaties and Events

There are a great number of resolutions addressing issues associated with food security and promoting improvements to agriculture and those below make up a small number of them. Internationally, it has been recognised that everyone is entitled to food and this is seen in the International Covenant on Economic, Social and Cultural Rights (ICESCR) and is reaffirmed by the General Assembly resolution on Right to Food.

- International Covenant on Economic, Social and Cultural Rights, 16 December 1966
- Food and sustainable agricultural development, 3 February 1997 **(A/RES/51/171)**
- Food Safety, 20 May 2000 **(WHA53.15)**
- International Treaty on Plant Genetic Resources for Food and Agriculture, 3 November 2001
- Agriculture Development and Food Security **(A/RES/651/178)**
- The Right to Food, 21 December 2010 **(A/RES/65/220)**
- Agricultural Technology for Development, 20 December 2013 **(A/RES/68/209)**
- Implementation of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, 20 December 2013 **(A/RES/68/213)**

Evaluation of Previous Attempts to Resolve the Issue

In order to tackle the issue of food security, there has been widespread improvement and creation of legislature pertaining to food production and handling. This has served to ensure that production is optimized and waste is minimized, and the results have been encouraging. Since having become a more pressing issue in the 1990s, gross worldwide food production has increased by approximately 40 percent. However, there are concerns that this is not substantial enough to keep up with the demand being generated by a rapidly increasing population. Additionally, critics also question the extent to which this can be attributed to a shift towards more sustainable agricultural techniques.

There have also been schemes in which teams have been sent out to various communities within LEDCs in order to educate and introduce various sustainable practices. These have invariably improved the situation for those effected as this creates a more reliable and substantial income for the farmers. This provides multifaceted benefits as improvements to the quality of life serve to create more positive change. Yet this action is focused on small groups and is not of a scale necessary to create the change being demanded.

Finally, solutions found within certain technologies have been considered to have had limited success. For instance, the methods of land reclamation used by the Israelis, while effective in increasing available arable land, requires large amounts of energy and has therefore been viewed by some as undermining its ultimate purpose. As well as this, Biofuel has become increasingly popular despite concerns about the implications of using agriculture for energy as opposed to food.

Possible Solutions

The best approaches to tackling the issue will be able to use a variety of cohesive methods in order to pragmatically address the various barriers being faced. Firstly, there is a need to ensure that strategies are taken in order to maximise the efficiency of food production. This could be done through a large number of means.

As always, education is core to this issue, agricultural workers need to understand how to make their work more sustainable and the benefits of it. If they are simply given the tools without any incentive to use them, there is a significant possibility that they will continue as they had done before the issue.

It is important to look at means that the agricultural sector can be made more efficient through means such as the implementation of relevant technologies. How these are funded and most effective is dependent on the strategy taken. There is little use in improving irrigation systems in areas where there are ample volumes of precipitation and so one must consider the areas they are dealing with and how the climate may affect the agricultural work.

Additionally, the sustainability of agriculture does not stop at the production of food. The transportation of food and its utilisation are intrinsic to promoting sustainability. Therefore, promoting initiatives that endorse eating locally and seasonally may be able to reduce carbon emissions from freight.

Finally another aspect to consider is the balance between global scale action and the involvement in small rural areas. While taking action in these remote villages may be more difficult, it is vital as this is where a large amount of agriculture is focused

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Appendix or Appendices

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II. "Feeding Nine Billion Video 1: Introducing Solutions to the Global Food Crisis by Dr. Evan Fraser." *YouTube*. YouTube, n.d. Web. 26 May 2014. https://www.youtube.com/watch?v=raSHAqV8K9c